A USER STUDY OF CHEMICAL INDUSTRY LIBRARIES IN MAHARASHTRA

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Submitted By

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December 2015

D E C L A R A T I O N

I hereby declare that the thesis entitled "**A User Study of Chemical Industry Libraries in Maharashtra** " completed and written by me has not previously formed the basis for the award of any degree or other similar title upon me of this or any other university or examining body

Place: Pune

Date: 08 Dec 2015

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Research Student

C E R T I F I C A T E

This is certify that the thesis entitled "**A User Study of Chemical Industry Libraries in Maharashtra**" which is being submitted here with for the award of the Degree of Vidhyavachaspati (Ph.D.) in Libraryand Information Science Faculty of Moral and Social Sciences Tilak Maharashtra Vidyapeeth, Pune is the result of original research workcompleted by **Mrs. Anita Vijay Patil** under my supervision andguidance. To the best of my knowledge and belief the work incorporated inthis thesis has not formed the basis for the award of any degree or similartitle of this or any other university or examining body upon her.

Place: Pune

Date: 08 Dec 2015

Dr. N B Dahibhate

Research Guide

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Executive Summary

Libraries and information centers always played an important role in all types of libraries. In special library system the role of library and librarian is crucial and supporting to education and research. Libraries are treated as store house of information and prime role is dissemination of information to users by organizing different services. Since recent past industrial libraries are growing fast as research activities are increasing and need libraries to hold the essential collection. A separate entity is derived from the category of special libraries and now called as industrial libraries, corporate libraries, and chemical industry libraries too.

The chemical industry develops new products and manufacture variety of products for human lives. Many of the products from the chemical industry, such as detergents, soaps and perfumes, are purchased directly by the consumers, 70% of chemicals manufactured are used to make products by other industries including other branches of the chemical industry. The chemical industry sector has witnessed growth nearly about 13-14% in the last five years.

Chemical industries are growing fast and treated as core area in national development. Industries are now engaged in research and development activities along with production, R and D and new innovative concept development is taking lead and these industries now need libraries and information centers to support their needs. It is also observed that large scale, multinational, medium scale industries along with production of compounds are developing new drugs, chemicals and also establish monopoly by way of obtaining patents. These activities need information support and well managed libraries. Industrial sector is prime developing area and need support of information to enhance its national contribution.

The researcher is working in chemical industry library and managing information support for its users. A cursory review of literature noticed that large scale industries having R and D are having their own libraries. The researcher tempted to assess the status of chemical industry libraries and suggest means to improve its collection development, library services more economically by developing network of industrial libraries. Researcher has faced many problems and challenges in satisfying user needs as they are unique to every researcher and depends on project in hand.

Researcher keeping in mind the situation of chemical industry libraries decided to study and review the progress of libraries in this zone and suggest best means to improve the status of libraries in zone by using ICT. The study is mainly based on chemical industry libraries from Mumbai and Pune cities as majority of chemical industry libraries are available in this zone. The survey of libraries identified many weakness and researcher tried to suggest few ideas to improve the status of industrial libraries.

The role of library in any field is changing and developing fast. The impetus for change must come from the librarian rather than the employer, whose views of change may be rather narrow and also realistic to library profession. Increasingly the industrial library's role is close in involvements in the organization's business activities, identifying information needs and giving advice to meet those needs. This includes exploitation of external resources, acquisition of special collections and an active role in the development of the "corporate memory" and integrated information systems. The role of the library within its own organization is reviewed, and is placed within the information network.

Library and information support is required in corporate and industries to have proper and pinpointed information to the users as well as fulfill the mission and vision of the industry. The user's expectations and needs are varied and needs interactions with the users for getting their wants. It is necessary to know the requirements of the users form this area to provide them proper services. Thus to satisfy users and provide user based library and information services there is need to understand the users and hence to undertake user studies from the chemical industries which is flourishing industry presently and review the needs and demands of chemical industry users to analyze, how far they are met the needs from the libraries of parent organization, and how to solve the problems faced by them in getting information in nutshell.

The aim and purpose of the present study is to collect the data pertaining to corporate libraries especially chemical industry libraries in Maharashtra in order to provide a statistical profile of these special type of libraries. The data collected from different libraries indicate the status of chemical industry libraries and discover the challenges and solutions to improve the library and information system in the chemical libraries.

Industries and Enterprises today need insights into markets, customers and their own internal processes, faster than their competitors to capitalize on opportunities and to deliver sustainable business performance. To perform businesses well, chemist need to go beyond the customary approaches to data and its management. For quick decisions, chemist must learn to cope up with the high volume and velocity of real-time structured and unstructured data in different formats. Leading industry analysts have suggested that those who practice this may outperform competition by 20% in every financial metric.

The main reason to undertake this study for the research purpose is that, such analytical studies based in chemical industry users are not yet visible to researcher after performing a literature search on the topic. On the other hand chemical industries are growing and have R and D and IPR units in large scale and multinational industries and they need KRC hence there is a need to conduct such studies which is not considered and analyze the status of working and practicing in industrial libraries. It is also noticed that the demands of users form chemical industries are very specific but varied as per the need of the users. The Growth in the information sector is also exorbitant and keeping track with rising information explosion is very difficult to manage. Unless user needs are analyzed and evaluated the requirements of the research community is very difficult. Hence studies which analyses user needs, analyze the information sources available in the field might add the values in area of chemical industries.

The statement of the topic is "A User Study of Chemical Industry Libraries in Maharashtra", in which efforts are taken to evaluate the user needs from the chemical industry sector and also framed out the solutions to enhance the chemical industry libraries based on the inputs received from the user's and librarians survey. The main aim of the study is to conduct a survey of the prominent chemical industry libraries and users of chemical industry libraries in and around Maharashtra, to analyze the expectations, needs and based on data collected enhance the status of chemical industry libraries to provide better information services using advanced practices in the profession.

The objectives have been considered for this research study are: study the need, growth and development of Chemical Industry, study the information needs of the

chemical industry users, study the expectations of industrial and research users from chemical industry libraries, identify the different information resources used and needed by the users, identify and list information resources available in both print and electronic media and develop a model for networking chemical industry libraries in a city and state. The hypotheses selected are: there is a need to develop proper library system for chemical industries, and Networking of libraries may help in sharing the resources among group of chemical industry libraries. Research methods used are: Descriptive research (survey method), secondary analysis method. The population and sample is discussed in this facet. Scope of the study is restricted to chemical industries in Maharashtra having libraries and information system.

This research study is presented in eight chapters. **Chapter 1:** Introduction: Covers the introductory and basic part covering importance, growth and development of chemical industries, requirements of researchers, role of industrial libraries, and need of the research study, reason to select the study with aim, objectives research method used and tools used for the data collection. **Chapter 2:** Literature Review: This chapter analyzes the published and available literature associated with the research study but felt useful to the researcher. The literature gathered from the different information resources is collected, analyzed, synthesized and used in the structure of the study where justification is required or to append as a base to the opinions derived after the detailed investigations by the researchers. The facets considered under the literature review are use and user studies, Information seeking behavior of users, chemical industry libraries and their user needs, expectations of chemical industry users, collection of industrial libraries, and trends in industrial libraries etc. **Chapter 3:** Importance of Chemical Industries: This chapter covers the growth and development of chemical industries in detail. The chapter focuses on global, national and regional development from countries like USA, UK, and India in brief. Maharashtra zone is also specifically discussed and tracked the growth in this zone.

Chapter 4: Need of User Studies: This chapter is highlighting the need of the user, use and ISB studies and their importance. These studies are mainly conducted to assess the user needs in specific areas. **Chapter 5**: Information Sources in Chemical Industries: This chapter discusses in detail the different information resources used by users and available in different forms for the research or process development purpose as well as filling patents which provide the information required to users. This chapter

also focuses in detail the available information resources and lists them for the best usage of them while performing the research. This also includes paid and free resources in print and digital media. **Chapter 6:** Libraries in Chemical Industries and Role of Librarians: This chapter highlights the issues related to manpower i.e. professionals working in industry libraries and acting as an information provider. **Chapter 7:** Data Analysis: This chapter analyses the data collected from librarians and users and presented in tabular form with observations. This is the supportive chapter to understand the status of libraries and user expectation from industry libraries. Based on the observations findings and suggestions are narrated. **Chapter 8:** Findings, Suggestions and Conclusion: This chapter is summarizes with listing of findings and based on them viable suggestions are listed and concluded the study with identifying scope for the future research. Bibliography and appendices are at the end of the study.

Prominent findings of the study are:

1. Chemical industry libraries sometimes also called as industrial libraries, corporate libraries, chemical R and D libraries etc. Libraries are found in large chemical industries and multinational industries where research element is more powerful along with product and process development. In small scale industries products are only manufactured and main activity is marketing, hence libraries are not associated with them.

2. Industrial librarianship is flourishing due to need of information in every sector like engineering, software, electronics, chemical and pharmaceuticals etc. Library Science syllabus has also included industrial librarianship as a subject to develop industrial librarians with special skills.

3. The users need specific information related to their product, process, new developments, market strategies, future needs in the field etc. For this purpose there is no single source available but the librarian has to consult many references and databases.

4. The collection of library consist of mainly journals, reference books, chemical guide books and internet as well as free and subscribed databases like SciFinder, Scopus, DERWENT patent databases etc. The resources required

by the users are not common and hence collection is limited and developed on demand basis.

5. The users consult to reference books, journals, technical reports, patents, standards, thesis, etc. either in print or e-form.

6. Librarians need advanced skills to manage chemical industry libraries. The management of library is simple but assisting needs of chemist are complex. There is no network of industrial libraries to provide more information support.

7. The main users of the chemical industries are researchers, R and D scientists or chemist, managers, senior consultants, policy makers, analysts etc. MD, CEO, V P, Managers, Chemists (senior scientists), Project chemist, and chemical engineers. All are generally involved in R and D and process or product development activity. It is observed that MD and Presidents are using the libraries very less as they are involved in development and management of company / industry and planning for the future growth and expansion. Chemists, chemical engineers, VP, refer to and make maximum use of libraries as they are really involved in R and D activities of the company. CEO rarely visits libraries. If MD and CEO's required information or data it is provided at their desktop.

8. It is observed that large-scale industries having R and D have appointed qualified librarians. It is observed that chemical industry libraries provide different information services to users for their R and D support. It is observed that 68% of libraries have the membership of other libraries such as IIT, UDCT, and CSIR Labs like NCL etc for getting information for users.

9. Users are preferring to electronic information resources like e-journals, databases and online searching of databases etc. more and hence more focus is given on procuring e-resources slowly.

Researcher has suggested best practices in the form of suggestions to improve the chemical industries.

1. There is a need to appoint qualified librarian in libraries associated with chemical industries to provide information support to develop R and D activity. Since many libraries associated to chemical industries are managed by chemist or temporary staff.

2. The collection of chemical industry library is not strong like other libraries as collection is need based & procured on demand basis. Hence the librarian need to acquire free information from the different sources available & make aware the users about new developments in their research area.

3. The collection development focused on e-publications rather than print. The information required by users many times available over the internet resources. Librarians have to find out different search engines which can provide better chemical information & inform the users like – Google, Google scholar, Scirus, Google library, Google patent, dog pile, Ask Jeeves etc.

4. Librarian need different skill sets to manage user needs which covers information literacy, searching of information from internet, specialized subject databases like chemical pharmaceuticals, drugs, marketing, safety data etc.

5. Librarians can use advance technologies and provide services based on internet, database, soil media, web tools etc. to quickly disseminate information among the group of users over the electronic mail.

6. Librarians have to demonstrate new information products available in the market which are more useful to their community by permitting trial access for few days to make them aware of the sources which covers latest information useful to them.

7. Instead of having documents in libraries, Librarians can take license to access databases useful to them on subscription base & search the bibliographic information & provide to users for review along with abstract .After consulting this the desired articles can be obtained from the neighbor libraries or clearing centers on payment.

8. Industrial librarian must be expert in searching information from various databases. Librarians have to acquire skills of database searching, online searching, internet searching, federated searching etc. These skills helps librarians in providing various types of information to their users on demand & saves money in subscribing printed resources.

9. Best practices in industrial library can be adopted to provide core library services which users are demanding hence librarians have to initiate.

10. Network model of chemical industry libraries is presented to achieve resource sharing.

The research study is suitably concluded with satisfying the objectives and the hypothesis considered are proved true and it is felt that industrial libraries need proper library system and networking of these libraries definitely help to the user's community. The objectives selected are discussed in different chapters as noted against each. 1) To study the need, growth and development of Chemical Industry (Chapter 3) 2) To study the information needs of the chemical industry users (chapter 4), 3) To study the expectations of industrial and research users from chemical industry libraries (chapter 6), 4) To identify the different information resources used and needed by the users (chapter 5, 7), 5) To identify and list information resources available in both print and electronic media (chapter 5), 6) To develop a model for networking chemical industry libraries in a city and state.(chapter 8)

This study is useful to librarian of chemical industry libraries and also for the other librarians as a model.

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List of Abbreviations

Abbreviations	Full forms
ACS	American Chemical Society
ASTM	American Society Of Testing Materials
A-V	Audio Visual
BSI	Bureau Of Indian Standards
CA	Chemical Abstracts
CAGR	Compound Annual Growth Rate
CAS	Current Awareness Service
CAS RN	Chemical Abstracts Service Registry Number
CAS No.	Chemical Abstracts Service Number
CEOs	Chief Executive Officer
CFCs	Chlorofluorocarbons
CILN	Chemical Industry Libraries Network
CIPO	Canadian Intellectual Property Office
CRC	Chemical Rubber Company
CSIR	Council Of Scientific & Industrial Research
CSO	Central Statistics Office
DIC	Documentation And Information Centers
DL	Digital Library
DOI	Digital Object Identifier
DOT	Directly Observed Treatment
DPIM	Dangerous Properties Of Industrial Materials.
EP	European Patents
EPO	European Patent Office
FDI	Foreign Direct Investment
FICCI	Federation Of Indian Chambers Of Commerce And Industry
GAIL	Gas Authority Of India Ltd.
GDP	Gross Domestic Product
GNP	Gross National Product
HPCL	Hindustan Petroleum Corporation Limited
HPL	Haldia Petrochem Ltd.

HTML	Hypertext Markup Language
IBEF	India Brand Equity Foundation
ICC	Indian Chemical Council
ICT	Information And Communications Technology
IDLH	Immediately Dangerous To Life Or Health
IIP	Index Of Industrial Production
ILL	Inter Library Loan
INPADOC	International Patent Documentation
IOCL	Indian Oil Corporation Limited
IPC	International Patent Classification
IPDL	Intellectual Property Digital Library
IPOS	Intellectual Property Office Of Singapore
IPR	Intellectual Property Rights
IRC	Information Resource Centers
ISB	Information Seeking Behavior
ISI	Indian Statistical Institute
IT	Information Technology
IUPAC	International Union Of Pure And Applied Chemistry
JNPT	Jawaharlal Nehru Port Trust
JOPAL	Journal Of Patent Associated Literature
JPO	Japanese Patent Office
KRC	Knowledge Resource Centers
LIS	Library And Information Science
LPG	Liquefied Petroleum Gas
MD	Managing Director
MMTPA	Million Metric Tonnes Per Annum
MSDS	Material Safety Data Sheets
MT	Metric Tonnes
NIC	National Informatics Centre
NISCAIR	National Institute Of Science Communication And Information Resources
NIST	National Institute For Standards And Technology's

OA	Open Access
OECD	Organization For Economic Co-Operation And Development
OPAC	Online Public Access Catalogue
PA	Per Annum
PAJ	Patent Abstracts Of Japan
PAJ	Patent Abstracts Of Japan
PCPIRs	Petroleum, Chemicals And Petrochemical Investment Regions
PCT	Patent Cooperation Treaty
PDF	Portable Document Format
R and D	Research And Development
R&D	Research & Development
RCF	Rashtriya Chemicals And Fertilizers Limited
RIL	Reliance Industries Limited
RSS	Rich Site Summary
S & T	Science And Technology
SDI	Selective Dissemination Information
SEZs	Special Economic Zones
SIPO	State Intellectual Property Office
SMS	Short Message Service
STN	Scientific And Technical Information Network
SWOT	Strengths, Weaknesses, Opportunities And Threats
TCS	Tata Consultancy Services
TOC	Table Of Contents
UK	United Kingdom
UKPO	United Kingdom Patent Office
UNESCO	United Nations Educational, Scientific And Cultural Organization
UNO	United Nations Organization
UPL	United Phosphorus Ltd
US	United States
USD	United States Dollar
USPTO	United States Patent Office

VOIP	Voice Over Internet Protocol
VP	Vice President
WIPO	World Intellectual Property Organization
WO	Prefix Of World Intellectual Property Organization
WWW	World Wide Web

CHAPTER 1

INTRODUCTION

1.1 Introduction:

The chemical industry is the business of using chemicals to turn raw materials, such as coal, oil, and salt, into a variety of products. During 19th and 20th century technological advancements in the chemical industry dramatically altered the world's economy. Chemical processes have created pesticides and fertilizers for farmers, pharmaceuticals for the health care industry, synthetic dies and fibers for the textile industry, soaps and beauty aids for the cosmetics industry, synthetic sweeteners and flavors for the food industry, plastics for the packaging industry, chemicals and celluloid for the motion picture industry, and artificial rubber for the automobile industry. Along with these industries many industrial developments in the sectors like engineering and allied industries, paper and pulp, glass and ceramics, mineral products etc. developed the GNP of the nations. Chemical business (https://en.wikipedia.org/wiki/Chemical_industry) divided chemical industries into few broad categories, like basic chemicals (about 35 to 37 % of the dollar output), life sciences (30 %), specialty chemicals (20 to 25 %) and consumer products (about 10 %).

Basic chemicals or "commodity chemicals" is a broad chemical category including polymers, bulk petrochemicals and intermediates, other derivatives and basic industrials, inorganic chemicals, and fertilizers. Typical growth rates for basic chemicals is about 0.5 to 0.7 times GDP (https://en.wikipedia.org/wiki/Chemical_industry). Chemical industry is growing fast and it is now backbone of national development. Indian chemical industry is the sixth largest in world and worth $ 3.6 trillion. It accounts for nearly one-eighth of industrial production of the country (http://www.smetimes.in/smetimes/news/top-stories/2010/Oct/29/prez-expresses-concern-over-chemical-industry62289.html).
Prospects for the Indian chemical industry is bright, considering the central role it plays in the growth of manufacturing and agriculture sector of the country. The current growth pattern of the country, is driven by agriculture, industry and services, and ensures a sustained demand for chemicals in future. India’s global competitiveness in

the chemical industry has grown and may continue to grow in the medium term due to the following reasons: (http://www.dnb.co.in/chemical/future%20outlook.asp)

- High demand and growth in the domestic and global market
- Localization of end-user industries. Some of the end-user industries are also growing rapidly and are emerging as outsourcing hubs for the global market, like textiles, pharmaceuticals.
- Low production costs in terms of labor, resources, etc.

These factors have led in increasing investments in R&D and building the skill base. Technology is also playing a significant role in empowering the chemical industry to meet future challenges. In the growth of chemical industries the role of library and information is also vital as chemist need nascent developments in their area of research or development of new product and processes.

1.2 Chemical Industries:

Chemical industry contributes significantly to improve quality of human life due to innovative practices and developing new products for the better human life. The chemical industry plays an important role in economic development of any country by developing new products and providing technical solutions to improve existing products. To improve existing products. To emphasize the importance of chemical industry and to achieve challenges, the United Nations Organization (UNO) has declared the year 2011 as "International Year of Chemistry". India is emerging as one of the focused destination for chemical industries worldwide. The Indian Chemical industry accounts approximately 7% of Indian GDP. The Chemicals sector accounts for about 14% in overall Index of Industrial Production (IIP). The chemical industry is pivotal sector in all most all countries. Generally chemical industries are grouped in to different zones and categorizes based on size and production area viz. small scale, medium scale and large scale industries. Chemical industries are grouped in to sub segments like basic chemicals, drugs and pharmaceuticals, agrochemicals, specialty chemicals, life sciences, consumers etc. Chemical Industries are leading throughout the world and contributes in nation's development.

1.3 Libraries and Information Centers to Support Chemical Industries:

It is observed that many chemical industries especially large and medium scale industries having R & D and IPR units and collaborate among the international collaborations. Libraries support R & D activities and also protecting the knowledge base for filing patents and developing test methods. In addition to basic types of libraries i.e. public, academic and special, new type of industrial libraries have been initiated in the profession. The role of industrial libraries is similar kind of special library but there is a little difference in its library system which is based on demands and needs of the user. In the changing scenario libraries are playing crucial role in any type of industries by providing different type of information to chemical industries and R&D organizations. The need of the industrial libraries felt due to collection of specified information, micro level, methods of knowledge communication, meeting the needs of the users in an economical ways etc. The Industrial libraries are attached to the software organizations, chemical and pharmaceutical business etc. and growing very fast. The proliferation of the micro subjects and the development of the information sources in industries need libraries to meet out the global competition.

Though it is fact that libraries are essential to provide R & D support and many chemical and pharmaceutical industries have established well developed libraries, but the situation is not true for all chemical industries. For getting information to industries chemist rely on clearing houses and online sources and neglect libraries. But it is noticed that in large scale multinational industries where R & D is prominent, they need libraries, but medium and small scale industries information is obtained from the resources available through information brokers. The need of the libraries is felt in chemical industries where process development, R & D activities, innovative IPR activities helps in developing new molecules, drugs, chemicals and other innovative products are given importance. Such chemical industries need constant review of nascent information and cannot leave without libraries or information centers. But the chemical industries where only production of basic chemicals is taking care of, in such industries there is no need of libraries and their plants are operating and developing the products for market purpose. Such industries generally small scale and need not

have libraries, but they can obtain the free resources or resources from the information brokers.

Libraries play a very important role in any sector including industries as these are treated as power house of information or a knowledge treasure house. Libraries are both a system for acquiring, processing, organizing, recording, cataloging information, dissemination of information and also act as service provider to support user's needs. Without libraries it would be difficult to track the growth and development of organizations and industries. The applications of ICT is introduced in libraries and due to this the role of the libraries have drastically changed from traditional to modern using different technologies. Libraries are now treated as information servers. The libraries in chemical industries are visualized only in large scale multinational industries where R & D and IPR is very strong and users need current updated information to sustain in the competitive chemical world.

1.4 Background for Developing Research Concept:

The industrial growth and development depends on the various factors and one of them is information support to the R & D. The updated information and the required information to the industrial users is an essential component to keep the developments in innovative research and competition. In any organization libraries are considered as a knowledge source for meeting day to day information requirements. Libraries and librarian are seen as resourceful professionals for getting information in different areas for difference users.

Different types of libraries have to perform their different roles for their users. Academic libraries, research libraries and special libraries serves well to the information society. Type of libraries are based on type of users and their demands. The most emerging type in special libraries is an industrial libraries where things are differently managed. Now a day's industrial libraries are growing and performing as Knowledge Resource Centers (KRC), Information Resource Centers (IRC), or sometimes it becomes Documentation and Information Centers (DIC). With changing trends, library professionals also have to play a major role by learning the new skills, for meeting user's demand which in turn fulfills organizational vision, mission and user demands. Since researcher has worked in industrial library for more than 14 years, it

is thought to select a topic of chemical libraries to study its organization which helps in reengineering chemical industry libraries and provide better services to the users.

The role of library in any field is changing and developing fast. The impetus for change must come from the librarian rather than the employer, whose views of change may be rather narrow and also not realistic to library profession. Increasingly the industrial library's role is close in involvements in organization's business activities, identifying information needs and giving advice to meet those needs. This includes exploitation of external resources, acquisition of special collections and an active role in the development of "corporate memory" and integrated information systems. The role of the library within its own organization is reviewed, and is placed within the information network.

Industrial librarian has to play different roles and requires to know information research, data collection, information tools, information analysis and selection of appropriate information to meet specific information requirements of any individual client or user. Certainly, exposure to industry is very important - background and understanding of manufacturing concepts and terminology, macroeconomics, understanding how public companies (corporate sectors) operate, etc. is very essential to library and information professionals, similarly critical aspects in knowledge of searching, methodology of various databases for picking right information to users in quite less time is the need as well as multiple file searching, federated file searching, knowledge recovery or mining tools etc. Above all, only the librarian knows/learns the new concepts, new searching techniques, new sources developed- as the world of information research is very dynamic and changing all the time. Critical thinking and ability to analyze information to match the requests that come from clients is an essential role of the professionals.

Library and information support is required in corporates and industries to provide proper and pinpointed information to users as well as fulfill the mission and vision of the industry. The user expectations and needs are varied and requires interactions among the users for getting their wants. It is necessary to know the requirements of the users and to provide them proper services. Thus to satisfy users and provide user based library and information services there is need to understand the users and hence to undertake user studies from the chemical industries which is flourishing industry

presently and review the needs and demands of chemical industry users to analyze, how far they are met with the needs from the libraries of parent organization, and how to solve the problems faced by them in getting information in nutshell. Hence the researcher has decided to undertake the study of "A User Study of Chemical Industry libraries in Maharashtra" to evaluate the status and improve upon the industrial libraries in chemical sector especially large scale multinational chemical industries.

There is a need to undertake studies in the area of chemical industries to assess the status of libraries in this zone which takes care of highly specialized chemical information user community. The researcher since working in a large scale chemical industry faced many challenges and problems while serving to the users and delivering the information. The concept developed for undertaking the study is outcome of the challenges faced while delivering information services having less collection in the libraries. The study definitely help to the users and the library professionals in this area in managing library system.

The purpose for undertaking this study is to collect the data pertaining to corporate libraries especially chemical industry libraries in Maharashtra State in order to provide a statistical profile of these special type of libraries. The data collected from different libraries indicate the status of chemical industry libraries and discover the challenges and solutions to improve the library and information system in chemical libraries.

1.5 Status of Chemical Industries in India:

The Indian chemical industry is one of the oldest indigenous industries, which has been contributing significantly to both industrial and economic growth of the country. There exists an urgent need for making the vibrant downstream industries capable of producing world-class end products through process intensification. This is aimed at establishing a strong presence of Indian chemical industry in the international arena. India also needs to be positioned as global R&D leaders so as to attract quality human resources.

A key constituent of the Indian economy that accounts for about five percent of the GDP, the Indian chemical industry has vital associations with several other industries such as automobile, consumer durables, food processing, iron and steel, textiles, paper,

and engineering, among others. It is the eighth largest sector in the world and the third largest in Asia by volumes, after China and Japan. The country's chemical industry was estimated at USD 91 billion in 2011 and has the potential to reach USD 134 billion by 2015 growing at a CAGR (Compound Annual Growth Rate) of 10 percent. The growth is expected to be driven by rising demand in end-use segments and expanding exports by increasing export competitiveness. The industry is a multi-product and multi-faceted that comprises basic chemicals, pharmaceuticals, petrochemicals, specialty chemicals, agrochemicals and biotechnology and their sub segments. Within the sub segments, the petrochemicals industry is growing fastest, with a rate of around 15 % annually. (http://www.researchandmarkets.com/repost/2125568/indian chemical industry 2012)

In India, the per-capita consumption of most of the finished products under the chemicals sector is far below the world average, which demonstrates the industry's enormous potential for growth. The government of India, plans to invest USD 34 billion in three approved "Petroleum, Chemicals and Petrochemicals Investment Regions" (PCPIRs); it also planned to establish port-based chemical parks in "Special Economic Zones" (SEZs) in the next five years.
India has the potential to become a global chemical manufacturing hub if the government and domestic players rise up to the challenge. It is projected that USD 350 billion of the projected USD 1trillion global specialty chemical industry could move to Asia by 2020. Immense growth opportunities coupled with intense competition are acting as major drivers behind the dynamic growth in certain segments. (http://www.researchandmarkets.com/reports/2125568/indian_chemical_industry_2012)

India's chemical industry has played an important role in the development of the economy. The industry includes basic chemicals and chemical products, petrochemicals, agrochemicals, dyes, paints and varnishes, synthetic fibers and industrial gases. Chemicals and chemical products industry is among the 22 industry groups in the manufacturing sector tracked by the index of industrial production. Domestic industrial production saw a recovery in the fiscal year ended in March 2015. The sector is expected to continue on its growth track, backed by a growing construction sector, a large textile sector, and a growing need for agrochemicals. The launch of "Make in India" campaign and other such government initiatives further added to the

growth of this sector. Chemicals and chemical products are one of the major industry groups tracked by the index of industrial production (IIP). It constitutes about 10.1% of the industrial output represented by IIP and grew at a Compound Annual Growth Rate (CAGR) of 2.1% during fiscal years 2007-2012. In the period 2009-14, chemical exports saw a double-digit annual growth rate of 18%. As of FY14, organic chemicals accounted for 41% of the Indian chemical exports, followed by plastic products with a contribution of 19%. (http://www.marketresearch.com/Emerging-Markets-Direct-Reports-v3814/India-Chemicals-9024270/)

To perform well in the global market new initiatives are needed and for this purpose the chemist need latest development in the area and support of global information. In large scale, multinational and production or process development industries libraries and information centers are established with qualified staff in the library profession. Libraries are not seen in small scale and production based industries many times. Now a days IPR cell has been introduced in many multinational chemical industries to file patent related activities and information group is associated in this activities. It is also found necessary to have support of the libraries in chemical industries to make awareness of the nascent developments in the new areas and also to support for the information dissemination to R & D users to develop more products and market them internationally. Libraries and information centers in this zone are popularly called as Knowledge Resource Centers (KRC's).

1.6 Need or Expectations of Chemical Industry Users from Libraries:

Industries and enterprises today need to know insights into markets, customers and their own internal processes, faster than their competitors to capitalize on opportunities and to deliver sustainable business performance. To perform businesses well, chemist need to go beyond the customary approaches to data and its management. For quick decisions, chemist learn to cope up with the high volume and velocity of real-time structured and unstructured data and information in different formats. Following information is required constantly for day to day performance by the chemists of industries from the industrial libraries:

- Industry information services to decide emerging market trends to fix the target.

- Content, tools, services and insight for pricing and purchasing materials, chemical lifecycle management and inventory optimization etc.

- Validate engineering/design methods, industry standards, regulations, supplier catalogs, and project costing etc.

- Greening or need of the supply chain, crisis and incident management, and environmental consulting etc.

- Information about production, process of preparation of compounds or products, literature on such methods, patents and other research documents like thesis and reports etc.

Industrial library is the place from where one can get all the required information. Use of computers, internet etc. information can be provided to the users through mail, websites or messages can be sent over mobile or smart phones using SMS services.

While discussing the need and expectation from the industrial libraries scientist Greenman (1916) in his article published in "Industrial and Engineering Chemistry" journal and entitled "Functions of Industrial Libraries" pointed out that research investigations are now carried on jointly in the library and in the laboratory, and the amount of time, labor, and money saved by first making a state-of-the-art search is usually carried out by the chemist. Author also indicated that the ultimate function of any library must be service, and this is the same major function for the existence of the industrial library and here it need to be developed to the highest possible degree. While discussing the functions of industrial libraries Greenman (1916) stated that a properly functioning industrial library should include the dispensing of information, both solicited and unsolicited. It has to serve as a reference department where definite questions are answered and where definite lines of thought may be investigated. In addition to this libraries has to distribute unsolicited information, a function in which many of our libraries are woefully lacking. By the distribution of unsolicited information means that the library has to constantly bring to the attention of every patron, any book, article, reference, or note of interest or value to him. In order to do this the librarian must be kept informed as to the lines of interest of each man or user in his area.

This clearly indicate the need of industrial libraries in 1916's and also narrated the functions by the scientists and proposed the expectations. Now the situation is more advanced and industrial libraries and chemical industries are more proliferating and new initiatives are carried out. Hence more libraries are essential in the sector with well-deserved library professionals trained specifically to serve in this sector.

1.7 Need of Present Research Study:

From the literature review it is observed that chemical industry is playing a leading role in developing country's output and GNP. Similarly libraries and information centers are supporting to research activities by providing appropriate information to users.

The main reason to undertake this research study is that analytical studies based on chemical industry users are not yet visible to researcher after performing a literature search on the topic. On the other hand chemical industries are growing and have R & D and IPR units in large scale and multinational industries and they need KRC hence there is a need to conduct studies to analyze status of chemical libraries. It is also noticed that the demands of users form chemical industries are very specific but varied needs of the users. The growth in the information sector is also exorbitant and keeping track with rising information explosion is very difficult to manage without libraries. Unless user needs are analyzed and evaluated the requirements of the research community is very difficult to understand. Hence studies which analyses user needs, analyze the information sources available in the field, might add the values in area of chemical industries especially libraries.

The information resources in Chemical and allied subjects is also shifting to the digital and many information resources are published in the form of electronic and databases as well as free resources available over the net in the field. Hence it is necessary to understand such developments through a proper user study in the discipline. In short information literacy is an essential area for both librarians and users. This study might be very useful to the library professionals working especially in chemical industry libraries. Hence selected a research study "A User Study of Chemical Industry Libraries in Maharashtra", which is a sample of a state and uniformly becomes true for the others to use. This study focused mainly on the information needs of users and information

sources available for use in the chemical industry and might be helpful to both users and library professionals.

Thus the purpose of undertaking this study is to collect the data pertaining to chemical libraries especially chemical industry libraries in Maharashtra State in order to provide a statistical profile of this special type of libraries. The data collected from different libraries indicate the status of chemical industry libraries and discover the challenges and solutions to improve the library and information system in the chemical libraries.

1.8 Trends in Research / Special / Industrial Libraries:

The libraries active in research, special, industrial kind are changing their roles from storehouse of information to dynamic information service provider. In R&D, educational role of special/industry libraries is unique, the user needs the library services quite often on a wide range of areas at any time but need pinpointed and filtered information for developing innovative concepts. The main purpose of these type of libraries is to provide right information to right user in right time that may lead the research activity. Hence the R&D/special/industry librarians should always be a step ahead of their users. The R&D/special/industry libraries need to provide web-based and user-based centric library and information services to the users under intranet and internet environment. It is also noted that there is great desire among the users to implement the library and information services through company website. There is also a need to plan an integrated training program for the users as well as the library staff for an effective utilization of information resources and provide value added information services. A regular feedback from the scientist/users also goes a long way in improving the library services. Thus the trends are visualized in adapting the technologies in library activities and develop electronic, digital, or virtual libraries and share the information for the users by networking facilities and collect global information for keeping updated in the profession.

1.9 Role of Library Professionals in Industrial Libraries:

The most of the researchers and chemist use the library to collect information, to write articles, and for their research work or experimenting new methods. The research librarian can identify the information needs of the researchers by understanding their

objectives for collecting information and observing the techniques applied by user to collect the literature. The research librarian collect information and provide to their target group, such as policy makers, designers, cultivators, industrialists, producers, students and public in general. The role of the librarian is to provide an information source to fulfill above objectives of the researchers which is the basic purpose for collecting information. Therefore the librarian should understand the social status, and information needs while providing information to the researchers.

The role of the librarian has become a complex at present due to multiplication of various information sources. They are engaged in collecting, organizing, storing, retrieving and disseminating information, which derives from different sources and utilizing computers and technologies. The research librarian uses a set of techniques and skills both traditional and advanced to achieve the goals and purpose of the organization. The librarian's task involves analyzing, classification, indexing, abstracting, and providing thesaurus for content management of the documents is a very specialized task of industrial librarian. The librarian has to provide primary, secondary and tertiary information sources to the users as per the requirements and also procure on demand the resources, as users are not a perfect in knowledge of library profession. One of the key roles of the research librarians are to provide information to the users very easily and most convenient manner when demanded in economic manner. The librarian can utilize audio-visual aids and technologies such as computers, communication, internet, as well as printed media for dissemination of information. Apart from this, exhibitions, seminars and meetings also to be conducted for users including orientation programs. The information provided to researchers have a practical value as well as quality. Therefore, it is very important that the information that disseminates has to be very precise, complete, meaningful, accurate, relevant, and up to date for use.

1.10 Statement of Research Problem:

The statement of the topic is "A User Study of Chemical Industry Libraries in Maharashtra", in which efforts are taken to evaluate the user needs from the chemical industry sector and also framed out the solutions to enhance the chemical industry libraries based on the inputs received from the user's and librarians survey. Since

chemical industries are leading and also need current information there is a need to establish suitable information system to support the industry libraries in chemical sector.

1.11 Aim and Purpose of Study:

The main aim of the study is to conduct a survey of the prominent chemical industry libraries and users of chemical industry in and around Maharashtra, to analyze the status of libraries and expectations, needs of users and based on data collected, suggest means to enhance the status of chemical industry libraries to provide better information services using advanced practices in the profession. The purpose of the study is to achieve satisfaction of the chemical industry users in chemical sciences by devising modern techniques and make them aware of the latest and nascent development in their sector to support national growth. Thus purpose for undertaking this study is to collect the data pertaining to corporate libraries especially chemical industry libraries and find out the status of chemical industry libraries and discover the challenges and solutions to improve the library and information systems in chemical libraries associated with industries.

1.12 Objectives of Study:

The following objectives have been considered for this research study.

1. To study the need, growth and development of Chemical Industry
2. To study the information needs of chemical industry users
3. To study the expectations of industrial and research users from chemical industry libraries
4. To identify the different information resources used and needed by the users
5. To identify and list information resources available in both print and electronic media
6. To develop a model for networking chemical industry libraries in a city and state.

1.13 Hypotheses:

The hypotheses selected are

1. There is a need to develop proper library system for chemical industries
2. Networking of libraries may help in sharing the resources among group of chemical industry libraries.

1.14 Research Methods Used:

Research methodology depends on the nature of the study researcher is going to conduct and based on it suitable research method is selected from the available research methods. The present study suits to descriptive research method in which survey of the prominent industries related to chemical sector, where library and information centers facilities are available. The tool used for data collection is structured questionnaire framed out for librarians of the chemical industries to assess the status of the libraries in the chemical industry zone. Similarly to assess the users need and expectations another questionnaire is framed out and circulated among the users. Thus librarians and user questionnaire are the main basic tools of data collection.

Both the questionnaires are structured and focused on the library activities and circulated among the librarians of chemical industries in Maharashtra zone and users of information facilities in chemical industries. Chemical industry libraries were identified from different sources. A preliminary search could identified 237 industries. From these chemical industries researcher selected chemical industries having R & D, process development and IPR cell as well as have libraries or information centers. To identify and collect data of industries in the chemical sector in Maharashtra an authentic sources are used. The sources consulted are:

1) Directory of Chemical and Industries in Maharashtra and Goa 2011 (Nandini Consultancy Center, Chennai, 2011)
2) Maharashtra Industries Directory (www.maharashtradirectory.com)
3) Directory of Chemical Units (Large and Medium Scale Units) 2012-2013 (Department of Chemicals and Petrochemicals Govt. of India 2014)
4) Indian Chemical Council Directory (www.indiachemicalcouncil.com)

5) India Chemical Directory (www.chemnet.com)
6) Chemical Weekly Buyer's Guide (Web based directory on Indian Chemical Industry and trade (Chemical Weekly www.cwbg.in)
7) List of Chemical Manufacturing Industries in India (nitinchem.tripod.com)
8) Handbook on Indian Chemical Industry (FICCI Tata Strategic Management Group and Roland Berger 2010. (www.rolandberger.com)

These sources have detailed out the industries in all sectors in India and also in Maharashtra and from these sources chemical industries are isolated, listed and recorded and used for the survey purpose. Apart from this internet sources are also consulted to drag the chemical industries. (The industries isolated are detailed in Appendix A, Appendix B, Appendix C and Appendix D)

1.15 Identification of Population and Sample Selection for Survey:

While browsing and referring to literature and its survey it is noticed that there are three types of chemical industries based on the size and nature of task performed by them.

1. Small Scale Industries: In which small compounds are prepared and sold in the market as per the requirement using the standard manufacturing process.
2. Medium Scale Industries: In which compounds are manufactured in bulk and sold in the market. There is a small unit which performs experimentation and try to manufacture new compounds at economical ways.
3. Large Scale and Multinational Industries: These industries are well set and have international collaboration with multinational companies. They produce compounds at very large mass scale and also have well established research and development wing with scientific staff as well as IPR unit. These industries are innovative and always search for developing new molecule and file patents.

Another organizations are also involved but neither they produce any compound or perform innovative activities. They are related to trading, marketing, distributing agencies etc. but from their name of enterprises it looks they are chemical companies. But their business is totally different.

It is also noticed from the survey of industries that among the three major types of industries small scale and medium scale chemical industries have no need of library or information facilities as their main task is to produce chemical compounds using known processes and supply to the users e.g. cosmetic and paint, agrochemicals etc. In case of large scale and multinational chemical industries have well established library or information facilities as they need current information in the area as they manufacture new molecules, compounds performing R & D. The libraries are also managed by qualified librarian supervised by the chemist.

Since the research element is based on the libraries and information centers to chemical industries the researcher has the only way to consider large scale multinational chemical industries where libraries are available. However the researcher tried to identify the need of libraries and getting information required where no libraries are available. The sample selected for the survey of chemical industries rest only where libraries and information facilitates are available to chemist. Hence the large scale multinational industries and wherever libraries are available are considered for the survey.

The researcher has selected chemical industries from the Maharashtra State and consulted the different sources to list out the industries from this state in chemical sector which covers the area:

- Basic Chemicals
- Polymers and plastics
- Pharmaceuticals and chemicals
- Agrochemicals
- Cosmetics etc.

It is noticed that in the state of Maharashtra chemical industries are well spread in the zones as mentioned below:

- Mumbai (covering Mumbai, Navi Mumbai, Thane, Dombivali, Badlapur, Khalapur, Raigad, Ambarnath,)
- Pune (Covering Pune, Chinchwad, Pimpri, Wagholi, Pirangut, Bhosari)
- Kolhapur (Sugar cane industries and jaggery industries but no chemical industries in this zone but suppliers and wholesalers, distributors are working)
- Solapur (More cotton and textile based industries)
- Nashik (Covering Nasik, Sinnar, Satpur, Sangamner). Only Food processing industries are more in this zone
- Nagpur (Food processing industries)
- Aurangabad (Covering Marathwada region, Paithan, Waluj, Pandharpur, Shendra, Chikalthana)
- Ratnagiri (Mainly food Processing industries and Agriculture products)

The industries identified from these major cities are listed in appendix A. It is noticed that in Mumbai and Pune zone major chemical and pharmaceutical industries are established followed by Aurangabad. Since more chemical industries are located in Mumbai and Pune, researcher has considered for the survey these two cities mainly and few prominent chemical industries from other zones. It is also observed that in many cases factories for production of chemicals are located in different placed but their head offices are in Mumbai and Pune. Such areas are considered in Mumbai and Pune zones only for the purpose of survey. It is observed that chemical and pharmaceutical industries are more in Pune and Mumbai zones and in other zones mechanical, sugar, food processing and allied industries are available which have been excluded from the survey.

The researcher has also noticed that in the name of company the word appears as “chemical “ but related to different activities rather than production or R & D like:- Distributors, traders, wholesalers, agents, suppliers of chemicals, marketing and trading agencies, advertisers etc.

Thus sample selection for the survey is based on only chemical industries in Maharashtra state engaged in R & D , production, process development, IPR activities, and also having library and information center support with qualified staff.

Thus using the different sources researcher compiled list of Maharashtra Chemical Industries which covers large, medium scale and small scale industries. Researcher identified different zones of Maharashtra where chemical industries are spread up as detailed above.

- Main cities of Maharashtra where more chemical industries are covered like Mumbai, Navi Mumbai (Vashi), Pune, Nasik, Aurangabad, Nagpur etc.

- The large scale or middle scale popular industries where libraries are available are only considered for the user's survey and its sample selection is based on random basis 10% of population of actual users of library facilities or need information on topics.

- Library survey is getting feedback from librarians to understand the status and user survey conducted for assessing needs, expectations and sources used by the users and its purpose.

Thus in Industries where libraries are available and librarians or chemist looking after library activities are considered for the survey. Whereas users are selected from the industries where libraries are available and 10% randomly selected users are identified which are involved in the production and process development units.

The appendix C is a list of chemical industries having Rand D and Libraries after detailed evaluation. Hence from the total population listed in Appendix D in Maharashtra State, the researcher has selected Mumbai and Pune zone for the survey where more chemical industries are available. The list of selected industries are listed in appendix A. There are 32 chemical industries isolated from the total population form Pune and Mumbai having R & D and libraries. (Detailed Below)

Table 1.1 List of Chemical Industries having R&D and Library:

Sr. No.	Name	Place	Address	Contact No.	Large (L)/ Medium (M)/ Small (S)	R & D	Library
1	Aditya Birla	Mumbai	Plot No. 1 & 1- A/1, MIDC, Tal. Dist. 410208, Panvel, Navi Mumbai, Maharashtra 410208	9967018634	L	Y	Y
2	Alkyl Amines Chemicals Ltd	Pune	20/06 Hadapsar Industrial Estate, Hadapsar Pune-411013	020-26874981	L	Y	Y
3	Asian Paints	Mumbai	Head Office Asian Paints Limited,Asian Paints House, 6A, Shantinagar, Santacruz (E),Mumbai - 400 055,	022-3981 8000 Fax: 022 - 3981 8888	L	Y	Y
4	BASF India Ltd	Mumbai	BASF India Limited Plot 37, Chandivali Farm Road, Chandivali, Andheri (East), Mumbai - 400 072, Maharashtra	022-2858 0200	L	Y	Y

			BASF India Limited Thane-Belapur Road, Turbhe, Plot No. 12, TTC Area, Navi Mumbai - 400 705, Maharashtra				
5	Cipla Ltd	Mumbai	Cipla Ltd.Mumbai Central,Mumbai – 400 008	022-23082891 022-23095521	L	Y	Y
6	Clariant Colour Chem Pvt. Ltd.	Mumbai	Reliable Tech Park Behind Reliable Plaza, Thane-Belapur Road, Airoli Navi Mumbai - 400 708	022-71251000	M	Y	Y
7	Colgate (I) Palmolive	Mumbai	Colgate Research Centre Main Street, Hiranandani Gardens Powai, Mumbai 400 076	022 - 67095050 Fax: 25705088	L	Y	Y
8	Deepak Nitrate Ltd	Pune	Deepak Complex, National Games Road, Yerwada, Pune-411006	020-66458000/66458080/66090200	L	Y	Y
9	Dow Agro Sciences	Mumbai	1St Floor, Block B, Gate 02, Godrej It Park, Godrej Business District, Pirojshanagar, L.B. S. Marg, Vikhroli	02356-272034-40	L	Y	Y

			(West) Mumbai-400079				
10	Emcure Pharma	Pune	Emcure House, T 184, MIDC, Bhosari, Pune-411026	020-30610000	L	Y	Y
11	Garware Plastics	Mumbai	Garware Polyester Ltd., 50-A, Swami Nityanand Marg, Western Express Highway, Vile Parle (East), Mumbai 400 057, India Email: Ho@Garwarepoly.Com	022-66988000 Fax: 022-28248155, 022-28248199	L	Y	Y
12	Gharda Chemicals Ltd	Mumbai	Gharda Chemicals Ltd. B-27, Phase-1 MIDC. Dombivili (East) District: Thane Maharashtra. India. Email Ghardadom@Gharda.Com	0251-2803380 – 86 Fax 91-0251-2430581	L	Y	Y
13	Glenmark Pharmaceuticals	Mumbai	Glenmark Pharmaceuticals Limited Glenmark House, B D S Marg,	022-4018 9999 Fax : +91 22 4018 9990	L	Y	Y

			Chakala, Off Western Express Highway Andheri (E), Mumbai - 400099				
14	Hindustan Organic Chemicals Ltd.	Mumbai	Rasayani, District. Raigad, Maharashtra	02192-50041-46	L	Y	Y
15	IOCL	Mumbai	Indian Oil Corporation Ltd., Indianoil Bhawan, Plot No.33, G Block, Bandra Kurla Complex, Bandra (E) Mumbai - 400051	022-26722701	L	Y	Y
16	Lupin Ltd	Mumbai	Laxmi Towers B Wing, 5Th Floor, Bandra Kurla Complex, Mumbai-400051	022-6640 2222	L	Y	Y
17	Lupin Ltd	Pune	1St Floor, Go Square, S.No. 249/250 Wakad Rd, Kaspate Wasti, Wakad, Pimpri-Chinchwad, Maharashtra	020- 6791 7400	L	Y	Y
18	Macleods Pharma Ltd	Mumbai	Atlanta Arcade, Marol Church Road, Andheri (East),	022-6676-2800 Fax : 022-2925-6599	M	Y	Y

			Mumbai - 400059, India. Email 1: Exports@Macleodspharma.Com				
19	Nicholas Pirmal India	Mumbai	Piramal Enterprises Piramal Tower, Ganpatrao Kadam Marg, Lower Parel – West Mumbai – 400 013.	022-30466666	L	Y	Y
20	Pidilite	Mumbai	Corporate Head Office Ramkrishna Mandir Road Off Sir Mathuradas Vasanji Road, Andheri (East) Mumbai - 400059 E-Mail: Pil@Pidilite.Com	022-3308 7000 Fax: +91 22 2835 7700	L	Y	Y
21	Piramal Healthcare	Mumbai	Piramal Enterprises 247 Business Park A-Wing, 6Th Floor Lbs Marg, Vikhroli (West) Mumbai – 400 083.	022-3095 6666	L	Y	Y
22	Praj Industries Limited	Pune	Praj House Bhawdan, Pune	020-71802000	L	Y	Y
23	Rashtriya Chemicals & Fertilizers	Mumbai	Priyadarshini Building, Eastern Express Highway	022-25548300	L	Y	Y

			Sion,Mumbai-400 022				
24	Rallis India Ltd.	Mumbai	156/157, Nariman Bhavan, 15Th Floor, 227 Nariman Point, Mumbai-400021	02356-272618,	L	Y	Y
25	Reliance Industries Limited	Mumbai	Reliance Industries Limited Makers Chambers - Iv, Nariman Point,Mumbai 400 021.	022-2278 5000	L	Y	Y
26	RIL Life sciences Pvt. Ltd	Mumbai	Dhirubhai Ambani Life Sciences Center,R-282, TTC Industrial Area Of MIDC, Thane-Belapur Road, Rabale, Navi Mumbai 400 701	022-6767 8000	L	Y	Y
27	RPG Lide Sciences Ltd	Mumbai	463, 4 Th Floor, Rpg House, Dr. Annie Besant Road, Worli, Mumbai – 400 030. Maharashtra	022-2498 1650 / 51/ 6660 6375 / 76 / 7	L	Y	Y
28	SI GROUP – INDIA LIMITED	Mumbai	(Formerly Schenectady Herdillia Limited)Thane-Belapur Road,	022-30782039, 30782000	L	Y	Y

			Navi Mumbai-400705				
29	Sun Pharma Industries Ltd	Mumbai	AC ME Plaza, Andheri Kurla Road, Mumbai-400059	022-66455645	L	Y	Y
30	Tata Chemicals Ltd.	Mumbai	Bombay House, 24 Homi Mody Street, Fort,Mumbai-400001 Maharashtra	02892-665264	L	Y	Y
31	Thermax Limited	Pune	97 E, General Block, MIDC, Telco Road, Bhosari, Pune-411026	020-66051200	L	Y	Y
32	United Phosporous Ltd	Mumbai	Ready money Terrace 167, Dr Annie Besant Rd, New Ambalal Chawl, Bhim Nagar, Mahalakshmi Nagar, Mumbai	9819547749 /022- 2493 0681	L	Y	Y

It is also noticed that R & D is available in few large scale industries but libraries are not available but the users need chemical information for R & D. In Appendix C list of 45 chemical industries under this categories are listed out.

Thus researcher out of 237 chemical industries from Maharashtra state isolated/selected 32 industries based on availability of R & D and libraries (Appendix D). In addition to this researcher isolated 45 chemical industries where R & D is carried out but no libraries (Appendix C) but chemist need information is selected for user survey. Thus

for user survey from the total population of 237 chemical industries in Maharashtra state sample for user survey selected is 77 (32+45) chemical industries based on the concepts stated above. The sample of 77 chemical industries having R & D and need libraries and information services are considered. Initially 32 chemical industries are surveyed and circulated questionnaire to assess the status of libraries in this sector. 77 chemical industries selected for users survey and 10% sample of chemist is selected for user survey.

The response to both survey is as under:

Out of 32 chemical Industry libraries 22 libraries has responded to survey positively. The response is almost 68%, researcher tried to get the response from other remaining chemical industries but failed due to administrative issues of the companies.

Sample selection for the user survey from Chemical Industries:

The researcher has also tried to identify the needs of users of chemical industry users busy in R & D activities and using libraries or need library or information facilities for their research work. It is also observed that proper well established libraries are not managed but users need information on chemical sciences. However there is no sufficient collection available in the library but the librarians tried to fulfill the needs of users by adapting different techniques like hiring information consultants or using internet for gathering basic data and later get support of specialized subject libraries or university libraries.

The researcher has also tried to assess the needs of users from chemical industries and for this purpose the industries selected based on concept that

- Availability of R and Facilities or IPR cells
- Availability of library or information centers
- Though libraries not available but depends on other sources for the data collection

To assess the users form chemical industries sample selected based on the following facts:

77 chemical industries having R & D and libraries are considered for selecting the users. The users are mainly chemist, scientist, managers, R & D Experts etc. From 77 industries 10% user sample is selected randomly. The total population is calculated based on the availability of R & D staff. Thus the total population of R & D staff is around 237. The random sample user selected is considered and the response is received from 188 users for the survey. Among these 188 the sample covers both using libraries of industry as well as depending for the information from other sources like information brokers and other libraries in the subject.

Sample for the Users Survey and Response: The sample for the users survey is randomly selected 79% users (188 out of 237 users) from the users directly or indirectly need the information support for carrying out R & D.

To support the survey the researcher has also tried to supplement the views of experts in the area and library professionals by conducting unstructured interview. The librarians from Gharda Chemicals Dombivali, Aditya Birla Chemical Division Mumbai, Reliance, Cipla, Lupin Pune, Emcure Pune etc. The opinions of experts helps in developing the new idea to continue the text. In addition to this prominent literature review is also conducted by the researcher (Documentary or secondary analysis).

The research methods used by the researcher to complete this study are:

- Survey Method: Chemical Industry Survey -Survey of Chemical Industries from main cities and zones of Maharashtra mostly Mumbai and Pune zone. The industries selected based on R & D work and having libraries for the survey. User Survey:- Users from Chemical Industries

- Interview: Interviews of librarians from the prominent chemical industries

- Secondary or documentary analysis of literature published

In brief Chemical Industries where R & D and libraries are available or need of information are considered for the survey. User's survey sample is restricted to 10% of the population.

1.16 Scope and Limitations of Study:

The scope is restricted to only chemical industries and libraries associated with them. However few pharmaceutical and drug industries associated with chemical industries are also considered in the survey. The chemical industries where library facilities are made available are considered but the industries without libraries but getting information for R & D purpose form the information brokers and clearing houses are considered and covered in the survey.

The following industries are not covered in the survey and excluded completely though some time they are grouped under the chemical industries sector.

- Purely pharmaceutical and drug industries
- Health care industries
- Polymers, plastics, resins, coating, and adhesives
- Agrochemicals and pesticides
- Paper and pulp
- Cosmetics and detergents
- Surfactants
- Food and confectionary
- Effluent and water treatment
- Engineering and allied industries
- Textile and fabrics, rayon
- Glass and ceramics
- Mineral products

Thus purely chemical industries with library and information facilities are considered for the study.

The chemical industries selected for the survey are based on:

- R & D, product or process development activities, IPR etc. are available
- Among industries where libraries are available
- Where libraries not available but have R & D needs to get information for research or new product development.

1.17 Structure of the Research Study:

The complete research study is covered in about 8 chapters:

Chapter 1: Introduction: Covers the introductory and basic part covering importance, growth and development of chemical industries, requirements of researchers, role of industrial libraries, and need of the research study, reason to select the study with aim, objectives research method used and tools used for the data collection.

Chapter 2: Literature Review: This chapter analyzes the published and available literature associated with the research study but felt useful to the researcher. The literature gathered form the different information resources is collected, analyzed, synthesized and used in the structure of the study where justification is required or to append as a base to the opinions derived after the detailed investigations by the researchers. The facets considered under the literature review are use and user studies, Information seeking behavior of users, chemical industry libraries and their user needs, expectations of chemical industry users, collection of industrial libraries, and trends in industrial libraries etc.

Chapter 3: Importance of Chemical Industries: Historical Development, Importance and Growth: This chapter covers the growth and development of chemical industries in detail. The chapter focuses on global, national and regional development form countries like USA, UK, and India in brief. Maharashtra zone is also specifically discussed and tracked the growth in this zone.

Chapter 4: Need of User Studies: This chapter is highlighting the need of the user, use and ISB studies and their importance. These studies are mainly conducted to assess the user needs in specific areas.

Chapter 5: Information Sources in Chemical Industries: This chapter discusses in detail the different information resources used by users and available in different forms for the research or process development purpose as well as filling patents which provide the information required to users. This chapter also focuses in detail the available information resources and lists them for the best usage of them while performing the research. This also includes paid and free resources in print and digital media.

Chapter 6: Libraries in Chemical Industries and Role of Librarians: This chapter highlights the issues related to manpower i.e. professionals working in industry libraries and acting as an information provider.

Chapter 7: Data Analysis: This chapter analyses the data collected from librarians and users and presented in tabular form with observations. This is the supportive chapter to understand the status of libraries and user expectation from industry libraries. Based on the observations findings and suggestions are narrated.

Chapter 8: Findings, Suggestions and Conclusion: This chapter is the summarizing with listing of findings and based on them viable suggestions are listed and concluded the study with identifying scope for the future research.

Bibliography and appendices are at the end of the study.

Chapter Summary: Researcher searched the literature published in the area of industrial and chemical libraries and noticed that there is a gap in research in the area of industrial libraries and especially in chemical industry libraries. Since researcher is a librarian of multinational chemical industry library noticed that the value of chemical industry libraries are increasing due to changes in global international policies. It is also observed that different type of special libraries are emerging in the subjects like medical, engineering, architecture, software, law etc. Industrial libraries are also emerging fast and in the area of chemicals, drugs and pharmaceuticals the need of libraries or information center is felt to the users to support the information base of

developing new avenues in the profession. Multinational large scale industries are collaborating with international business and developing new molecules and filling the monopoly claim for the processes and products through patents or developing new standards for identification by developing standards. The industrial users are using different primary and secondary information resources to keep themselves updated with the current global development. The chemist are busy in experimenting and they do not want to spend their time in searching information and then experimenting. Hence they need the libraries and qualified skilled library professionals who can assist them. Hence libraries are becoming more functional in this area. The researcher has selected this research topic keeping in mind to review the state of chemical industry libraries and need of users as the user needs are not common like other libraries. The chapter narrated the reason for selection and research method adapted to undertake the study.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction:

The literature review is an important consideration and activity for research studies because it helps to fix the concepts of research which is related to prior research in statistics, concepts, proves the originality and relevance of current research problem undertaken by the researcher. Literature review helps in identifying and stating the research statement based on previous studies conducted and visualized in literature published in different forums. The decision of fixing the research topic and research methodology for the study is also decided on the basis of literature review and plan of research is fixed based on the published literature. It also presents researchers preparedness to complete the research in proper and systematic manner. The literature review is nothing but a critical discussion and summary of literature published and is of `general' and `specialized' relevance to the particular topic or research problem. In literature search researcher discover the knowledge exists related to research topic, increase knowledge in research area, helps in identifying gaps in published research and based on this generates new original ideas and presents in the research work as well as avoid duplicating the results and justify the relevance of proposed research. Hence literature search and analysis is considered at the initial stage of research.

2.2 Why Literature Review:

The literature review performs number of important functions like: demonstrates the research student has read a large amount of literature available on the topic and prove that the student is aware of the wide range of research in theory and methodology related to the proposed research topic. In the research proposal researcher can emphasizes or stress the originality of the dissertation. Without a good literature review, researcher cannot convince that the proposed research is original. Literature review is

more than a summary of publications published and used by the researcher. It provides evidence that research conducted may be an original and relevant contribution to topic. While conducting research number of academic requirements are to be fulfilled by the researcher and literature review helps in performing this important academic requirements. Literature review helps researcher in:

- Discovering knowledge base available which is related to the topic of research
- Increase the depth of thinking of researcher in analyzing the problem in better ways
- Identify gaps in published literature as well as track the trends in the area of research
- Consulting the published different literature, the researcher can generate new ideas and concepts and add newness to the research
- The main reason behind undertaking literature review is to avoid duplication in research and also support to the facts deduced by the researcher in his study
- Justification for the selection of proposed topic for research can be satisfied

Thus literature review is backbone of the research study and it is to be performed before undertaking research to fix research plans and to decide the steps in approaching to the problem, to identify the newness with support of literature, and finally writing the research report in proper manner. Literature reviews are secondary sources, and as such, do not report any new or original experimental work but takes summary of past development. Literature review can be interpreted as a review of an abstract accomplishment. (http://en.wikipedia.org/wiki/Literature_review)

A literature review goes beyond the search for information and includes the identification and articulation of relationships between the literature and field of research. The literature review may vary with different types of studies, but the basic purposes remain constant i.e.: provide a context for the research, justify the research , indicate where the research fits into the existing body of knowledge, understanding knowledge of the field and help in refining, refocusing or even changing the topic and concepts.(http://www.library.cqu.edu.au/tutorials/litreviewpages/)

2.3 Facets for Review:

For the literature review researcher has selected following concepts on which published literature is useful for research.

- Importance of Chemical Industries
- Industrial libraries : status, need, functions and role
- Collection of industrial libraries (special Libraries)
- User needs and expectations from industrial libraries
- Need of user studies
- Trends and transformations in libraries
- Information services delivered through industrial libraries
- Role of Librarians in Industrial / corporate / business libraries

2.3.1 Importance of Chemical Industries:

Chemical Industries are considered as most important industries in the world. Chemical products are used in every industrial process and are crucial in every industry. The Chemical industry plays an important role in every human lives. Human beings are depending on chemical industries for their day to day needs. The natural resources cannot be consumed or used directly by humans, so chemical industries converts these resources into a useable format such as water, oil, minerals, metals etc. Today almost 80% of the chemical industry produces plastics and polymers. These products are necessary for producing the products or act as a raw material for other industries like the life science, medical field, food, transport, and daily used products like TVs, computers etc. Today the development is due to advances in chemical sciences. Chemicals plays an important roles in the food we eat, the clothes we wear and the surrounding around us. Chemical Industry produces 70000 different types of products that are used by individuals as well as other industries. Chemical sector is of considered

the important factor in the development of national economies and plays a vital role in the economic development of any country. The industries based on chemical sciences are pharmaceuticals, agricultural, electronics, paints and solvents, metals and alloys, petrochemical, paper, plastics and rubbers, soaps and detergents, synthetic fibers etc. with more than 60,000 to 70,000 different chemicals being used today. (www.inquimica.com/chemical-industry-modern-life.html and www.technofunc.com/index.php/domain knowledge-2/chemical-industry/item/importance-impact-of-chemical-industry)

Wikipedia (www.en.wikiepedia.org/wiki/ chemical-industry-chem Indus) also indicated the importance of chemical industries and its usefulness. The chemical industries comprises the companies that produces industrial chemicals. Chemical industries convert raw materials (oil, natural gas, water, metals, minerals etc.) in to more than 70,000 different useful products to human life. Globally the chemical industry is estimated to be USD 3.4 trillion. Chemical industry is growing very well @ 9% PA up to 2008 and later lowered and again increased in 2010 onwards. Different types of chemical industries constitutes: Basic chemicals 45%, Biotech 5%, Agrochem 1%, Speciality chemicals 22%, Pharmaceuticals 27%. Thus basic chemicals is the largest sector of chemical industry followed by pharma industries and speciality chemicals. The importance of the chemical industries is unique in all the sectors. (www.indiachem.in).

OECD (2010) in the communication Environmental outlook for chemical industry detailed out the statistics of chemical industries and in the year 2010 Indian chemical industry produces USD 83 billion PA. Indian chemical companies are both domestic and multinationals. Organic chemicals are significant part of Indian chemical industry. Chemicals are used to make every manmade product and have played an important role in industrial sector not in India but all over the world. The chemical products provide support to agriculture, increase in yields, prevent and cure diseases and many more benefits to human life. In India chemical industry is very diverse and divided in to basic, speciality, life sciences, consumer etc.

Indian Chemical Industry - Five Year Plan (XII) (www.planningcommision.gov.in) states that chemical industry is very critical for economic development of any country. The industry is increasingly moving fast and supports too many industries. Indian

Chemical Industry can grow @11% PA to reach size of $224 billion by 2017. FICCI (www.ficci.com) described the role of Indian chemical industries, growth of chemical industry (13-14% in last 5 years). The different roles played by chemical industry in human life like domestic use, export potential and foreign trade, diversified manufacturing products are major issues. Government is also promoting and supporting to chemical industries in India and declared policies and new initiations for up keeping in the industrial sector and promote to national income. Chemical industries also trying to offer new products as per the needs of market.

IBEF (www.ibef.org) in its analysis recorded that in India after agriculture, chemical industries occupy a vital role. Indian chemical industry stands 3rd largest producer in Asia and 12th in world, in terms of volume. The industry could grow 14 % PA to reach a size of USD 350 billion by 2021. India accounts for approx. 7% of world production of dyestuff and dye intermediates. The Govt. of India has approved 100% FDI in chemical sector and also reduced excise duty from 14% to 10%.

Indian Chemical Council (www.slideshare.net/) stated that chemical industry is spread very well in Indian states but the major role played by Gujarat and Maharashtra. The state wise growth reported by ICC is Gujrat (53%), Maharashtra (9%), Madhya Pradesh (5%), Uttar Pradesh (6%), Tamil Nadu (6%), and Punjab (4%) and in all other states it is 17%. Maharashtra leads at second position after Gujrat state. Similarly ICC also grouped Indian Chemical Industry in three key segments. Basic chemicals segment contributes to 48% and covers major sectors of organic and inorganic chemicals like petrochemicals and polymers, fertilizers, Chlor Alkai etc. Speciality chemicals segment contributes 21% and covers organic chemicals like dyes, and dyes intermediates, textile chemicals etc. Knowledge chemicals segment contributes to 31% covering pharmaceuticals, biotechnology and agrochemicals. Major segments of chemical industries covers mainly petrochemicals, inorganic chemicals, organic chemicals, fine and specialties, Bulk drugs, Agrochemicals, paint and dyes.

Many sites have indicated best chemical industries in India. The major chemical industries are:

Tata Chemicals, United phosphorus, BASF, Pidilite industries India glycols, Aarati industries, Deepak Nitrites, Hikal Industries, Atul Limited are the top ranked industries and few more like Aditya Birla, Navin Florine, Ecel India, Alkali Amines, Kanoria

chemicals, Transpek Silox, Mangalam Organics, Sunshield Chemicals, Dai-Ichi Karkaria, Kilburn Chemicals, Salvi chemicals, Sudarshan chemical industries, few pharma and drugs industries are Cipla, Lupin, IPCA, Sun Pharma, Aurobindo, Kopran, Cadila, Wockhardt etc.

ICC also listed out few leading companies in basic chemicals like Reliance industries, IFFCO, Tata chemicals, Navin Florine, RCF, Aarti Chemicals, Gujarat Alkali and chemicals etc. Petrochemicals includes Reliance Industries, IOCL, GAIL etc. Speciality chemicals includes Asian Paints, Pidilite Industries, Atul Industries. In knowledge chemicals Cipla, Ranbaxy, Dr Reddy's, Lupin Labs, Aurobindo Pharma, UPL, Cadila Healthcare, Bayer, Glaxo SmithKline, Sun Pharma etc. Other key segments covers construction chemicals, Paint and coating chemicals, water treatment chemicals, textile chemicals, cosmetics and personal care ingredients etc.

Summary:

The chemical Industries forms an integral part of growing Indian industries. This industry occupies a pivotal role in meeting basic needs and improving quality of life. The chemical industry is rooted in sciences and provides input to large number and variety of industries. Thus without chemical industries there would not be electronics or other industries. Even power industry depends on chemical industry for its operation. Thus importance of chemical industries is immense in every country and also growing fast and contributes heavily in national income. Such industry need different infrastructure for achieving progress and this also includes information support to know the current R & D activities globally to meet the competition.

2.3.2 Industrial / Special / Corporate Libraries: Status, Need, Functions and Role:

Growing and competitive global markets in chemical industries need well supported information and documentation unit to keep scientist aware of the current trends. Libraries and information centers are necessary in these industries. Since pat the need of libraries is felt in the chemical as well as industrial libraries.

Slater (1963) has defined the need of industrial libraries and explained the need as well as users of industrial libraries in his communication "types of use and user in industrial

libraries: some impressions". In his questionnaire survey on the use of special library/information units in the fields of science and technology is considered to understand the status. Researcher investigated the typical behavior patterns of users in definable groups of users; as users of special libraries are different than other libraries, and from the study results predicted their needs with reasonable accuracy. This information become very useful to organizations to set up new information services or to reorganize existing services to enhance them. The article clearly highlighted the need of user survey to analyze the status of industrial libraries and fixing the path for the enhancement of libraries in industrial sector.

Greenman (1919) discussed in his paper "Functions of Industrial Libraries" and pointed out that research investigations are now carried on jointly in the library and in the laboratory, and the amount of time, labor, and money saved by first making a state-of-the-art search is usually carried out by the chemist. Author also indicated that the ultimate function of any library should be service, and this is the same major function for the existence of the industrial library and here it should be developed to the highest possible degree. While discussing the functions of industrial libraries Greenman (1919) stated that a properly functioning industrial library should include the dispensing of information, both solicited and unsolicited. It should serve as a reference department where definite questions are answered and where definite lines of thought may be investigated. In addition to this it should distribute unsolicited information, a function in which many of our libraries are woefully lacking. By the distribution of unsolicited information means that the library should constantly bring to the attention of every patron, any book, article, reference, or note of interest or value to him. In order to do this the librarian must be kept informed as to the lines of interest of each man or user has in his area. This has clearly indicated the need of industrial libraries in 1919's and also narrated the functions by the scientists and proposed the expectations.

Kelsey and Porter (2011) in their book described the history of corporate libraries, IP and corporate libraries, best practices in information sharing among the corporate libraries. This book illustrated the overview of corporate libraries and librarianship and provided best practices regarding variety of issues and challenges faced by corporate professionals including functioning and services, facilities, information management, marketing etc.

Wendy, C (1997) prepared a report on corporate libraries in USA in the thesis from after surveying the needs of users in corporate libraries of Ohio State in USA. In this researcher clearly indicated that there are different types of corporate libraries bundled together under the term industrial libraries which includes chemical manufacturing industries libraries also. The research has also tracked the history and origin of industrial or chemical industry libraries but could not traced except it is part of the special libraries. Researcher concluded his study indicating that any corporate or industrial library are tasked with the responsibility of helping their library users to survive in changes.

Wikipedia (en.wikisource.org/wiki/ the encyclopedia Americana 1920 libraries-special-commercial-industrial) described the industrial or commercial libraries found in manufacturing business and other industry sectors. The purpose of these libraries is to supply users with information required for R & D purpose

McCallum and Quinn (2004) in their communication valuing libraries discussed the values of special libraries which serve to specific users and for achieving specific purpose to meet the information needs of their parent organizations. Special libraries have specific functions wherever located either run Govt. department, defense establishments, law firms, research centers, corporate sectors, industries, business etc. Their objectives are to understand, anticipate and meet information requirements of the users and satisfy mission and vision of parent body. Special libraries provide value to specific needs in the area serving.

Griffith and King (1993), Tenopir and King (2000), Portugal (2000) also discussed the value of special libraries are communicated in which all have summarized the usefulness, value, and impact of information on users. The authors communicated their opinions based on 27 user studies and services of special libraries and information centers as well as 4 national surveys of scientists and other professionals. The authors used the term “Information Edge” to refer to advantages from use of information and libraries. Tenopir and King (2000) opined that chemists and researchers found that the services and resources of special libraries contribute to the vision and mission of parent organization e.g.

- help in improving quality work

- increase in productivity supporting by information
- developments of new products from discovering information
- provision of information to researchers and knowledge workers
- provide access to sources, materials and save time of users

Portugal (2000) in SLA published results of research on validation of information sources and noticed:

- Return on investment since all are using information
- Add value to knowledge base
- Flow of information, keeping awareness of new products

In short libraries in special sectors proved to be cost benefiting by collecting and sharing information. Thornton (2000) indicated that survey of users regularly helps in increasing of satisfaction and helps in analyzing impact of libraries on users. In special libraries the need of user survey and analysis gives inputs to improve library services in any sector.

Summary:

From the literature review it is very clear that industrial or corporate or commercial or business libraries are part of special libraries but their structure is slightly different in terms of functioning, acquiring and storing information and disseminating information. But the main role is to support the mission and vision of the parent body associated to it. The users need are to be fulfilled. The industrial libraries have different nature of users and their needs are very specific related to the projects. Since industries are growing fast and becomes the integral part of the nations development support to information needed by industry is to be performed by libraries and information centers positively. The need of libraries is felt due to R & D carried out and scientists need constant information support for the development of innovative concepts. In brief it is noticed that special libraries functions are unique and user community is also expecting services form libraries using modern technology.

2.3.3 Collection of the Industrial libraries:

The collection of the industrial libraries is similar to the special libraries but depends on the user demands and nature of the industry. In the collection major part is composed of journals and reference books and annuals or treatises which gives fact finding data on requirement. Apart from this patents, standards and thesis as well as conference proceedings and reports are needed by the users. Generally special collection useful for R & D is required in such type of libraries.

2.3.4 Role of Librarian:

Ghosh and Wesley (2002) in their article discussed involvements of organizations in research, action-research and advocacy on various development issues, particularly in the social services and human development sector. Research therefore generates information which is consequently inter-disciplinary in nature. In order to manage such information and also to make more information available, special libraries and thematic, issue-based information centers have been set up. Libraries are peculiar as far as their collection, users, services, queries and information processing are concerned. Authors in their case study of The Institute of Social Sciences, New Delhi discussed in detail the role of library professional in special libraries and suggested how a special library has to establish a synergy between the research focus of the institute and the information cropping up from research for their users.

Brown (1949) in his article narrated definition and various functions of industrial librarian and gave more emphasis on how a non-professional librarian handles the library with practical experience. Author also discussed about various problems faced by industrial librarian right from setting up of library to providing services to the specialized user.

Abel (1986) discussed the role of the library of any field which is changing and developing fast due to ICT applications. The impetus for change must come from the librarian rather than the employer, whose view of change may be rather narrow. Increasingly the industrial library's role is close involvement in the organization's business activities, identifying information needs and giving advice to meet those

needs. This includes exploitation of external resources, acquisition of special collections and an active role in the development of the "corporate memory" and integrated information systems. The role of the library within its own organization is reviewed, and its place within the information network. Its influence on the integration of "internal" and "external" information is discussed by the author very well.

Lary (1981) in his paper discusses about corporate management of patents, from a technical information viewpoint. Author suggested that librarian, who is the direct user of patents, should become knowledgeable in the rich resources of patent data. Technology transfer can be accomplished by the engineer and scientist having the complete picture, which the librarian offers in response to a search request. The General Electric Company is used as an example of corporate patent management. The author conducted two surveys. The results of these surveys are over 30 patent depositories in the United States, the 'average' research librarian does not make complete use of these repositories and unaware of these data sources. The paper describes several key patents within the General Electric Company supported by library research, and specifically, man-made diamonds. The paper concludes with a forecast of how libraries and special libraries retrieve patents and patent applications before the next century commences and suggested that librarian's main role is to search valid essential data for the users.

Ifidon (1995), has discusses in his communication the contribution of the libraries for the progress of education, commerce, industry and science and technology and pointed out that unless educationists, business men, scientists and engineers keep up with the fast–moving world, they and their countries cannot progress well. The study examines the role played by public libraries in the development of technology advanced countries. On the basis of that, Nigerian situation is evaluated and suggestions for improvement are given including the role of modern librarian in searching information resources on and off line both.

Pervez Ahmad (2009) in his communication discussed the core competences of library and information science (LIS) professionals as managers of organizations. Author also discussed the comparative study of LIS professionals and managers of organizations and showed how more similarities are found than differences. This article outlines and discusses the professional skills and necessary technological skills needed for library science professionals and managers to fulfill the needs of user community using

techniques and technologies. Author also focuses on marketing and promotion of the products by the LIS Professionals.

Murthy (1999) in his article highlighted the librarians' connotations of information technology (IT) which has developed changes in libraries, and pointed out that IT is very useful and relevant to libraries for providing different services. Author also discussed the future of IT, its use in libraries and role of librarians in future.
Feng (home.comcast.net/afeng/pht/) has pointed out the role of corporate librarian in an environment of web 2.0 and called it as librarian 2.0, which is a new core competency required in ICT era for the librarians working in industrial libraries. Author has also indicated that role of librarian and information specialist is undergoing continuous change including corporate librarians. Now to run the corporate library and meet out their demands in limited collection many skills and techniques are to be adapted by the library professionals as the role of librarian in this sector is very crucial. The autos has also suggested many core competencies required in the profession.

Summary:

The role of librarian in corporate and industrial libraries is more crucial as compared to other libraries. Feng has rightly pointed out the need of skills and competencies required for the library professionals working in these type of libraries. The role of the librarian in this sector is very difficult. The demand of the users are varies and need user centric services and hence the skills and competencies are different than any other libraries. The librarians have to use ICT for automating libraries and functions and also collect data using online searching of information and skills related to information searching are also essential.

2.3.5 User Needs and Expectations from Industrial Libraries:

Tamil Amani (2009) in his research study explained the user’s expectations from R & D Libraries. The study covers use of library by the researchers in chemical industries and expectations which are highlighted based on the survey. The authors highlighted use of library, resources used by user’s atmosphere of the library, staff of the library along with services provided and expectations of the users. The research study though based on a particular library as a case study but it reflects clear suggestions in terms of

improvement of library services as per the need of chemical industry users. Author suggested that e-journals, e-books, e-resources are to be acquired in library and different databases to be searched using either off line or on-line. The staff needs advance training and libraries have to be automated and provide OPAC's to users. Librarian's task is to develop awareness about the library, resources and service through regular orientation or training programs to users in the era of information explosion valid suggestion given by the author to shift for e-publication is essential in the present special libraries.

Poetzer and Wilson (1990) discussed the needs of chemists from chemical sciences. Authors analyzed and pointed out the values of information for industrial society. Chemistry is a discipline which deals with compounds and play important role in the industrial zone. The research activity resulted in developing more than 10 million compounds and every year added @0.5 million compounds discovered new. The information required by users is unique and novel and current which can provide value added information. The need of the users is that they required timeliness, accuracy, completeness, and currency in getting information from the libraries and librarians. Users demand is for the new information published in different sources for innovative thinking. Users need the information on compounds in which they are studying like stereochemistry, toxicity, chemical properties, applications and uses, analytical and manufacturing methods, safety information etc. Users need factual, numerical information and reviews on literature published. Information services has high priority in chemical industries and hence the task of librarians is comparatively different.

2.3.6 Need of User Studies:

Guinchat (1983) opines that a user can be defined on the basis of two sets of criteria, namely 1) objective criteria, such as socio-professional category, specialist field, nature of the activity for which the information is sought, reason for using the information system, and 2) social and psychological criteria such as the user's attitudes and values with regard to information in general and in his relations with information unit in particular. User need information for different purpose and has unique query. User survey helps in identifying the work area and based on the study librarian can acquire the literature. Thus role of user study is important form the librarian's point of view.

Guinchat has suggested to undertake the review of needs regularly to update the collection and also provide the serves.

(Guinchat, Claire (1983). General introduction to the techniques of information and documentation work. Paris: UNESCO)

Bernal (1958) provides some sort of classification of users based on using scientific and technical information from the point of view of the kind of information services required by them. One major aspect of this grouping is combining engineers, architects, medical practitioners and agriculturists into the category of technologists. Author has also included managers (both business and industry) among distinct group of users of information. Another method for grouping users is on the basis of their approach to information. They can be classified as:

a. The potential user - one who needs information which can be provided by specific services;

b. The expected user - one who is known to have the intention of using certain information services;

c. The actual user - one who has actually used an information service regardless of the fact whether he derived advantage from such a service or not; and

d. The beneficiary user - one who derives a measurable advantage from information services.

Based on the category of the users need of the information varies. Librarians has to support to the needs of users efficiently and using subscribed and internet based resources.

Bernal, J. D. (1958). The transmission of scientific information: a user's agenda. International Conference on Scientific Information. Washington, D.C., National Academy of Sciences -- National Research Council.

Dr. S.R. Ranganathan (2009) has grouped users on the basis of types of services enunciated and according to author the division of users can be grouped into: the freshman, ordinary inquirer, specialist inquirer, and general reader. The need of the very

group of user is different and to search the user interest user survey is essential part form the library and librarians point of view.

(Ranganathan User education in libraries B. Ravi Kumar: International Journal of Library and Information Science Vol. 1(1) pp. 001-005 June, 2009

Information seeking behavior of different types of users in selected libraries of Delhi Kumud Prabha: International Research: Journal of Library & Information Science | Vol.3 No.2, Jun. 2013)

Summary:

User studies are most required in any of the library to assess the needs of users. User needs are always depend on the work and projects assigned to them. Every reader has its own concept developed in his mind for developing new ideas. Unless librarian noticed the interest of users it is difficult to provide him necessary information support. Hence user analysis, user surveys, user behavior studies, user need analysis is essential part of libraries and librarians.

From the literature three general groups of users are formulated. Three important groups are identified based on scientific and technical information system users distinguishable according to the kind of activity in which they are engaged viz.

- Researchers
- Practitioners and technicians engaged in developmental and/or operational activities the different fields of technology, and
- Managers, planners and other decision make is who are engaged in coordinating development activities at local, national, or international levels.

All these groups need information based on their needs. Need assessment is an essential task and it is to be repeated at regular intervals.

Siatri (1999) traced on evolution of user studies and discussed different concepts related to user studies as well as information use or information seeking behavior. While discussing evolution of user study's author date backs to 1940's and tracked the studies performed by the researchers like D. J. Urquhart's, Fussler, and Menzel who were the pioneers in conducting user studies. The user studies reviewed traces in 1990's and

authors clearly differentiated the needs shifted from decade to decade. Similarly every decade due to introduction of different technologies, user behavior is shifted is also analyzed in studies.

Siatri, R. (1999). The evolution of user studies. Libri, 49, 132-141. Retrieved from http://www.librijournal.org/pdf/1999-3pp132-141.pdf

Robert Kosara, et al (2003) described their experiences with user studies in this article. They discussed importance to conduct user studies. User studies are helpful to identify the user needs. Authors have tried to focus the studies in two ways. First is to promote evaluating visualization methods with user studies and second is to ask where user studies might be useful, and where other techniques might be appropriate. Sridhar (1995) in his article presents the thoughts on significance and scope of user studies as well as the methods and techniques used together with a step by step procedure for conducting sound user studies in a simple and brief way. Author discusses the need to understand about users, their characteristics, requirements, behavior, attitude etc. and evaluation of users to be conducted for providing better services form libraries.

(Robert K et al Robert Kosara, Christopher G. Healey, Victoria Interrante, David H. Laidlaw, Colin Ware, Thoughts on User Studies: Why, How, and When, IEEE Computer Graphics & Applications (CG&A), Visualization Viewpoints, vol. 23, no. 4, pp. 20-25, July/August 2003.)

(M. S. Sridhar (1995), Understanding the User - Why, What and How? Library Science with a slant to Documentation and Information Studies, 32 (4), December 1995, 151- 164.)

Wildemuth (2003) in his study prominently highlighted the need of user studies for improving librarianship in libraries. User studies are now popular as user behaviors or information seeking behavior of a particular kind of users and author emphasized on the fact that such studies are necessary for improving activities required for library and librarianship. Information needs of the user are very much essential to evaluate in the era of information and technology which helps in providing better services including qualitative information acquisition or qualitative collection development, designing new databases for users, developing online library system in libraries and hence specific importance is gained to users studies by which librarians could analyze effective needs

of users and based on these they can develop different activities and services which are user centric.

Nick Bryan-Kinns and Ann Bland ford (2000) have examined the use of digital libraries in terms of interaction and its properties. Authors have discussed issues reported from the survey of users and potential users of digital libraries-who use, or might use, digital libraries, study of digital library interfaces etc. Various techniques used to conduct surveys of digital library use and their suitability is also discussed in the communication.

Wilson (2006) discusses the issues of user studies and information needs in the context of information science. The author has published his views as part of his project report conducted in 1980. Author emphasis on methodologies for the conducting study of human information seeking behavior, focusing on qualitative methods and action research. Author also highlighted importance related to information user needs, information behavior.

William J Maher (1986) in his article discussed about the archival and manuscript programs services offered to users. It outlines methodologies for regular analysis of daily use and for specialized studies of specific aspects of reference service and provided examples of both kind of user studies in his communication. Lowell A Martin (1976) described various kinds of use studies and user studies and list out guidelines for user studies. Author also describes in details application of user study methods and its useful to library professionals and emphasized more on value of user studies in library planning. (Martin A. L. 1976, User Studies and Library Planning https://www.ideals.illinois.edu/bitstream/handle/2142/6863/librarytrendsv24i3g_opt.pdf?sequence=1)

Wilson (1999) in his study clearly indicated that there is a need to assess user needs in relation to information from the library users. Author discussed in his case study the importance related to user studies and suggested that user analysis and need analysis are considered to make the library activities successful.

Information seeking behavior refers to the way people search for and utilize information. Wilson (2000) described information behavior as the totality of human behavior in relation to sources and channels of information, including both active and passive information-seeking, and information use. Author described information

seeking behavior as purposive seeking of information as a consequence of a need to satisfy some goal. Information seeking behavior is the micro-level of behavior employed by the searcher in interacting with information systems of all kinds, be it between the seeker and the system, or the pure method of creating and following up on a search. (http://en.wikipedia.org/wiki/Information_seeking_behavior)

(Wilson, T D., 2000, Human Information Behaviour, Informing Science, Vol.3 No.2, 49-55)

Summary: Libraries and information systems are designed and built-with the primary objective of meeting the information needs of a group of people who constitute their clientele. In the past, information systems and services were developed based more on 'literary warrant' rather than 'users warrant'. The user is the focal point of all information activities at all levels. User is a broad concept which may include both producers as well as clients of information. The user demands are more based on the activity and project in hand. There is always a need to assess user need and demands, hence user analysis is required at regular intervals. There are different methods of conducting user analysis studies. But the majority follows survey method for analyzing users need.

2.3.7 Trends and Transformation of Libraries:

Ajanappa et al (2009) have explored the impact of Information and Communication Technology on entire gamut of library sector. Conceptualizing the transformation of conventional libraries into Librarian 2.0, libraries 2.0 and Web 2.0 tools are changing scenario of information industry. Further they described the role of libraries in supporting teaching and student community by means of developing Indigenous knowledge and organizing the content of open access e-journals, digital repositories, free courseware's and instructional materials to the users by establishing state-of-the-art ICT facilities.

Rameshwar Dayal (2012) in his article discussed applications of information communication technologies in the college libraries and highlighted the benefits of ICT in library applications and due to this libraries are moving faster than ones imagination resulting in information explosion crossing geographical boundaries. Author also explained how information communication technologies helped to remove barriers of

distance and time, different ways used by modern technology for speedy retrieval of information most consistently. The modern technologies are also helping every reader to get the information. Importance of information communication technology in libraries provides immediate and easy access to information that lead towards the modernization of college library services which is an essential practice to follow.

Williams and Sochats (1996) in his article provided an introduction to expert system technology and intelligent agents/assistants as well as discussed the role of technology that has a potential use in work activities performed in libraries and information centers. In addition, authors have also provided some indication of expert systems developed in areas of LIS activities which have proved useful and whose techniques could be incorporated into intelligent agents/assistants.

Elaine et al (2012) in their article presents a library readers' desk management system with the use of fingerprint biometric and barcode technology to the activities of a library's readers' services. Author tries to show the proposed system which is capable of reducing the time spent and errors associated with identification and verification of users and library books as well as charging-in and charging-out of books to library patrons. Thus ICT played an important role in transforming the functions of libraries.

Dubey (1996) in his article explained the concept of expert systems and how it functions for libraries. The components of expert systems: developing the knowledge base, the inference engine, user interface and the knowledge acquisition module etc. are explained. The various activities in the LIS field where such systems can be put to use are also discussed well in this communication. Vinitha et al (2006) highlights the changing dimensions of library services due to the impact of ICT. The various aspects of digital library, its purpose and advantages are discussed in the communication. The most essential features such as infrastructure, staff support and budgetary aspects are discussed well with respect to Indian context.

Tyagi (1998) emphases the various issues connected with information provisions for decision making and problem solving in socio-economic development. The author suggested that only inter and intra disciplinary approach can provide effective information support in this area. The exchange of knowledge and experience through networks can speed up the process of problem solving and decision making in a development using ICT. Murthy (1994) in his article discussed various information

storage, retrieval and disseminations methods. User's behavior for seeking the information is also discussed. Author outlined how users feel comfortable to use the current e-media while some others continue to prefer paper-based information. Every user or reader gets his medium and every medium have its users. Author correlates the famous Five Laws of Ranganathan with the IT-based library services though transformation is taking place but the laws are still universal.

Neena Singh (2001) in her article focused on the impact of Internet on various library processes, services and products. Author also emphasized on the challenging role of librarians and information professionals in the present internet era. Today the internet has revolutionized the traditional library activities viz. document acquisition, technical processing, circulation, reference service, resource sharing, document delivery, etc. The crucial role of librarians and information professionals is in designing and maintaining libraries' web page/website leading to increase in library efficiency. The transformation is treated as boon in the LIS society.

Jeevan and Dhawan (2002) highlights the problems and issues in the transition of libraries to a digital library environment. The problems and issues relate to integration of information technologies in libraries and information centers, in particular to relevant aspects such as IT infrastructure planning, digital library tools and software, models for resource development, IT training needs, resource development, content development, and copyright management, etc. Authors also discusses on the changing roles of the libraries and librarians in the context of emerging digital library environment.

The rapid developments and use of information technologies have already laid a solid foundation for a new innovative developments in libraries including university libraries and academic libraries as well as other types of libraries. Due to new advances and use of emerging technologies and cutting-edge technologies, academic libraries have already initiated steps towards transformation in their functions. The libraries in the modern era are differently recognized as; information centers, learning centers, training centers, publication centers etc. (Lilili, 2009). In addition to the technology World Wide Web (WWW) (the invention of Tim Barnes Lee), has also influenced for the transformation of libraries as knowledge resource centers, rather than store house of print media. The impact of this change is all pervasive and affecting all the aspects of

library operations, information resources and services, staff skills requirements and users expectations. The accelerating pace of technological developments has tremendously increased the ability to access, store, and process, communicate and deliver information services at the desk-tops of the library users. The library services are now Web-enabled and attention is being focused on designing user-friendly and easily managed and maintained libraries by developing library websites.

In the context of change, the libraries have brought in revolutionary changes in the concept of organization/institution, functioning and management of library and information systems throughout the world (Houghton, 2000). The convenience and availability of e-information sources from the Web have dramatically altered the information landscape and the functioning of libraries (Kuchi, 2006). Website serves as the primary tool in the delivery of services (Shropshire, 2003). To develop libraries (Balas, 1998) – there is a needs to assess the quality of academic libraries through the web (Chao, 2002). The library's home page represents a new platform for the delivery of varieties of library services (Bao, 2000) and provide academic libraries to provide different resources available over the net. The transformation has occurred due to these development in the libraries. (Detlor and Lewis, 2006)

According to Diaz (1998), "a library website can play different roles; it can serve as a workstation where a user finds links to databases, electronic texts, and the online catalogues. It is a way to make available library resources and products, as well as different internet resources for the better use of resources and fulfilling the need of the users. It also plays a role of communication tool where information about services, people, facilities and collections can be made available to users. The webpage offers the possibility to become disseminators of information through developing proper website of library and provide links to it. The most effective library website appears to be the one that has a clear sense of purpose as well as a clear sense in fulfilling users' needs. Therefore, an important aspect of planning and maintaining a website is to identify the likely users and to review their needs. Rozic -Hristovski , Todorovski and Hristovski reported about developing a library website and suggested a guide to library services and resources in 1997. In the early 1990s Nielsen and Rubin pioneered the testing of websites to determine whether websites met users' needs. They adapted

usability engineering techniques developed for computer software design and applied them to web design.

Summary:

Transformation in library activities is resulted due to the applications of ICT in libraries. In the information explosion era there is a need to adapt the new tools and techniques for collecting and sharing information. The libraries are changing the faces due to ICT. In case of industrial libraries there is also a need felt to use ICT for providing different user services. Transformation is essential in all libraries including industrial, business, chemical and commercial libraries. The trends are towards adapting technologies and provide value added information services to users or user centric services based on technology use.

2.3.8 Information Services Delivered through Industrial libraries:

Choughule (2007) explains the role of digital information services in corporate libraries. Corporate libraries have different users with different requirements. Author discussed the role of digital information which has added a new dimension to information technology, which gave birth to new concept of digital information services. The author opined that effective and efficient use of new technologies helped librarians to improve the library's image and services. Author also focused on digital information services provided and the effects of services to assist members of the library along with organizing material or making them more widely available. Author suggested that in today's era a library whether big or small or any type has to provide better or more accurate information services to its end users at minimum cost and time. Ramanand Malviya and Sundar Rajan (1996) reviewed various avenues available for a modern library to access remote databases and provide an efficient and comprehensive service to users. It specifies gateways of online services available to Indian libraries and lists the hardware needed to use such services. Some of the upcoming Indian networks are also briefly discussed in the communication.

Tehobanoff and Price (www.ideals.illinois.edu) in their communication Industrial information services: expectations pointed out that the industrial sector may include

chemical, mechanical, electronics, etc. need programs to improve quality of its products and services. The industrial librarians must be expert in online searching of literature from databases, understanding needs of users and their expectations, provide proper reference service to users, service attitude and for this the librarians need special skills of leadership, data collection skills, interpersonal skills etc.

Summary of Literature Review:

The major sources used for the literature for this topic includes research papers, conference papers, thesis, databases like EMRALD, EBSCO, Science Direct etc., LISA and different online sites searched through web pages using internet. The facets were selected to collect the data on the topic of research. The researcher analyzed the data based on the experience of chemical industry libraries and deduced the following facts which are more essential for the managing industrial libraries and their specialties etc.:

- Chemical Industries anywhere in the world are in progressive trends and forms assets for the national income generation. Globalization, collaboration has made the industry decor more competitive and every industry needs innovative products for their company to compete in the market. A new trend of filing monopoly of products and processes in the market by filing patents is the trend to get more benefits form the products. Hence multinational large scale industries are developing IPR units and libraries to support the research activities. It is true that all chemical industries have same status but now many industries (40%) have their own setup of R & D and well supported information infrastructure by developing information centers managed either by librarian or a chemist. Chemical industries are in progressive demand as they produce human life supporting products.

- Libraries or information centers or KRC's are established only at multinational large or middle scale industries where R & D has more value. The libraries are not rich in collection but the professionals are aware of using online and e-documents to fulfill the needs of the users. The functions of the libraries attached to chemical industries are same as that of special libraries but the importance is given more towards information services and provide data on specific topic available for the use of R & D. Thus librarians need more skills in searching information and getting it in time and also make aware of information to the respective user. Thus libraries in this sector are not prominent but their existence is required by the multinational

- The collection of industrial libraries are not prominent but wherever libraries are there the collection contains majority of Journals and reference books. The collection of "topics, trends, reviews "are more in the collection. The collection is based on "on demand" from the user which is based on the project based requirement. Mostly online searching of databases especially "SciFinder", Patent databases etc. are more useful to the users. Rest the full text is collected from the clearing houses. Many cases users visit to the prominent institutes where more chemical information can be searched like university libraries and departments of chemistry, UDCT Mumbai, IIT libraries, CSIR laboratories etc. The DDS is more popular among these libraries.

- To assess the user needs librarians have to use survey and many other research techniques and analyze the need of the users. But it is noticed that the researchers form industrial libraries need current, exact, and pinpointed information on the topic of the research. This is possible only by searching online databases and coordinating with chemical information centers. The needs of users are varied and consist of data required for the project undertaken by them. Assessment of need is difficult and hence librarians have to always get the feedback of users.

- The libraries in this zone are mainly advanced and uses technologies. The libraries functions are more depending on services rather than collection. Providing access to information is main key element rather than owning the literature. Thus to cope up with the competitive world these libraries have to be transformed and use of internet, intranet, searching databases are more essential.

- Information services are main task of the industrial libraries.to perform. They need advanced searching instead of common serving. The main requirement is of CAS, SDI, and Alert services.

- The role of librarian is difficult in this sector and need to have additional skills and socialites to manage industrial libraries. Vic Searching and analyzing data, procurement of specialized literature, visiting different library to collect data on the topic suggested.

Thus the role of industrial libraries is different than the special libraries even these are considered as social libraries. The researcher noticed form the literature review that there are no more studies in the area of chemical Industry libraries conducted in the

recent past. But the need of the chemical industries is increasing and information support is also required to the users. It is also noticed that no similar topics were located, which are associated with chemical industry libraries.

However few studies reflected in literature search are:

1) Kruzas, A T (1960) the development of special libraries for American Business and Industries. PhD Thesis. University of Michigan

2) Kruzas A T (1965) Business and industrial libraries in United States. 1820-1940. New York SLA

3) Tenopir, C (1985) Characteristics of corporates that founded libraries. 1910-1921. Special Libraries 76(winter) p 43

4) Moore E (1987) corporate science and technology libraries: 100 years of progress. Science and Technical Libraries 8 (Fall) 51

5) Brimsek, T (1989) From Top: Profile of US and Canadian corporate libraries and information centers. Washington DC SLA pp 258-63

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It is observed that in developed countries like USA few studies are tracked which are related to chemical industries but in case of native countries researchers undertaken industrial library topics but not in specific to chemical industry libraries. Since the researcher is working for the chemical industry library tempted to look in to this topic. Even in developed countries users could get very small sample for survey as industries having libraries are very notable and countable to few.

From this review it is noticed that there is a need to assess the chemical industry libraries to get awareness of these special type of libraries. Hence researcher planned to undertake the study on chemical industry libraries in Maharashtra state in which stays of libraries and user needs are focused more.

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http://www.emeraldinsight.com/doi/abs/10.1108/eb049356. Accessed on 23rd January 2015.

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9 Choughule, Pradnya (2007) Role of Digital Information Services in Corporate Libraries. 5th Convention PLANNER -2007, Gauhati University, Guwahati, December 7-8. Corporate or commercial libraries In Wikipedia. Accessed at en.wikisource.org/wiki/. Accessed on 22nd February 2015

10 Dayal, Rameshwar (2012) Recent Trends of Using ICT in Modern College Libraries. International Journal of Engineering and Mathematical Sciences Jan. - June 2012, Volume 1(1) pp.55-59

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CHAPTER 3

IMPORTANCE OF CHEMICAL INDUSTRIES

3.1 Introduction:

Chemical industries alone contribute at an alarming rate in the production of different industrial products. The categories of chemical products are generally grouped into basic chemicals, specialty, fine chemicals, plastics and fibers, pharmaceuticals, paints and coatings etc. Chemical companies has employed nearly one million workers in USA including more than 90,000 scientists, chemists and engineers who work in research areas and functions, and they account for more than 2% of the total US gross domestic product and 12% of the manufacturing gross domestic products. The similar conditions are also visualized in the developing countries too, though not so high as developed countries but are taking part in the race.

The major products of chemical industries are basic chemicals, commodity chemicals to polymers and speciality chemicals. Basic chemicals or commodity chemicals are broad chemical category industry which includes polymers, bulk petrochemicals, intermediates, derivatives and basic industrial, inorganic chemicals and fertilizers or pesticides. (India Chem 2010). The chemical industry develops new products and manufacture variety of products for human lives. Many of the products such as perfumes, soaps and detergents, are purchased by the consumers directly, other industries and branches of chemical industry develop new innovative chemicals and byproducts by using 70% of chemicals manufactured. The chemical industry sector has witnessed growth nearly about 13-14% in the last five years. In India chemical industries are also growing fast and competitive in the global market. The major causes in growth of chemical industry in India are identified as under: (http://www.ficci.com/sector/7/Project_docs/Chemical-Petrochemical-sector.pdf)

- Increasing urbanization and demand for the products like paints, textiles, cosmetics, constructions etc. which supports to the growth and also predicted 10-13% rise in future.
- Internal consumptions of products are 33% average of output and likely to increasing in future
- Diversified manufacturing base which support to produce world class products

- Export of chemical products 5.4% in dyes pigments, pharmaceutical products, agro-chemicals etc.
- Global competition is increasing and import / export policies are simpler. Chemical Industries has been recognized as India's economical key growth by the Government .Indian Government has permitted 100% FDI in chemical sector. Number of incentives and initiatives has been added in the 12th five year plan (1912-1917), which boosts in growth of chemical industries.
- Govt. want to increase GDP up to 25% till 2025 from current 16%
- Govt. want to support chemical industries to develop bio based products to reduce dependencies on other countries and enhance export promotion.

Due to these facilities more chemical industries are collaborating with multinational companies and develop new competitive products for use.

3.2 Importance of Chemical Industries:

Almost everything used in human life for the human survival is made up of chemical products. In the modern world Chemical industries play an important role. In every industrial process chemical products involved which play an essential vital role. The Chemical industry is the one responsible industry for converting raw materials like natural gas, oil, water, air, minerals and metals in to more valuable products. The different chemicals used like basic chemicals which include fertilizers, petrochemicals, inorganic chemicals, reaction intermediates and polymers. For construction pipes, tools, appliances, electronic devices, toys, games, transportation, clothing and textiles, packing, and manufacturing many other products polymers and plastic are used. Crude oil or petroleum, Liquefied Petroleum Gas (LPG), natural gas raw materials are used to produce polymers, other organic chemicals and specialty chemicals. (http://www.inquimica.com/chemical-industry-modern-life.html) More than 70,000 different products are manufactured through these industries. (www.en.wikipedia.org/wiki/chemical_industry_chemical industries, and https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

Basic Industrial chemicals include explosives, resins, pigments, synthetic rubber, and rubber products. The oldest chemical categories belongs to Inorganic chemicals which include daily products like soda ash, caustic soda, salt, acids like nitric, chlorine, sulfuric and phosphoric acids, and hydrogen peroxide, which are important for branches

of chemical and other industries. Chemicals like phosphates, potash and ammonia are basic fertilizers which belong to a smaller category of chemicals used to make the soil more fertile for more production of agricultural products and growth of various plants. Biological substances and chemicals are used by life sciences for manufacturing animal health products, vitamins, pharmaceuticals and pesticides. As compared to other chemical sectors this industry produces the most expensive products which contribute a very small volume. Life science products are produced with detailed specifications and to have best quality. Before introducing a product in market a lot of investments are made in research and investigation. Government agencies keep a close eye and strictly scrutinize the chemical industry for any malfunctioning. (http://www.inquimica.com/chemical-industry-modern-life.html)

Specialty chemicals are of a specific categories and covers very high valued chemical products which are rapidly growing today, innovative products which makes todays living better and safer includes adhesives, industrial gases, electronic chemicals and others. Finally, the consumer products like detergents, soap, and cosmetics are directly marketed to the customers. (http://www.inquimica.com/chemical-industry-modern-life.html)

Specialized finished products are transformed from raw materials by undergoing various chemical processes in the chemical plants. The chemical industries relies on the knowledge and investigations of the chemical properties of different materials. (http://en.wikipedia.org/wiki/Chemical_industry, http://www.inquimica.com/chemical-industry.html and http://www.rsc.org/get-involved/importance-of-chemical-sciences/)

3.3 Status of Chemical Industries:

Among all the industries chemical industries have ranked status in the world, as it helps directly to the welfare of the human society. Tata Management Group (2014) pointed out that at global development and contribution to GNP, chemical industry accounts for $1.7 trillion sales per annum. Among the world development US chemical industry is the world's largest producer of different chemicals. There are hundreds of chemical companies with more than 2,800 facilities abroad and 1,700 foreign subsidiaries or affiliates operating in US. (Tata Management Group 2014)

The Indian chemical industry (large, medium and small scale) has about 70,000 chemical manufacturing units located in different parts of India. But a major share is of small scale sector. The top ten chemical companies listed as per the 2012 based on revenue earned indicators are: (http://www.ficci.com/sector/7/Project_docs/Chemical-Petrochemical-sector.pdf)

- Tata Chemicals
- United Phosphorus limited
- BASF
- India Glycols
- Pidilite Industries
- Vikas WSP
- Phillips Carbon Black Limited
- Gujrat Heavy Chemicals
- Aarti Industries
- Gujrat Alkalies and Chemicals Limited.

Petrochemicals and polymers constitute 70% of end products in India. The main industries involved in this sector are:

- Reliance Industries Limited (RIL)
- Indian Oil Corporation Limited (IOCL)
- Haldia Petrochem Ltd. (HPL)
- Gas Authority of India Ltd. (GAIL)
- Hindustan Petroleum Corporation Limited (HPCL).

3.3.1 Products of Chemical Industries:

The products of the chemical industry are generally categorized in:

- Basic chemicals
- Speciality chemicals
- Consumer chemicals

A) Basic chemicals:

Basic chemicals are further bifurcated into

- Petrochemicals (Chemicals derived from oil)
- Polymers

Basic chemicals, produced in large quantities and marketed to the branches of chemical industry and other industries to produce finished products that are sold to general consumer. For example, to make esters Ethanoic Acid is used, which further utilized to make paints. In Europe Poly (Ethene) and other polymers are made by supplying large quantities of Ethene gas by pipeline, which are then marketed to manufacturers of plastic components before being sold out to the actual consumer.

Throughout the world many changes and development of very large sites has been seen in production of petrochemicals and polymers from petroleum especially from coal and biomass. Straight chain Alkanes, mainly the hydrocarbons in crude oil and gas are first separated using their differences in boiling points by distillation process. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html). Branched chain Alkanes, Alkenes and Aromatic Hydrocarbons are converted to wide range of basic useful chemicals like (petrol, ethanol, ethane-1,2-diol) or are further used for reactions to produce a useful end product (for example, phenol to make resins and ammonia to make fertilizers). (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

Basic Inorganic Chemicals are used throughout manufacturing and agriculture which are relatively cheap. Chemical products like Chlorine, Sulfuric Acids, Sodium Hydroxide and Nitric Acids etc. are produce in large quantities per year at a reasonable rate with stringent environmental and safety standards other than Europe and Us, which led to tough competition in global market. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

B) Speciality chemicals:

In US and Europe major focus has been laid on this category which covers a wide variety of chemicals for colorants (dyes and pigments), paints and inks, and crop protection, paper, diverse as textiles and engineering. Better and more stable

profitability with new environmental regulations and rising customer needs have been achieved with effective and active research and development (R & D) in Speciality chemicals.

C) Consumer chemicals:

Detergents, soaps and other toiletries are examples of consumer chemicals which are sold directly to the consumers. In last two decades industrial researchers have developed more effective detergents for cleaning large industrial plants to sensitive skin. Wider range of synthetic chemicals for fragrances, cosmetics and toiletries, has evolved through research and development. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

D) Research and development (R & D):

Although research and development is crucial, expensive and time-consuming to the industry's evolution but to keep competitiveness in the industry must find new products which enhance the quality of life. This can be achieved by proper planning of accessing cheap raw material, labour, technology and mass production with a superior marketing and sales channel. While doing production in chemical plants the environmental balance should also be maintained.

The R & D cycle - involves not only researchers, scientist, chemists and chemical engineers but other experts; financial managers (for raising the large funds required), legal (to secure patenting and copy rights), many others like libraries and information centers , Knowledge managers to assist researchers in providing the information needed as well as marketing team(to sale new or improved product), . (http://www.indiamart.com/ramyagroup/about-us.html; and http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

E) New Innovative through R & D:

For industry's evolution research and development is crucial though it is time consuming and expensive. To keep competitiveness, the industry need to develop new enhanced products which will uplift the quality of life as well as fulfill changing consumer demands. Chemical Industries should focus on bulk production by utilizing

the minimum raw material, energy and latest technology which will make less environmental loss, give priority to safety measure with reduction in capital expenditure. Speciality chemical companies rear good centers of R&D within both the commercial and university sectors. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

Sometimes discoveries have took place in industries e.g. the discoveries of both low density and high density Poly (Ethene). With specific aims in mind discoveries has been made by clever ideas of chemists e.g. The discoveries of Polyesters, Polyamides, and, much later, linear low density Poly (Ethene). Research on use of new catalysts is still very fruitful and new catalyst for the manufacture of Methanol at lower temperatures and lower pressures than previous and saves much energy. New research areas are now commercialized which include biotechnology, nanotechnology and the development of biofuels to supplement oil supplies. The development of Green Chemistry, improved octane rating of petrol, water-based paints, replacements for Chlorofluorocarbons (CFCs) have made significant benefits to the environment by the new researches evolved.

The first step is to carry research work in laboratories of universities and industries and then convert the successful research into realistic industrial processes and production. Once the research is successful it is the job of chemical engineers to start bulk production into the plants at a cheaper rate. It is a Hercules task for the chemical engineers to mimic the large scale process and achieve the desired output under controlled conditions with a higher yield at a suitable rate. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

For conducting research and development activities which includes development of innovative practices need support of information or library. The new literature on the topic of research is essential for R & D chemist. It is also observed that large scale medium scale, multinational industries have established well developed library system to support industrial activity. Professional librarians with subject knowledge are selected for the post of librarians having capacity to serve users based on their needs. The user centric services is the need of industrial libraries. The collection though not

sufficient but the librarians are collecting information from different sources. In industries new product and process development is continuous as well as intellectual monopoly rights are also tried to secure by the industries for the profits. Thus libraries plays an important role in supporting industries for information support.

3.4 Challenges in Chemical Industries:

Many challenges are visible in chemical industry sectors and few major challenges are listed below which are summarized from http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html:

- Worldwide huge changes are undergoing in the chemical industry. For export and their own consumption companies in Middle Eastern countries, China, India and Brazil emerging as manufacturers of chemicals on a mammoth scale, Due to open economy and global markets US and European companies are investing in these large emerging countries vice versa these countries are also investing in plant in the US and Europe. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)
- A new research is being done to replace oil and natural gas as it is becoming scarce and expensive day by day. Coal and biomass are also looked upon as an option for future fuel needs to be fulfilled as per the growing consumer demand. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)
- In the late 19th and the first part of the 20th centuries, the organic chemical industry was based largely on coal and biomass. In the absence of air to form coal gas coal was heated strongly (a mixture of hydrogen, methane and carbon monoxide). Coal Tar a liquid by-product which contained many useful organic chemicals, including benzene, and an impure form of carbon was coke which was the source of synthesis gas. To yield carbon monoxide and hydrogen steam at high temperatures was passed over it. Biomass was another source of organic chemicals. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)
- Better and better ways has been found since 1940’s onwards, from refining of oil to produce many more other chemicals elaborated above. An example is the

growth of the petrochemical industry with new innovative polymer products, detergents etc. at a lower cost. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

- As oil and natural gas supplies are becoming scarce day by day we have to find new technologies which are less dependable on non-renewable resources. Researchers have to find out new energy sources which can be environmental friendly as well as produce on a large scale with less resources utilized at cheaper rate.
- By using alternative routes and catalyst aid it is the greatest challenge to find ways to run the chemical plants at a lower temperature. Also we have to find new alternatives to produce energy without depending on non-renewable resources. (http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)
- The new technologies based on nano-materials forefront in future advances in the chemical industry and it will be important to ensure that the production of these revolutionary materials is safe and of economic benefit.(http://www.essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)
- In the 21st century chemical industry has to face many challenges to remain as major economy sector in every country. The chemical industry has to play an important role in helping the society to maintain and improve its safe and quality standard of living.
- The industries need information support from the libraries, this is also a challenge for the chemist's. In China for industries "China National Chemical Information Center (CNCIC) is established. This supports to the information needs of industrial researchers and chemist. Such Information centers are needed in every country for providing support.

The challenges are tried to solve by the industrial associations, Govt. policies etc. But need more efforts towards solving the issues. The very notion of sustainable Development requires new approaches in a number of areas. For ensuring environmental as well as economical goals and betterment of society new innovations would play an effective role in all levels and fields of activity undertaken.

(http://www.icca-chem.org/ICCADocs/1996-01-Policy_Paper_on_Sustainable_Development.doc)

Increase Human life span with a healthy living in green environment is the most important contribution done by chemical industry by researching and innovating new and better products. This contribution is based upon the knowledge and experience the industry has acquired from applying innovation not only to making, handling and use of chemical compounds, but also to reprocessing, recycling and solving environmental problems. Sustainable Development is being achieved by new innovations in various product developed by the chemical industry. (http://www.icca-chem.org/ICCADocs/1996-01-Policy_Paper_on_Sustainable_Development.doc)

This concludes:

- New researcher work should be under taken consistently to develop new better products with the best technologies for a better future
- Environmental safety majors should be followed for a greener tomorrow.

3.5 Chemical Industries: Brief Overview

3.5.1 Global Overview:

Globally the chemical industry is estimated to be USD 3.4. Trillion. Chemical Industry is growing very well @ 9% PA up to 2008 and also rising since 2010. Basic chemicals constitutes 45%, Biotechnology 5%, Agrochemicals 1%, Speciality chemicals 22% and Pharmaceuticals 27%. Thus Basic chemicals is the largest among the chemical industries followed by pharmaceuticals and speciality chemicals. (India Chem 2010)

In the USA the initial development of Chemical industries were started by Dow and Dupont, both the chemical companies are at fourth and seventh positions today in the world situated in Midland, Michigan and Wilmington, Delaware. Large salt deposits which contained high concentration of bromide irons was the main reason for developing industry by Henry Dow at Midland in 1897. Dow had patented two methods for obtaining elemental bromine from these deposits. DuPont's Eleuthère Irénée (E I) du Pont fled to the United States from the French Revolution. In 1802, Henry Dow started his first powder mill site near the river banks Wilmington by paying $6,740 to Jacob Broom, a local businessman after arriving at a considerable experience in

producing gunpowder. . The machinery of the mill was drove by the falling water and the willow trees on the riverbanks were turned into charcoal, being one of the ingredients of gunpowder. The site was selected far away from Wilmington so that in case of explosion the harm will be less but was near to the river for easy shipping out of powder. Hence it was a perfect and logical location from business point of view. (http://essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

During this time Bayer and BASF two German companies were established in 1863 and 1865 respectively. Bayer's encouragement was the river Rhine, a branch of which is in the city of Barmen (now is a part of Wuppertal city). This city was selected as it was near coal fields as well as power and transport was easily available. So a factory was set up by Friedrich Bayer and Johann Friedrich Weskott, for manufacturing a synthetic dyestuffs which was derived from coal-tar and useful for the textile industry. (http://essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

BASF, like Bayer, was established near civic utilities and with an intention of early industrial recycling for producing dyes. In 1861 Friedrich Engelhorn built a gasworks in Mannheim and installed the street lighting for the town council. For producing dyes coal tar a byproduct was utilized in those times. Other chemicals notably alkalis and acids were used for manufacturing dye production, Due to its location in the Grand Duchy of Baden and production of wide range of chemical products Engelhorn called his company Badische Anilin- & Soda-Fabrik The plant was built across the Rhine at Ludwigshafen to avoid pollution near the city with an insight of a better environment for the citizens. (http://essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

In UK the locations of much of today's industry also relate to the nineteenth century's industrialization. For example, Due to closeness of ports suitable for easy transport, availability of raw material in form of coal mines and iron ore (for steel industry) resulted in concentration of the chemical industry in the Northeast of England. Similarly in the Northwest of England the availability of local coal and salt mines and the ease of transportation through canal to a main port of England, helped to boost the strong chlor-

alkali industry (sodium hydroxide, chlorine, sodium carbonate). The dyestuff industry developed around Manchester on the grounds of great cotton mills in Lancashire.

Pharmaceuticals to plastics and with many other chemical products manufacturing companies mentioned above have flourished and expanded during the subsequent 150 years. To satisfy increasing customers' demands factories have been installed worldwide Nevertheless, factors considered in the nineteenth century for establishing and expanding the chemical industries are active today, for example: access to raw materials, plentiful water supplies, good transportation and communications (road, rail and port facilities), for the products reliable energy supplies, and the availability of skilled labour.

After 1945 and during the twentieth century petrochemical/polymer industry developed which changed the importance and dimensions of oil and natural gas feed stocks. Due to which some installations are sited adjacent to oil fields. For example, In Texas cluster of companies are sited near the oil fields that are involved in discoveries and development of gas shale. Places like Texas, Colorado and Pennsylvania are being chosen for new investment in chemical plants. Refineries and chemical companies have been built on the coast of many countries, due to access to the sea for transportation, whether they import oil and gas or have their own production plants (http://essentialchemicalindustry.org/the-chemical-industry/the-chemical-industry.html)

3.5.2 National (India) Overview:

Growth of Chemical Industry:

In the last 5 years petrochemicals have registered a growth of 8-9% while the chemical sector has witnessed overall growth of 13-14% over the same period. The major growth drivers, behind India's chemical industry could be listed as follows: (http://www.magships.com/india-growth-of-chemical-industry/)

Ø Structural advantage: With a growing market and purchasing power, the domestic industry is likely to growth at over 10-13% in the coming years. Growing disposable incomes and increasing urbanization are fueling the end consumption demand for paints, textiles, adhesives and construction, which, in turn, leads to substantial growth

opportunity for chemicals companies. (http://www.magships.com/india-growth-of-chemical-industry/)

Ø High domestic consumption: The chemicals industry in India is the largest consumer of its own products, consuming 33% of its output. With promising growth trends in the chemicals industry, this internal consumption is also set to rise. (http://www.magships.com/india-growth-of-chemical-industry/)

Ø Diversified industry: The Indian chemicals industry has a diversified manufacturing base that produces world-class products. There is a substantial presence of downstream industries in all segments. Further, this large and expanding domestic chemicals market also boasts of a large pool of highly-trained scientific manpower. (http://www.magships.com/india-growth-of-chemical-industry/)

Ø Promising export potential: Chemicals constitute ~5.4% of India's total exports. India already has a strong presence in the export market in the sub-segments of dyes, pharmaceuticals and agro chemicals. India exports dyes to Germany, the UK, the US, Switzerland, Spain, Turkey, Singapore and Japan. (http://www.magships.com/india-growth-of-chemical-industry/)

Future Prospects and Investment Opportunities:

By 2021, Indian chemical industry is expected to double its share in global chemical industry to 5-6%. By registering a growth of 8-9% in next decade. Indian Chemical industry can achieve significant growth provided some of the key growth imperatives are taken care of. Securing Feedstock, Right Product Mix, M&A opportunities are currently the key imperatives for chemical industry in India. Few investment opportunities can be highlighted as: (http://www.magships.com/india-growth-of-chemical-industry/)

Chemical companies in India can either explore alternate feedstock or invest in setting up plants in resource rich nations to secure feedstock. Companies need to invest in exploring the right product mix to be competitive and profitable using the available feedstock in India i.e. Naphtha and its derivatives Indian companies can explore possible Merger, Joint Venture opportunities for technology, capital or access to international market by taking advantage of increasing expansion of western companies

in India. Chemical companies can invest in exploring strategic energy management and strategic water management to cut down their energy costs and contain water availability concerns Companies can invest in upcoming PCPIRs in India and overcome challenges related to infrastructure, power and water availability. There are good opportunities in segments such as Speciality Chemicals, Speciality Polymers, for catering to huge emerging domestic demand as also as a manufacturing hub. (http://www.magships.com/india-growth-of-chemical-industry/)

Factors Influencing the Growth of Chemical Industry:

 setting up the Training center for the new talented pool of chemical engineers.

 to learn the art of developing the high quality, low cost manufacturing from lab scale to ton scale.

 Increase the R&D investment to enter the world of innovators

 Install the latest facilities and technologies to fast and large production to meet the demand of export.

 Tax Reduction and other incentives to be provided for flourishing the production rate of industry

 Development of SEZ and world class infrastructure along with improved facilities of transportation by railways, roadways and ports.

Economy of India has developed in which chemical industry had played an important role. The Indian chemical industry includes basic chemicals and chemical products, petrochemicals, industrial gases, dyes, paints and varnishes, agrochemicals and synthetic fibers. The index of industrial production (IIP) has tracked Chemicals and chemical products industry among the 22 industry groups in the manufacturing sector. In the fiscal year ended March 2015, the domestic industry recovered and is expected to continue on its growth track, with a boom in growing construction sector, agrochemicals and textile sector. New government policies such as “Make in India” campaign added to the growth of this sector. In its report IIP constituted that the chemical industry output was about 10.1% of the total industrial and grew at a CAGR of 2.1% during fiscal years 2007-12 and during 2009 - 2014 chemical exports saw a double-digit annual growth at a rate of 18%. As of FY14, in chemical exports organic

chemicals contributed 41% and plastic products up to 19% (http://www.researchandmarkets.com/reports/3246147/india-chemicals-industry-report-2015)

The Indian chemical industry (large, medium and small scale) has about 70,000chemical manufacturing units located in different parts of India. But a major share is of small scale sector. The top chemical companies listed as per the 2012 revenues are: (http://www.ficci.com/sector/7/Project_docs/Chemical-Petrochemical-sector.pdf)Tata Chemicals

- Tata Chemicals
- United phosphorus Limited
- BASF
- Pidilite Industries
- Aarti Industries
- Gujrat Alkali
- Deepak Nitrite
- Aditya Birla Chemicals
- Vinati Organics
- Navin Fluorine
- Alkyl Amines
- Kanoria Chemicals
- Vinyl Chemicals
- Mangalam Organics
- Sunshield Chemicals
- Dia –Ichi Karkaria
- Span Chemicals

- Clariant
- Sudarshan Chemicals

Petrochemicals and polymers constitute 70% of end products in India. The main industries involved in this sector are:

- Reliance Industries Limited (RIL)
- Indian Oil Corporation Limited (IOCL)
- Haldia Petrochem Ltd. (HPL)
- Gas Authority of India Ltd. (GAIL)

4. Hindustan Petroleum Corporation Limited (HPCL)

In the year 2010 Indian Chemical Industry produces US $ 83 billion PA. In India also basic chemical industries are on top (53%), followed by pharmaceuticals (24%). biotechnology 3%, Agrochemicals 2%, speciality chemicals 18%. Petrochemicals form largest segment in basic chemicals. Indian chemical companies are both domestic and multinational. Organic chemicals are playing significant role in Indian chemical sector. (OECD 2001)
(Ref: Organization for Economic Cooperation and Development OECD (2001) Environmental outlook for Chemical Industries. Accessed at www.oecd.org)

The characteristics of Indian Chemical Industry are: (http://glipho.com/reenadhiman/make-in-india-campaign-will-indian-chemical-industry-gets-the-boost-they-deserve)

- Third Largest producer in Asian region.
- Third Largest global producer in agro-chemicals
- Sixth largest producer of chemicals in world
- During 2013-14 19,300 metric ton production
- 16% global industry share of chemical industries and rise in following years
- In the last 5 years the chemical sector has achieved a growth of 13-14% while petrochemicals have gained by 8-9%.

Based on the net sales of the chemical companies the top ranked chemical companies are: (http://www.moneycontrol.com/stocks/marketinfo/netsales/bse/chemicals.html)

3.5.3 Maharashtra Overview:

The Indian chemical industry played an integral and vital role in the country's economic development and is one of the established traditional sector. It provides in the form of basic goods raw material a critical input for agriculture and industrial development. The Indian agricultural and industrial development has taken growth on the basis of immense contribution from the chemical industry one of the oldest industry. The chemical industry satisfies the needs and demands of sectors such as plastics, textiles, paper, printing inks, leather, and food stuffs, and many more. The chemical industry is one of the most diversified industrial sectors which includes basic chemicals and its products fertilizers, dyes and paints, petrochemicals, natural gases, pharmaceuticals, etc. More than 70,000 commercial products, are produced to feedstock the demands of downstream industries such as finished drugs, detergents, paper, dyestuffs, plastics, synthetic rubber, polyester, paints, pesticides and fertilizers. Over the years, the industry has been evolving with product research and innovations, maintaining the environmental balance and brand building. Also importance and focus is given to customers as with the new trend customer is the king of market. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

The industry comprises small-scale, middle scale and large scale units (including MNCs) producing thousands of products and by-products ranging from plastics and petrochemicals to cosmetics and toiletries. Almost a one third production is consumed internally by the chemical industry sector itself for developing new products and byproducts. In the Index of Industrial Production (IIP) chemical industry has a weightage of 14% which gives an indication of its importance and significance in the country's industrial growth. A development around 3% of India's GDP and estimation of USD 35 billion as on March 31, 2008 has been assumed due to many strategic and economic benefits to the nation by the chemical industry sector. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

The Indian chemical sector contributes 13-14% of total exports and 8-9% of total imports of India. It is the twelfth-largest in the world and the third-largest in Asia in terms of mass production. A potential for huge growth is visualized by the fact that one tenth of the world average per capita consumption is done of Indian chemical industrial products. Basic chemical or commodity chemicals production is an advantage that account for about 57% of the total domestic chemical sector. The chemical industry can be mainly classified into two segments – organic and inorganic chemicals. Organic chemicals cover over half of all known chemical compounds, including cosmetics, petrochemicals, agrochemicals, drugs etc. Inorganic chemicals contribute with dyestuffs, alkalis, dyes etc. More functional classification, can be done as basic, specialty and fine chemicals. ((https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

From the total chemical production in India Alkali chemicals form the major chunk i.e. 70% organic chemicals at around 20%. One of the important segments of the Indian chemical industry is the dyestuff sector which has linkages with a variety of other sectors such as leather, textiles, plastics, paper, printing inks and foodstuffs. 70% of the consumption of dyestuffs is done by the textile industry. Due to its growing significance of dyes and dyestuffs in sectors such as textiles, leather, plastics and foodstuffs. The production of dyes and dyestuffs is increasing day by day which has been very low.

In Maharashtra. During the chemical industries are well established with a production of major chemicals in the state was 565,481 MT for FY07. The total installed capacity increased to 1.02 MMTPA by the new production capacity added of 17,928 MT.

Under the National Industrial Classification, the chemical industry includes basic chemicals and its products like fertilizers, petrochemicals, gases, paints, varnishes, perfumes, soaps, toiletries and pharmaceuticals. Chemical industry is classified into five major segments comprising of alkali, inorganic chemicals, organic chemicals, pesticides, and dyes and dyestuff. Accordingly, information on these five major segments will be exclusively referenced in the Indian chemical industry. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

Availability of low cast labour and raw material offer a huge growth for the chemical industry with other allied industries such as food processing, textiles, plastics, rubber, leather etc. Also new government initiatives such as Special Export and Investment Zones, SEZs, cluster development and monetary incentives through fiscal policy have helped to develop and sustain the growth of chemical industry. Infrastructure development smooth, wider roads, train facilities and development of new ports JNNPT etc. have given anew boost to the development of chemical industry. However, lack of new technologies, unskilled labour, environmental norms are a threat to the industry. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

The task of remaining in the global competition and trends should be maintained by focusing on the area of expertise by the chemical industry. Research and Innovation enables focus on core competence and enables players to be leader in specialty products. Competitive advantage in business segment should be grabbed at an earlier stage by focusing on core competencies. By building R&D capabilities and incorporating new technologies in product and production process which will enable the industry to cut down in production costs and build its expertise in a chosen field. From the product design, end use, to its final disposal (hazardous waste) of products should be done with environmental international standards, managing the safety measures should also be focused. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

In the short run many threats are posing to the chemical industry like anti-dumping activities, Logistical bottlenecks, high fuel prices and raw material prices. To sustain the growth and development of the Indian chemical industry many factors as infrastructure, research development, skilled labour and easy availability of raw material has to be maintained. Improvement in export markets will improve the chemical industries future which is currently affected by economic recession. (https://www.dnb.co.in/IndianTelecomIndustry/Chemical%20overview.asp)

3.5.4 Mumbai and Pune:

Maharashtra is one of the largest states in India, the state continues in predominant position as an industrial and service center with Mumbai as the commercial and financial capital of the country. The state has been a preferred investment destination for both domestic and foreign companies because of the availability of skilled manpower, enabling infrastructure and socio-economic development. In 2009-10, the manufacturing sector accounted for around 21.4 per cent of GDP (at current prices). Maharashtra has been a pioneer in many of the policy initiatives that support manufacturing sector and the state government recognizes that manufacturing is a key driver of states economic growth.

Chemical sector has been traditionally strong in Maharashtra with specific strength in raw materials, Building Block production and Value Addition & Processing with clusters located in the Mumbai, Thane and Pune belt. According to National Accounts Statistics 2013, brought out by the Central Statistics Office (CSO), chemical and chemical products sector (industry division 24 of NIC 2004) accounted for2.06% of the GDP (at 2004-05 prices) in 2011-12, compared to 2.18% in 2010-11. The share of this sector in the GDP for manufacturing sector at 2004-05 prices was 13.1 % during 2011-12.The size of the Indian Chemical industry in terms of value of output in the year 2011-12 was5, 99,148 crore. The average Indices of Industrial Production (IIP) for the Chemical and Chemical products (division 24: NIC 2004) for the year 2012-13 stand at 127.3, which is 3.8% higher as compared to the previous year. (http://chemicals.nic.in/Chemicals%20&%20Petrochemicals%20Statistics%20At%20A%20Glance%20%202013.pdf)

Chemical industry is typically referred to as a source of enabling technology. Chemistry and chemical products enable virtually every other industry to innovate and produce products that touch all of us literally every moment of the day. Few examples stated below indicates the uses of chemicals in day to day life of human being indirectly: (

- The clothing's
- Fire retardancy of the fibers in drapes.
- The ink on the pages of the books and the pens is chemical in nature.
- The plant food used for human survival.
- Chemicals for film and photo processing.

- The bleaching and coating agents.
- Cable insulations for protection.
- Urethane cushions in and goods.
- Plastics for household materials and equipment's.
- Process chemicals.
- Cosmetic chemicals etc.

In addition to these in 20th century gave birth to new applications of chemicals and developed modern medicines, electricity appliances, the automobile, air and space travel, the computer and mass communication, great milestones in human progress. Thus chemical industry is, a big part of industrial development and termed as the old economy of nation covering contributions of Chemical, Pharmaceutical, Plastics, cosmetics, Health care, Dyes and dye stuffs Speciality chemicals, Polymers and fibers, Agricultural chemicals.

Summary:

Since independence the chemical industry is the oldest industry sector contributing to the growth of Indian economy. Around 70,000 commercial products, which range from plastics and pesticides to toiletries and cosmetics, are presently produce in India. Several categories can be classified comprising of inorganic and organic (commodity) chemicals, plastics and petrochemicals, drugs and pharmaceuticals, dyes and pigments, pesticides and agrochemicals, fine and specialty chemicals, and fertilizers. Government of India has taken new initiative by designing and implementing new favorable policies, development of infrastructures, ports, and transportation for supporting the growth and development of the chemical industry. Since 1991 The Department of Chemicals and Petro-Chemicals that has been part of the Ministry of Chemicals and Fertilizers, is responsible for making policy, planning, development, and regulation of the industry. In the private sector, several organizations, including the Indian Chemical Manufacturers Association, the Chemicals and Petrochemicals Manufacturers Association, and the Pesticides Manufacturers and Formulators Association of India, all work with the goal of promoting the growth of industry and the export of Indian chemicals (http://www.india-exports.com/chemical.html) The Indian chemical industry have attracted investors from India as well as foreign countries worldwide by achieving a significant growth at an average rate of 12.5%. Many positive factors like

cheap labour, skilled man force, easy availability of raw materials and use of new technologies for producing a fine world class products make it profitable destination in the new era. Indian industry stands at 12th position in the world's production of chemicals. (http://www.india-exports.com/chemical.html)

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CHAPTER 4

NEED OF USER STUDIES

4.1 Introduction:

Every human being is in need of Information which is required for growth, development and sustainability of life and this applies to industries also. Continuous development takes place based on new information provided to chemist and hence users depends upon libraries for the updated current pinpointed information. Since the world is advancing and due to enormous competition there is a need of well-developed library systems, to keep users updated about the development in their area of interest. Information regarding latest developments carried around the world have to reach to the end users for better utility and development of new products. The main purpose of libraries is to update and inform users regarding different developments to sustain in the market and remain competitive in their field. The library and information systems are changing tremendously and growing in exponential way in terms of knowledge and technology. However there is a need to assess users in respect of their need and on this basis provide them information sources for the development. This is the main reason of undertaking user studies for providing sufficient information on their needs and provide them right information in the information explosion era. The purpose of user studies is to collect the need based information sources and improve services provided through library. User studies and are now considered as information seeking behavior in which users are analyzed with different angles in terms of using information. User need's analysis can be achieved through user studies, which helps to identify users and their specific information requirements.

The way users use to search for information are changing due to transition in the publications and the major shift is due to the digital era, hence user expectations from libraries to provide effective information retrieving tools is also shifted. For researchers, scientist, chemist in industry information plays an important role in developing a knowledge base and need recent information in their field continuously. Due to changing practices information can be accessed by users directly from the sources but proper skills are required to collect and present the appropriate information. The major role of libraries and librarians is to explore the information published for users by

acquiring and providing different library services, which helps scientist to improve their research studies and generation of new products in the competitive world.

4.2 What is User Study?

User studies are necessary in libraries to identify user expectations, user behavior and user needs.

Tsakonas,G (2011) defined user studies as "User Studies are research studies focusing on the use of information sources from end users". User studies focused on channels of information like – means (formats) networks (social, academic, work place networks) or information providing systems (IRS, DL, Web Search System, Intranet etc.) and information sources. However in users study use of information sources are considered as dependent variable while user are consider independent variable. Dependable variables are focused on usage factor, what is used? How is used? Why it is used? And Users opinion. Whereas independent variable deals with age, sex, working area, educational level, location, communities etc. (www.dbis/dlib/ionio/gr/workshop2011/presentations/Taskonas.pdf)

User studies are of two types –

1. Usage Studies (What, Why and How much is used).
2. Behavior Studies (How and why something is used).

Usage studies are important for area of libraries and information related organization, usage studies have practical significance and they can assist in decision making. They focus on usage patterns, usage studies are conducted for cost benefit decision like subscription / operational cost, cost per user (download, view etc.) understanding users.

4.3 Why to Conduct User Studies?

User studies, use studies, information-need studies, information transfer studies, communication behavior studies, information dissemination and utilization studies, user-research, etc., are all closely related terms. The aim of user study is to help in designing, altering, evaluating and improving efficiency and effectiveness of library and information systems and their products/services in meeting their user needs. For understanding the user, many approaches (or models) have been used as conceptual frame works like different models developed by Dervin (1986), Belkin (1982) Taylor (1962) Kuhlthau (1983,1993) to identify user needs and problems. These models helped

in identifying and improving library services for user's and measuring satisfaction and needs. (http://core.ac.uk/download/pdf/11881510.pdf M.S. Sridhar) Rhyne, T(Ed) in her communication also discussed in detail the role of user study. The author has pointed out that "User studies are scientifically sound methods to measure the performance of library system".

The term information seeking behavior is now used popularly for identifying how users use the information and find out his needed information from different information resources. Few scholars Wilson (1981, 1999), Norman (1988), Ellis (1989, 1993), Foster (2004) have developed models for finding out information seeking behavior.

4.4 Purpose of User Studies:

Banwell and Coulson (2004) in their communication user and user study methodology listed out the purpose of conducting user studies:

- User studies help in developing proper collection development based on user needs.
- Helps in defining users' wants, needs, contexts, motivations, expectations and tasks.
- Helps in identifying use of information sources actually used by users.
- Identifying barriers in finding information by users.
- Track the use of information services provided by libraries.
- Helps in finding out use of different information resources by the users.
- Evaluate needs of users based on SWOT

Thus the main purpose behind user survey / studies is to improve existing conditions. To find out requirement of users can be managed only through user studies, which helps in identifying users and their specific information needs. A user study supports formulating decisions helping in improving the administrative process of libraries.

The purpose behind conducting user survey is to find out type of users, their needs, finding user information behavior, evaluation of library services provided to users and adding new services if required, and identifying level of satisfaction of users based on their needs and expectations from libraries.

The purpose of user studies is to improve library need based collection and provide services to enhance usage of library and its collection. Proper collection development and user centric services can only be achieved through understanding user needs and user studies, which helps to identify users and their specific information requirements. User studies gives picture of information acquisition process and the different types of information sources and the frequency with which they are used by the users. In general, it can be said that carrying out user studies is the most effective way of determining user needs and therefore establishing the facilities to meet them properly; they also enable continuous evaluation of the system to take place.

4.5 Need for User Studies:

As long as library and information systems are required and existing, there is a need for user studies which may be beneficial for the managing effective use of collection and providing user based cost effective services (Sridhar, 1994). User studies are effective in improving library systems but user studies needs to be conducted periodically as user needs changes as per the project needs. User studies improves public relations of a library with its users.

The need for conducting user studies are (Khandare, 2013):

1) To identify the actual strengths and weaknesses of library resources and services
2) To identify the levels and kinds of user needs
3) To identify the limitations or problems in use of information resources
4) To improve the organization and planning of library services.
5) To find out the information seeking attitudes of users
6) To find out users requirement and expectations from the library, in terms of type, quality and range of services to satisfy their needs.

4.6 What to Understand about Users:

For librarians there is a need to understand the behavior of users towards information needs hence librarians conduct user surveys using different methods and try to analyze different factors which impacts on use of information. From the user's librarian ascertain user characteristics, information needs, information behavior, attitude towards information, user's opinion about library and evaluate users based on critical evaluation. User-studies try to find out similarities and differences among the users on

the grounds of status, age, experience, education, specialization, field of research, discipline, etc. The terms `requirements' the `needs', `wants' and `demands' represents similar meaning and connotes needs as perceived by the users based on objectives of organization. Information-needs are categorized as `perceived needs', `actual or idealized needs', `immediate needs' , `deferred needs', `continuous needs', `discrete needs', `regular' and `irregular needs' etc. (Sridhar -1994).

4.7 Methods Applied for User Studies:

Generally for identifying user needs user studies are conducted using survey methods as a main technique and questionnaire, interviews, observations, discussion or diaries, case studies, content analysis etc. are used as technique for data collection.

4.8 User and Information Needs:

Information is called as commodity, since it has an economic value. Information is basic element in development of industries. The present century is treated as an era of information revolution and libraries are also adopting these new changes and migrating towards use of electronic information sources. There are different forms of e-resources available and it’s difficult to select the relevant one. Users found difficult to manage with the information explosion and need pinpointed as well as accurate information in their field in the present era searching and gathering information has become more complex and expensive due to information explosion. The traditional services such as reference service, current awareness services and selective dissemination of information does not fulfill user needs but requires new services such as accessing e-resources, databases as well as internet resources, libraries Alerts, Digests are more in demand. The basic challenges in the library profession is to convince and convert traditional users into users of internet-based and network based resources and services to meet out their needs.

Leckie, Pettigrew and Sylvain (1996), Wilson (2000) have explained in their article regarding the user information needs and highlighted the evaluation of ISB which is essential to render library services. Information needs have been analyzed by many scholars and information requirement is different for different users and in order to

provide efficient information resources and information services one has to know user's needs. The users can be classified as:

- Potential user - those who needs information which can be provided through specific services;
- Expected user - those who are known to have the intention of using certain information services;
- Actual user - those who are actually used information service regardless of the fact whether the derived advantage from such a service or not; and
- Beneficiary user - those who derives a measurable advantage from information services.

UNESCO has also categorized two types of users' viz. Actual and Potential users. (http://www.unesco.org/webworld/ramp/html/r8722e/r8722e0l.htm).

It may be worth noting here that Ranganathan (1988) has grouped users on the basis of types of services provided:

i) Freshman, (Need information to get awareness in the area)
ii) Ordinary and General (refer to information sources without any specific need)
iii) Specialist (Expert users engaged in R & D and needs constant information support)

The services provided by special libraries focuses mainly on needs of the users. Users demand depends upon the organization requirement, technology, products etc. Librarian has to review the information needs and priorities required by the users from time to time.

The main information needs of users fall into two categories:

- The need to get specific information published in documents which have bibliographical references which are known by the users.
- The need to find out information relating to a particular technology, theory etc. or information is required to solve a particular problem, or information required

> on the latest developments in a specialized field to keep users informed and updated with information. (http://www.unesco.org/webworld/ramp/html/r8722e/r8722e0l.htm)

This clearly indicates that need for information depends upon the user requirements and demands of the users. Information needs changes from user to user in the organization and from time to time. Librarian has to identify needs and facilitate users by providing the required information.

Lancaster (1988) grouped users according to the information needs as follow:

- Need for a single document of a factual type, for example, rapid reference queries commonly handled by libraries;
- Need to consult one or more documents on a particular subject;
- Need for a comprehensive search, involving the retrieval of the maximum number of published documents on a particular subject in a given period of time.

The problems faced by Librarians are, users generally do not know their information sources and therefore do not express those needs completely. Hence in order to determine the information needs of the user it is necessary to interact with users and find out type of information required by them. In some cases users are unaware of the information sources and services available to them. If they clearly mention the requirement and if librarian is unable to find the same, it can be diverted to the clearing houses or information institutes.

Librarians are responsible for the efficiency of the system and direct users to the relevant sources of information and provide needed information through library services, as per user demands. In addition, information sources can also anticipate the requirements of users and gear itself to them; this can only be done through continuous communication, making it possible not only to establish current needs but also to design new trends which helps users to keep updated themselves with new information demands. Information service is a generic term for a library or other organization of which main role is the collection, analysis, dissemination and presentation of information. Such information may be required by the organization, or assemble on

demand or distributed for publicity purpose. The type of services provided by libraries and information centers could be in response to some demand or may be in anticipation.

4.9 Information Seeking Behavior:

In chemical industries we can see different types, of users, they may be scientist, engineers, project assistant, Managing Director, CEOs or trainees. According to their job need for the information differs such as information may be required by scientist for their ongoing research project, engineers or trainees may require information to know about any technology updating, management or marketing personnel may require market data or company related information or any new plants/factories or upcoming competitors information. It is been observed in Libraries that each user have their own ways of finding the information. They may either approach librarian for the information or can directly locate the resources or may approach clearing agents or may share the information by found by their colleagues depending upon their need. Hence there was a need felt to study the information gathering techniques used by users, how they fulfill their needs and the problems faced while searching for the information.

The information seeking behavior was studied by Bernal (1960), and author presented a paper on scientific information at Royal Society Conference. Authors, scholars and researchers from different disciplines have highlighted and opined the need for ISB studies in different fields. In today's era of technology, information has grown tremendously and can be accessed in different form by the users. It's a challenge for librarians to make available information to the users in different formats. Now a day's user expects the information should be available to them on their desktop, laptop, mobile handset or through e-mail 24X7. But it's becoming difficult for getting a pinpointed information required by the users due to big amount of information being published in print format, e-formats, databases, CD-ROMs, internet etc. Hence Librarian as well as users have a challenge of finding appropriate and authentic information. Users at first tries to get the information on-line that is through the free sources available over internet but they are not aware the available information is authentic and can be relayed on it. Because of internet sources are made freely available, users are getting confused and diverted from the right information. In such situation information seeking becomes difficult and hence its librarian's duty to know about the

information requirement and accordingly search and deliver the information to the users, this is nothing but studying of information seeking behavior of users and accordingly provide right information to the right user. In general in industries librarians have to understand information needs and ISB of users. Information seeking behavior refers to the way people search for and utilize information. It mainly focuses on methods of seeking information by user, evaluation and use of information to satisfy their needs.

Since 1940's many studies have been conducted to assess information needs and ISB of different category of users. The initial studies were focused mostly on scientists, technologists to meet their needs and later the scope of ISB expanded by covering researchers, scholars, academicians, students and faculties from various disciplines. In industry researcher, scientist, management personnel and trainees are the major users of information and library have to fulfil their needs by providing them market updates related to their products, competitors information, technology updates, upcoming projects, conferences, seminars etc.

Librarian while searching for information should focus on the Users ISB which helps in collection development in libraries as well as providing right information services to the users. The study of behavioral pattern is not easy because each users is different from each other and have different requirements. Their approach towards information seeking is different and have different ways to satisfy their information needs. Studies have been carried out by various scholars in past years to find ISB of various user groups in both print and electronic format. Information seeking studies are generally conducted to analyze the user, to understand user's psychology, attitude, subject interest, working condition, etc. User studies and ISB is therefore related with designing information system.

4.10. User Expectations from Library:

Users are important for libraries, without users information system loses its complete purpose. In a library set-up it is very important to understand who are the users and what they need and how needs can be satisfied using the library collection and services. If people are not using the library resources properly, they are not aware of the

availability of information in the library. The user is termed as user, consumer, patron, client etc. but they are synonymically used in library profession. Heidi (1999) classified the user component.

Line (1998) has defined expectations of user's from the library and few of them are summarized as:

- Facilities required by users and long opening hours of libraries
- A variety of area for study purpose (individual space and space for group)
- A coffee shop where one can relax.
- Easy and good access to information in library with Wi-Fi environment.
- Speedy procedures for circulation
- The ability to access a variety of media from one workstation.
- An easy to use web catalogue which is easily accessible.
- Speedy access to the resources not held in the library.
- Friendly behavior of staff with users.

The expectations of users defined by Line (1998) are true in case of traditional libraries as well as technology based libraries. But apart from these expectations, few more could be added to the list after analyzing the trends as under:

a. The collection in library must be developed based on user needs and according to mission and vision of institute.
b. More information services based on print and e-resources
c. Guidance and assistance from library staff to search proper information.
d. Increased usage of e-resources and need to orient users i.e. developed information literacy among users.
e. Economical ways for collection development using different models
f. Users need pinpointed information within no time from different sources.

There is a need to design a system in libraries for developing proper collection and services to be provided to users based on their needs. It is not possible to satisfy all the users but the facilities provided can be easily made available and can be used by every user according to their own needs. In addition to this user centric services can be

introduced using online searching of e-resources. To re-engineer the practices in libraries librarians have to observe and understand the user needs. The library can also construct a profile of its user's interest and match it regularly against the available databases. Librarians need to listen and learn to find out the requirements of the clientele and make provision of information sources accordingly. This can be successfully achieved only if libraries measure their performances and undertake ISB studies and user studies.

4.11. User Studies and Surveys:

In the early years user studies "research was conducted which later shifted from studies of library and documentation use to user behavior or the information behavior, information seeking behavior. The term user study means a study of user's need for information. The purpose of user study is to make an attempt to discover patterns of use and levels of awareness of users towards library services and facilities, to determine success of services and to identify what adjustments are needed in service strategy. According to Busha and Harter (1980) "User studies are often instigated as attempts to understand justify explain or expand library usage and consequently to gain more knowledge about the process of communication in so far as libraries and their clientele are concerned". According to Kamaruddin (1992) indicated that user study is a systematic study of information requirements of users in order to facilitate exchanges between information system and users. Pao (1989) grouped user studies in three stages:

1. User oriented studies
2. System use oriented studies
3. Utility oriented studies

User oriented studies focused on characteristics of users and Pao (1989) considers points in his study are: age, educational level, task description etc. System use oriented studies drive their data from the system. The transactions between users and the system are investigated and examined like loan through ILL, number of online searchers performed. Utility oriented studies are reflected to information use and tis impact.

The purpose of user study is:

- To identify the needs of users
- To identify the resources and services required by users

- To identify strength and weakness of library resources
- For collection development
- For proper collection of resources

User study is a complex process as it holds studies of information needs, information use, ISB, use of information sources and channels. Accessing information needs and ISB is the base for designing information systems and services. Information provider cannot provide information unless he knows or identifies need and expectation of users. The "Centre for Research on User studies" defines user study as a "multidisciplinary art of knowledge being the study of the behavior of users (and non-users) of information systems and services."

Summary:

This chapter highlighted different angels of user needs which is main focus of any library and information center. Without user study users need cannot be identified and this chapter focused on the basics of need of user studies and its components. The researcher analyzed information needs of user and tried to understand the expectations of users and their needs.

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Chapter 5

INFORMATION SOURCES IN CHEMICAL INDUSTRIES

5.1 Introduction:

An information source from where one can get information. Information source is means of disseminating recorded information. Information source represents results and actions of task performed. Different type of information sources are used by everyone to track the previous developments and conduct research on the missing areas. Information gathering is needed by academicians, researchers, scholars, as well as learners and teachers. Information sources are housed in the libraries and information centers. Libraries since past considered as store house of information and the information is managed by the librarians and disseminated to users as and when needed or demanded. In research activity the role of librarian and information sources are vital. Information explosion is very high and the needed information by users are very difficult to provide from one source. The information is published in primary sources and abstracted in secondary sources. Tertiary sources are also equally important which covers reference sources.

Information sources are required depending on the search questions of the users which deals with general and special subject area, keywords, technical, scientific, marketing, commercial, business etc. The information required is covered in different information sources like books, journals, proceedings, thesis, technical and scientific reports, government statistical documents, internet sources etc. Every information source has its own characteristics and its contents are also specific to the type. Among all types of sources users prefer journals more as they disseminate nascent thoughts to all, followed by patents and thesis. In e-publishing era databases are more preferred than abstracting journal. Databases are more focused on the subject areas. Databases are of different types like bibliographic, full text, abstracting and data banks etc.

5.2 Types of Information Sources used by Chemical Industry Users:

Chemistry is the "science concerned with the substances of which matter is composed, the investigation of their properties and reactions, and the use of such reactions to form new substances; (in early use also) alchemy" (from Oxford English Dictionary). (https://www.lib.umn.edu/subjects/rqs/31)

Information resource is a data and information asset of an organization, department or a unit. Managing the information is becoming a big task due to explosion of information. The technique of managing the information resources of an organization is become a difficult task. Information resource management includes identifying the appropriate information sources, type and value of information and the ways of classifying, processing and storing of information. Chemical science is the science of matter; the branch of the natural sciences dealing with the composition of substances and their properties and reactions (wiki definition).

There are three main information sources viz. primary, secondary and tertiary. Primary sources are original information sources generated by producers. Primary sources describe research studies completed by others. They cover new information and discovery of new products, first-hand information of events. Primary information sources encompasses journals, trade literature, patents, thesis, reports, manuscripts, diaries, conference proceedings, government data, etc. Now a day's primary e-resources in the form of e-mail communication, internet resources, blogs, RSS, webinars etc. are grouped in to this. Secondary source of information is not communicating first-hand information but compilation of information published in primary sources of information. Secondary sources of information collect information published in primary sources, analyze, interpret, evaluate, annotates, narrates and then present in abstracting or indexing form as information products which provides access to published information in primary sources. Secondary sources covers mainly bibliographies, biographies, reference material, monographs, textbooks and now web sites, portals, search engines etc. Tertiary sources consist of sources developed from distillation and collection of primary and secondary sources. Guidebooks, Directories, Manuals, Almanacs' etc. are the sources covered in this category. These resources are available in different formats like print, non-print, e- resources, A-V and multimedia.

Information resources are stacked in libraries and information centers systematically according to definite order.

With the exponential increase in chemical information resources such as scientific journals, papers, conferences, standards, patents etc. Published today and with the advancement of technology, managing the information is becoming an increasingly complicated task. Research scientists are often unable to keep up with the periodicals and patent literature in their own fields. The primary role of information specialists is to keep updated the users about this information and make it 24X7 available and easily accessible to the users. In many industries information specialist has to manage the documents related to their projects also.

At chemical companies, information specialist has to support two types of users. One is the research scientist and other is management (Business or marketing) people. For research scientists they have to provide them background information necessary to undertake new experiments, literature published in the respective area, patents details related to their experiments etc. And management people requires price of chemicals, market trends, human resource management etc. For research scientist the fastest growing areas for industry related information the databases published worldwide. Databases are designed to search for periodical abstracts, bibliographic data, patent data, molecular information of a particular compound etc.

Chemical industry users are using traditional and e-resources both. Generally reference books, journals, thesis, patents, standards, proceedings and databases, internet resources, marketing literature are popularly used by the users. Industrial users prefer e-publications more than the traditional. Industrial users are more interested in getting information on current developments to forecast the new trends in the profession which can be applied for product development. Libraries are now establishing in large scale industries as they need latest information in the area of research. The collection is developed on demand of user needs. Internet is developing as boon to users because most of the literature in public domain is available over the net. By using information users can initiate some work and then consult commercial sources for getting advanced and authentic information for R & D. Internet can be used to get information on different companies, organizations, current news and information, publishing information for fast dissemination, etc. For getting proper

qualitative information users need to know the information resources available in their subjects as well as information searching / retrieval skills. Searching information without theme can get more hits of irrelevant data. Researcher has tried to collect the information sources useful for chemical industry users and suggested way for searching information. Chemical industry users are interested in all kinds of information sources as per the need and research work in hand. They generally prefer to consult reference collection consist of encyclopedias, fact finding books, monographs, journals, Indexes and abstracts, drug information, databases, trade literature, internet resources, Scopus, web of science, safety material sheets, social media tools like blogs, RSS.

In brief following resources are more consulted in chemical industries:

- Technical Journals (Scholarly publication containing articles written by researchers, professors and experts. Journals focus on a specific discipline or field of study).
- Conference Proceeding (Conferences are a major source of cutting edge research, particularly in science and engineering).
- Research Level Books (monograph)
- Encyclopedia
- Databases
- Handbooks
- Material Safety Data Sheet
- Chemical Abstracts
- Dissertations
- Specialized databases in chemical sciences
- Patents and patent databases.
- These and dissertations
- Standards

5.3 Information Sources: Traditional (Print):

Information is power and needed for decision making in industries. Users need timely qualitative and relevant information for the research work. Hence there is a need to know information sources useful to the users. In industries researchers and R & D chemist do not have sufficient time to search information and hence industries

appoints qualified librarians for searching information and providing to users on demand. Librarians appointed generally has information about resources in the field, searching skills, information products, internet usage, and information literacy etc. Information sources are generated by academicians, researchers, individuals, industries, and government agencies, private and society publishers and now internet is biggest source of disseminating information. In industrial libraries quick information finding sources fact finding sources are used commonly. The print resources are also very useful to chemist, but these are now available over the net.

Key Traditional Resources used by Chemists as reference books are:

- Andrew, P (2000) Handbook of Organic Chemists. Chemical Publishing Company, New York
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For the fresher's, guide books are available which describes the chemical information sources for chemist the details are given below:

1. The Merck Index:

The Merck Index is an encyclopedia of chemicals, drugs and biologicals. It is first published in 1889 by Merck & Co. a pharmaceutical company in United States. Till 2012 it was published by Merck & Co. now it is licensed to Royal society of Chemistry and is available online. An online edition offers the information as available in the print edition and is convenient and in searchable full text database. It

contains more than 11000 monographs including historic records and new updates not available in the print edition. The current edition is 15th, published in April 2013. The Merck Index contains the information regarding chemicals, CAS registry number, molecular weight, structural formula, melting point and boiling point, IUPAC nomenclature, solubility of solvents, hazards information and references to the relevant literature. In general physical and chemical properties are listed in this source. (https://en.wikipedia.org/wiki/Merck_Index)

2. Kirk Othmer Encyclopedia of Chemical Technology:

Kirk Othmer Encyclopedia of Chemical Technology is published in 26 volumes and 27th volume is the index volume. This compilation is first published in 1949. The latest edition is 5th edition and published in 2007. Now it is available online at http://onlinelibrary.wiley.com/book/10.1002/0471238961. The Kirk Othmer encyclopedia is written by the scholar's from industries, research and academic institutes and consist of articles on chemical substances, their properties, manufacturing process and uses. This encyclopedia is considered as a bible for the chemical industry as it covers A-Z reference for more than 1000 chemical substances and chemical technology fields. The source covers solid-state chemistry, process development and design, health and environment issues, biotechnology, analytical techniques, fuels, patents and licensing, marketing and economic data etc. The latest edition is updated with the changes and development taken place recently in chemical technology field. The online edition of Kirk Othmer encyclopedia allows to search and browse in the database with quick reference. Searches can be performed on author, title, keyword or topic. For browsing contents a subject list is also available alphabetically.

3. ULLMANN'S Encyclopedia of Industrial Chemistry:

ULLMANN'S Encyclopedia of Industrial Chemistry, the benchmark reference in chemistry, chemical and life science engineering. First published by Professor Fritz Ullmann in Berlin in 1914 as "Enzyklopädie der Technischen Chemie" under the German title. It became a standard reference work in industrial chemistry. The 5th edition of ULLMANN'S Encyclopedia of Industrial Chemistry was published from 1985 to 1996 and was the first edition published in the English language. The latest

edition is 7th edition containing 40 volumes in print version that covers inorganic and organic chemicals, advanced materials, food chemistry, pharmaceuticals, polymers and plastics, biotechnology and biotechnological products, metals and alloys, process engineering and unit operations, analytical methods, environmental protection, and more than 600 articles are updated and consists colored figures for easy understanding of processes. The online version of ULLMANN'S Encyclopedia is available since 1997 and offers a wealth of comprehensive and well-structured information on all facets of industrial chemistry. With the introduction of the Smart Article technology in 2014, ULLMANN'S offers a range of advanced chemistry search and display options to users:

ULLMANN'S online version have the following features:

- HTML format for easy browsing
- PDF format for printing
- Structure-based identification and display of chemical compounds
- Highlighting of chemical terms
- Search for a word or phrase in the entire text, including highlighting of search terms
- Perform complicated searches using wildcards and Boolean operators
- Perform chemical structure and substructure searches
- Follow cross references via hyperlinks

4. Sax's Dangerous Properties of Industrial Materials:

Sax's Dangerous Properties of Industrial Materials edited by Richard J. Lewis, Sr. and published by Wiley. The first edition was published in 1950, the latest edition is 12th edition which also available online. Sax's Dangerous Properties of Industrial Materials is the primary source for professional who requires to evaluate the hazardous potential of substances used in industries. It provides CAS number, DOT number, DPIM code, molecular formula, molecular weight, structural formula, health and safety data, regulatory standards, toxicity and carcinogenicity information, and physical property profiles for over 26,000 potentially hazardous chemical substances, also provides the Dangerous to Life or Health (IDLH) levels for approximately 1,000 chemicals. (wileyonlinelibrary.com/ref/sax)

5. CRC Handbook of Chemistry and Physics:

CRC Handbook of Chemistry and Physics edited by W.M.Haynes, published by Taylor and Francis, (2015-16). The first Edition of the CRC Handbook of Chemistry and Physics was published in 1913, latest edition is 96th edition of the book. CRC stands for Chemical Rubber Company, earlier the handbook was referred as "Rubber Bible" or "Rubber Book". The CRC Handbook of Chemistry and Physics is a basic reference book referred by chemist, scientist and chemical industry users. The handbook consist, tables of data, symbols, units, physical property and mathematical formulas used in labs and current international recommendation on nomenclature. Handbook is divided into sections such as Properties and Physical Constants, Chemical Tables, Properties of Matter, Heat, Hygrometric and Barometric Tables, Sound, Quantities and Units, and Miscellaneous. It also covers subjects such as; "Antidotes of Poisons", "Rules for Naming Organic Compounds", "Surface Tension of Fused Salts", "Percent Composition of Anti-Freeze Solutions", "Spark-gap Voltages", "Greek Alphabet", "Musical Scales", "Pigments and Dyes", "Comparison of Tons and Pounds", "Twist Drill and Steel Wire Gauges" and "Properties of the Earth's Atmosphere at Elevations up to 160 Kilometers".

6. Lange's Handbook of Chemistry:

Lange's Handbook of Chemistry was first published in 1934 by McGraw Hill publications. The latest edition is a Sixteenth Edition published by McGraw-Hill Education and edited by James Speight published in 2005. Lange's Handbook of Chemistry is a standard reference for chemists, students and chemical engineers. The Handbook covers the data, facts, properties of approximate 4400 organic and 1400 inorganic compounds, equations for calculating temperature and pressures, solubility in water and experimental findings in area of chemistry, conversion tables, and spectroscopy. A classic reference covers the entire field of chemistry with state-of-the-art facts, figures, values, tables and formulas. It is an essential source for all chemistry professionals

7. Perry's Chemical Engineers' Handbook:

Perry's Chemical Engineers' Handbook was published in 1934 and latest Eighth Edition is published in 2007. Perry's Chemical Engineers' Handbook 8th edition is edited by Robert H. Perry and Don W. Green. This is a reference book in every industry and required daily by all the chemist and chemical engineers for performing

their tasks. The Handbook covers the fundamentals and principles of chemical engineering, chemical processes and equipment, unit conversion tables and charts, physical and chemical data, Heat and Mass Transfer, Distillation, Gas Absorption and Gas-Liquid, Liquid-Liquid Extraction Operations and Equipment, Handling of Bulk Solids and Packaging of Solids and Liquids, Process safety and Process Economics etc.

8. Coulson and Richardson's Chemical Engineering:

Chemical Engineering a series by Coulson and Richardson is a fundamental book for the student and chemical engineers. It was first published in 1955 and the latest edition is 5th edition published in 2002 by Butterworth-Heinemann. The series have 6 volumes and each volume consist a different topics related to processes and plant designs in the chemical industry. The book provides the theory and practical examples in the beginning and at the end provides the solved problems which is a unique feature of the book.

9. Deans Handbook of Organic Chemistry:

The first edition of Handbook of Organic Chemistry was published in 1987 and edited by Professor John Dean, and latest is the second edition published in 2004. This book covers details about the organic and inorganic compounds, properties of atoms, physical and thermodynamic, constants and conversion factors. The latest edition of Dean's Handbook of Organic Chemistry covers key equations and tables with practical information, and introduction to each topic.

There are many other good reference sources chemist use to consult for the basic ideas, like:

- Dictionary of Organic Compounds
- Comprehensive organic synthesis
- Concise Encyclopedia Dictionary
- Encyclopedia of inorganic chemistry
- Dictionary of organometallic chemistry
- Encyclopedia of reagents for organic synthesis
- McGraw Hill encyclopedia of science and technology

- Dictionary of Commonly Cited Compounds
- Dictionary of Drugs
- Dictionary of Inorganic and Organometallic Compounds
- Dictionary of Natural Products
- Handbook of Chemistry & Physics
- Polymers: A Property Database
- Properties of Organic Compounds

5.4 Electronic and Online Resources Useful for Chemist:

a) Types of Electronic Sources:

The databases that correspond to the different primary and secondary printed sources are categorized as:

- **Bibliographic** - provide a bibliography of documents, with abstracts, and increasingly with links to the full texts of the primary documents. Each record includes the elements needed to identify the document including journal title, author(s), article title, volume number, issue number, pages, and year of publication etc.

- **Non-Bibliographic** - numeric, text, dictionary, and directory databases are covered in this. Non-bibliographic databases are sometimes called **Factual or Source databases**, as opposed to bibliographic databases that traditionally give only pointers to primary publications that have facts in them.

Scientific research work is first published in journal articles (primary literature) then various secondary tools organize the published primary literature and make the retrieval of literature of interest to users easier. Most important of these are the abstracting and indexing (A&I) services such as Chemical Abstracts Service, the Web of Science, Reaxys, and Scopus.

1. SciFinder (Scifinder.cas.org):

This is the electronic version of Chemical Abstracts (CA) and most compressive database for the chemist. Without CA chemist cannot survive in the R & D. This source acts as ablactating source and contains more than 68 million compounds. The literature scanned from journal articles, patents, conference proceedings, thesis, books, reports etc. The source covers data from 1907 and unique source for the chemist. Scifinder is the electronic version of CA and searchable with many access points including CAS RN and structure searching.

2. Web of Science:

Web of Science is database of Science Citation Index (covering data from 1900 to 1944) and contains abstracts of 55 million records from 12000 journals articles. Access points to search information varies. It provides citation data for the articles of interest.

3. Reaxys:

This is a very good reference source for chemist and provides structural and property data of organic and inorganic compounds scanned from more than 400 scientific journals and literature data from more than 16000 titles. It is a very good source for finding properties of compounds.

4. Scopus:

Scopus is a multi-subject database covering science, engineering, covering journal articles and conference proceedings back to 1960.

5. Knovel (e-resource):

Full text reference work collection in chemistry and chemical engineering and useful for physical and chemical properties of compounds.

6. ChemSpider (www.chemspider.com):

A free repository from Royal Society of Chemistry which includes chemical structures and associated data.

7. eMolecules (www.emolecules.com):

Free database which covers chemical information in the world and makes it available to public in general.

8. Open Access Journals:

The Directory of Open Access Journals contains many OA journals including chemistry. Many publishers of subscription journals now permit authors to pay an article processing charge and allows their article to publish in open access as soon as it is published. Journals containing a mix of OA and subscription-required articles are known as hybrid open access journals. Two such programs are managed in chemistry by Royal Society of Chemistry's Open Science and the Author Choice option of the American Chemical Society. (https://en.wikibooks.org/wiki/Chemical_Information_Sources/The_Publication_Process).

9. Internet:

The Internet, is based on the World-Wide Web, and links to full-text databases. Scientific full-text databases on the Web include graphics, for example, the Web versions of the American Chemical Society journals. Both HTML versions and PDF versions of the articles are found in some databases. The HTML versions may have enhanced features such as links in the references of the bibliography of an article to Abstracts of the cited articles in an A&I database. E.g. it is now possible to link Chemical Abstracts database to over 1,000 primary journals through ChemPort option. A project (CrossRef) provides direct links from the citations in an article to the cited article without having to visit an A&I service as an intermediate step. CrossRef is also the official **DOI** (Digital Object Identifier) registration agency for scholarly and professional publications.

Sources available on internet are:

- Internet for Chemistry (http://www.vtstutorials.co.uk) chemistry resources available free over the net
- Chemdex (www.chemdex.org/) information gateway to chemistry resources
- ChemIDplus Advanced (http://chem.sis.nlm.nih.gov/chemidplus/) Substance identification, toxicity data, chemical data etc.

- IPCS INCHEM (www.inchem.org/) Safety information
- Links for Chemists (www.liv.ac.uk/chemistry/links/link.html) catalogue of websites in chemistry
- Scirus (www.sciru.com/) science search engine and covered evaluated academic sites
- Buyer's Guide (http://www.buyersguidechem.com/) Buyers Guide Chem is one of the earliest and largest directories for chemicals and chemical suppliers and producers on the Internet and it is online since 1996.
- Chemexper (http://www.chemexper.com/) Searches more than 6,00,000 products from 400 suppliers
- Organic chemistry portal (http://www.organic-chemistry.org/) The Organic Chemistry Portal offers an overview of recent topics, interesting reactions, and information on important chemicals for organic chemists.

10. Online Searching (Access to remote databases outside the boundaries of the organization):

Vendors of online search services like STN International, lease or acquire databases from the database producers like Chemical Abstracts Service or Thomson Reuters and make them available to users on remote computers. There are many databases available for users through vendor. The mode of payment is "Pay per Use", especially in industry, pay-as-you-search fees are accessed based on connect time, number of queries, and records displayed, printed, or downloaded. Another option is to search free chemistry databases on the Web. The quality and range of search features of some of free Web databases may be more limited than those of the commercial databases. Nevertheless, free web databases should not be ignored, even when one has access to many subscription databases. The excellent free chemistry web databases include "ChemSpider" which is supported by the Royal Society of Chemistry and the National Institute for Standards and Technology's "NIST Chemistry WebBook".

11. Beilstein Crossfire (1779 onwards):

It provides worldwide literature in the field of Organic Chemistry. The Beilstein Crossfire Chemical Information System is published by Elsevier. It covers data published in Beilstein Hand Book of Organic Chemistry from 1779 onwards. The

database contains more than 8 Million organic compounds and provides access to structure and related information.

12. Gemlin: (1772 onwards):

It provides worldwide literature in the area of inorganic chemistry and organometallic chemistry. The data is covered from 1924 till date. It is a good tool for searching of patent literature on metal compounds.

Beilstein and Gmelin are two classic print compendiums of chemical information. Most of the information in the print volumes was converted to electronic form and for a period of time existed as separate databases. All of the digital information from these two sources as well as other databases have now been merged into a unified database system created and maintained by Elsevier, Reaxys, which is also available on STN International as the REAXYSFILE. Large academic research libraries often have significant print holdings that still have value for the patient, diligent searcher. Chemistry librarians at such institutions maintain helpful guides to the print runs, for example, the University at Buffalo (Beilstein, Gmelin) and the University of Texas at Austin (Beilstein, Gmelin).

13. Embase (1947 onwards):

It is mainly a medical database developed by Excerpta Medica, however this database also consist of data useful for biomedical sciences, medicinal chemistry, drugs and pharmaceutical information.

14. Chemisches Zentralblatt:

Chemisches Zentralblatt is the oldest abstracting journal in the field of chemistry. It covers the chemical literature from 1830 to 1969. In the course of those 140 years, Chemisches Zentralblatt published 900,000 pages, including 2 million abstracts. Chemisches Zentralblatt introduced formula indexes using the Richter system (different from the Hill system) in 1925. In 1956 it changed to the Hill system. The previous title Chemisches Central-Blatt (1856-1906) has only author, subject, and patent number indexes. InfoChem has performed automatic chemical named entity

recognition of the entire text of this abstracting journal to produce the Chemisches Zentralblatt Structural Database which is structure-searchable. The database is offered either as a Web application or for in-house loading. It links to digitized versions of the original paper product that were produced by FIZ-Chemie.

15. Clearing Houses:

A revolutionary step in the publishing of electronic journal articles was taken in 2007 by the Royal Society of Chemistry. RSC introduced "RSC Prospect project". This provides hyperlinks from words in the article to their definitions from Gold book and various bioscience Ontologies. In addition, compounds are linked to structural depictions and other data related to them. The American Chemical Society has developed a similar program of enhanced full-text articles, "ActiveView PDF". Most primary chemistry journals are now available on the Web. Chemistry Electronic Journals list accessible through the Indiana University Chemistry Library is useful.

5.5 Chemical Abstracts Service (CAS)

CAS, a division of ACS, is the most authoritative and comprehensive source of chemical information including rich patent data resources in the area of chemical sciences. The database can be searched online through STN using different access points for getting accurate information by the researcher.

5.6 Importance of Patent literature in Chemical Industries:

All the above organizations help in developing patent databases which can be used for searching information in various areas. These databases are very useful in decision making and they are always used for issuing patents by the patent offices. Among the national patent databases, more popularly used are Canadian patent database, Chinese patent database (SIPO), Patent Abstracts of Japan (PAJ), Hungarian Patent database, UK patent database, are very popularly used. The databases like Chemical Abstracts (CA), DNA Patent Database, Fullerenes Patent database, Beilstein crossfire, cover patent data for few popular subjects. Apart from this special patent databases like USPATFULL, CA, MARKUSH, etc. are purely patent databases in chemical sciences. This indicates the importance of patents in chemical sciences. Patent portals

or patent websites are also made available like BitLaw, Burd Law, Heiros Gamos IP portal, IP mall, IP Menu, Free Patents Online, Patent Caffe Magazine, Pipers patent, SurfIP are the patent web sites used frequently by users.

5.6.1 Databases Available Online for Patent Searching

Patent literature is very valuable information source to chemical industries users. Patents covers nascent information which is very useful to industries. Patents describes the prior art and newness reported in it so the new innovators are monitoring patent literature for economic development of chemical products. Use of Information Technology has made information searching quite user friendly and almost all traditional sources for patent searching have been converted into digital formats. The online patent databases have different categories based on information content and coverage in it. These databases cover national (single country), global (all countries), regional (Specific group of countries), subject (discipline oriented), concerned on specific issues like legal status, bibliographic, full text, Markush (structure search), patents, IPC based search, family coverage etc.

Many valuable patent databases are developed by the patenting authorities for providing quick, timely and accurate information in various fields of S & T. patent databases are made available to users through various patent database networks like STN, Dialog, Orbit, etc. STN is the basic source for chemical information developed by Chemical Abstracts Service (CAS) (A division of American Chemical Society, USA.) They also cover other patent sources and provide patent information to users at single contact source. Some internet resources are also available to users free. The important online databases used are detailed in the following tables.

Table 5.1. Global Patent Databases:

Database	Producer	Host	Features
EDOC	Institut de la Propriete	QUESTEL	Patents and applications from 17 major industrialized nations,

	Industrielle		European and PCT documents, organization Africaine de la Propriete Intellectuelle.
INPADOC	INPADOC	DIALOG, ORBIT, STN	Patent families and bibliographic searches, legal status covering all countries.
INPANEW	INPADOC	DIALOG, ORBIT	Recent 6-week data only
INPAMONITOR	INPADOC	DIALOG, ORBIT, STN	Tracking latest developments in patent filing
LEGSTAT	INPADOC	DIALOG, ORBIT	Legal status of IP
WPI/L (World Patent Index/Latest)	Derwent Publications	DIALOG, ORBIT, QUESTEL	Chemical and pharmaceutical patents searchable by Derwent codes, chemical formulae, etc. with universal coverage.
CAS/ACS	STN	STN	Chemical and pharmaceutical patent information: a unique source and universal coverage.

(Source: Kirk Othmer Encyclopedia of Chemical Technology 1993 data compilation)

(http://www.mrw.interscience.wiley.com/kirk/articles/patesimm.a01/sce 13.htm)

Table 5.2 Patent Databases Multiple Country Coverage (STN):

File(Database)	**Subject area covered**	**Years covered**	**Countries covered**	**Remarks**
CA plus Chemical Abstracts	Chemistry and Chemical Engineering	1967 till date	30, + EPO, WIPO	Complete family members, structure & registry

Service USA				number search
WPINDEX Derwent Information UK	All sciences and technologies	1963- Pharma 1965- Agro 1966- Plastics and polymers 1970- all chemistry	39,+ EPO, WIPO 14 million patents from 40 patent authorities	Complete Family members (No Reg number search)
File(Database)	**Subject area covered**	**Years covered**	**Countries covered**	**Remarks**
DELPHION	All sciences and technologies	1974- all chemistry	INPADOC, EP, US, DE, WIPO/PCT, JP, etc.	Bibliographic search
INPADOC European Patent Office, Vienna, Austria	All areas and Legal Status	1968 onwards	64, +EPO, WIPO	Legal status for 22 issuing authorities (No Reg number search)
DPCI	All sciences and technology	1994 onwards	DE,EP,GB,JP. US,WO	All subjects

Table 5.3: Internet Resources for Patent Information:

Databases	**URL**
Australian Patent Office	www.ipaustralia.gov.au

Biotechnology Patents	www.nal.usda.gov/bic
Canadian patent database	www.cipo.gc.ca
Chemical Patent Plus	http://casweb.cas.org
Delphion	www.delphion.com
Derwent's Patent Explorer Database	www.derwent.com
Dialog	www.dialogweb.com
Direct patent Netheralnd	www.direct patent.nl
EDS shadow patent office	www.spo.eds.com
European Network of patent office	http://ep.espacenet.com
European Patent office	www.ep.org/ep/en, Esp@acenet:
France	fr.espacenet.com
Free patent online	http://www.freepatentsonline .com
General information about patents	www.patents.com.
Germany	de.espacenet.com
GetIPDL	http://www.getipdl.net/en/
Indian Patents	www.indianpatents.org.in
INPADOC	2pkid.delhi.nic.in
Japanese Patent Office	www.japio.com, www.jpo.go.jp
Micropatent	www.micropat.com
NIC New Delhi	www.patentoffice.nic.in
Optipat USA	www.optipat.com
Patent cafe	www.patentcafe.com

Patent Minior	www.patentminor.com
PATSCAN: (Links to patent databases on internet, a guide to searching patents, Patent office's etc.)	www.library.patscan
PIPERS virtual Intellectual Property Library (covers all National and Regional Patent Offices.)	www.piperapt.com
Questel Orbit	www.questel.orbit.com
Repositories	www.library.patscan
Science and technology Network(STN)	htttp://stneasy.cas.org
STO's Internet Patent search system	www.sunsite.unc.edu/patents sunsite.unc.edu/patents
The PATLIB network	www.european-patent-office.org/patlib
TIFAC New Delhi	www.tifac.org.in
Trilateral web site for EPO, JPO, USPTO	www.european patent office.org/tws
United Kingdom	gb.espacenet.com
US Patent Office	www.uspto.com
WIPO/PCT Databases	www.pctgazette.wipo.int (www.wipo.org) (www.ipdl.wipo.int)

Prominent and useful sites are:

Delphion:

Its coverage is mainly for the global availability of patent searching, but it is accessed via subscription. US, JP, EP, WO, and INPADOC data is made available through this database. The data can be searched using various strategies like simple search, complex search. Full patent images can also be downloaded for US, EP and WO patents.

Esp@cenet (EPO):

It allows global patent coverage with full text images (open source). It is the best resource for searching patent information and getting full text.

Freepatentsonline:

It mainly covers US patent ranges from 3930271 to 7045600 and applications from 2001 onwards. Quick and expert search facilities are also made available (open source).

Freshpatents.com:

This database covered the latest published US patent applications every week (before grant). The database can be searched with title, abstract, application number etc. and provides brief patent description, full patent description, patent application claims, etc.

Intellectual Property Digital Library (IPDL):

It covers Hague, Madrid, PCT and Journal of Patent Associated Literature (JOPAL) (non-patent reference) data using patent number, author(s), company, title, abstract, claims, full text. It displays full page images.

Patent Abstracts of Japan (PAJ):

It covers only Japanese patents. The database can be searched using text search (applicant(s), title, abstract, date of publication of application,

IPC) or number search (application number, publication number, patent number).

SurfIP:

It covers IPOS, WIPO, EPO, UKPO, USPTO, JPO-IPDL, CIPO, Taipei PI. The search can be carried out simultaneously with selected databases and internet (AltaVista or Google).

5.7 Types of Searches Chemist Prefer:

While conducting literature search for getting solutions to the specific problems, particular and specialized searches are being conducted. Various types of searches need to be conducted to get specific information.

Table 5.4 Types of information searches:

Type of searches	Purpose and Utility
Subject Search	• To find what has been published in a subject or in a specialized field to establish the state of the art (to know what is already known and what is already protected by patent). • Map the technological evolution of a process • Monitor patent infringement
Bibliographic Search	This is easy and quick search for acquiring bibliographic elements of known patents. This is a general purpose search
Keyword Search (Text search)	Common way of searching information, using keywords to retrieve the subset of subject.
Patent Classification	IPC search is useful for researcher to browse the literature on a particular subject of interest. It requires

Search	professional skills, expertise, searching experience and knowledge of the domain.
Inventor or Assignee Search	• Patents filed by an applicant, either by inventor (person) or assignee (company), are searched for reviewing status of a company. • To locate experts, consultants and identify competitors. • To locate ownership of process, product, monitor patent infringement, etc.
Publication and Application Data Search	These searches are carried out either by patent number, date of filing, priority date, application number, application date, etc. This is for maintaining the developments during specific period of time.
Patent Family Search	• To find out, in which other countries inventor has filed patent application. • To find out whether an invention is protected in a specific country. • To find out patents filed in English to avoid translation.
Legal Status Search	• To check the validity of patent and use the invention if its term is over. • Identify patent extensions, patent validity.
Chemical Substances Search	Searching patents using chemical names or structures to get valid information. These are used in chemical sciences.
Country wise Search	Survey of international technology for filing of patents in respective countries and monitoring the progress of a country in terms of patent filing.

Novelty Search	This is the most important search. It is conducted to check the newness of data and innovative concepts at the time of drafting or after filing of a patent application.
Chemical Structure Search	Exact search of chemical compounds (structure or substructure) for establishing novelty and granting patents in chemical sciences.
State of Art Search	This type of search is conducted to track the development of topics or subjects.
Current Awareness Search	Such types of searches are conducted to get the information related to current developments in the area of new patents granted by patent office.
Business and Market Information Search	This helps in taking the decisions in entering into the business or fixing the marketing practices.
Citation Search	Many databases support citations (forward or backward) and these are helpful for tracking research development in any field.
Cutting Edge Technology Search	Conducted to get complete review of developments within a year or less to track the developments.

While searching information the user must know the requirements and a specific problem on which information is to be searched. Generally the keyword search, subject search, patent number search etc. are very common. The search type or technique is chosen based on the query.

5.8 Importance of Search Strategy for Searching Information:

Search strategy is nothing but a systematic plan for conducting search to get information from huge amount of literature. More perfect the search

strategy, more relevant search results would be obtained. The search strategy preparation is a skill and needs subject knowledge, awareness of information resources, communication skills, information technology skills, etc. The search strategy must be specific and objective. It depends on purpose of search, need of information and content of databases.

5.8.1 Building Search Strategies:

There are few simple steps for searching information in a 'SMARTER' way from patent literature:

- **S**pecify information needs (e.g. identifying requirement and recent technical developments in the topic selected)
- **M**atch information sources to need (e.g. discuss with information search expert in addition to the database search requirements.)
- **A**ssess search tools (e.g. which database(s) may cover the required information.)
- **R**ecognize differences between databases and search tools (e.g. Identify one or more databases, which cover the information, and build the cluster of databases, if required)
- **T**hink search statements (e.g. which wildcards, proximity operators or Boolean operators can be used to get the proper information.)
- **E**xecute the search (It is online all the time connecting with host computer located remotely)
- **R**efine the search (e.g. Conduct the pilot search, review the results and think for the additional parameters which could be used to refine the search results and get the desired information)

The most efficient and effective search strategy depends on need and purpose of the search and resources to be used.

5.8.2 Preparation of Search Strategy for Online:

A research topic of research worker's interest is received by information professionals having skills of online searching. On getting the query, the

information professionals understand the topic and follow certain procedure to develop the search strategy. Following steps give the details of the procedure followed:

Step 1: Determine search question or topic

A search question received is to be analyzed and divided into prominent keywords, which suit the requirement of the user. (Discussions with users provide more information on the topic which helps in gathering the required information)

Step 2: Identify relevant files (Databases)

Select the databases in which the probable answer to the question can be sought. It may be a single or more than one file. For this purpose CAS/STN has provided complete list of databases and their contents in the form of a catalogue and database sheets. Select the relevant database/s from more than 200 S & T information resources available online. (www.cas.org/online/stn/doc.html)

Step 3: Build the search question

The keywords prepared from the query are to be listed properly according to main concept, and using thesaurus, synonyms, alternative terms are to be listed and connected properly using Boolean Operators. Prepare a strategy based on this data. While preparing search strategy, truncation symbols (? For Zero to any number of characters, # Zero to one character at the end of term! Exactly one character within a term or at the end of the term) and proximity operators ((W) for adjacent, (nW) n=1, 2, 3.., (A) adjacent to each other, (nA) n or fewer words between each other) can be used to make the question clear and get a precise answer.

Step 4: Selecting files and commands

The STN commands like file, expand, search, display, print and log off are to be used as per the database file selected.

Step 5: Log in to CAS / STN host

Using the assigned user ID and password, log in to the host e.g. at Columbus, Ohio, USA and get connected to host STN/CAS and upload the query.

Step 6: Conduct the search:

The search is conducted and if required a pilot or preliminary search can also be conducted and the results are to be evaluated. If required, the search query can be sharpened, altered and the final search is conducted again.

Step 7: Closing the session (Log Off)

This involves storing of search results in a file, finding the cost of search, and then logging off the session.

Step 8: **Getting the feed back**

The feedback from users for the search conducted must be received to analyze the precision and recall as well as rate of satisfaction of user. This is also useful for future searches.

While searching chemical information, the user queries are generally related to product, preparation, uses, specific reactions, etc. and for this purpose, users provide various key terms which they are familiar with like chemical name, trade name, molecular formula, general subject, etc. A specialist provides ring structure or CAS registry number also. Special facilities provided by CAS for searching the CA file having the CAS Roles can be used to get the proper and accurate results. The CAS roles are applied when searching a particular aspect form CA File. These are preparation, analytical studies, biological studies, formulations in pharmaceutical, occurrences and uses etc. Detailed CAS database sheets are provided for each database so that user can get an idea of using the commands and operators while searching information.

Michel (2006) points out the best practices, like challenges, patent searching, navigation tools, search engines, search methodology, etc. in patent search. He has also discussed the features of online searching of databases and has suggested best practices to be observed while conducting literature search. Many aspects like nature of query, nature of information required, end use of information collected, analyzing indexing terms, resources, coverage and content of resources, nature of resources, etc. should be considered while searching patent information. Nuyts, A. defines patent

searching as 'To find in an efficient way a small set of records in a large collection that satisfies a well-defined query or information need' (as quoted by Michel (2006)). In short, searching of information depends on design of a good strategy, by retrieving accurate data, filtering of information and by adding value so that the search is more effective.

Thus the online searching process provides accurate information to the users instantly. This practice is followed in searching chemical information, patent information, drug and pharmaceutical information online and saves the time of users. Though the process is cost involved, gaining of accurate information in less time is an advantage which replaces the cost structure. The search can be conducted using single database or multiple databases at a time. For this purpose the data cluster is prepared

Patents are complicated and competitive instruments of knowledge and information contained in patents must be searched properly so that it forces the competitors to change their product, process, market strategies etc. The search strategies help users to find the gaps in research and trends in their areas of interest. Thus, searching information in chemical sciences is very essential to develop new products in the market.

A generalized model for search methodology is given below.

- Identification of elements to search (Independent and dependent elements).
- To find search entities (codes, classes, keywords for each essential element).
- Super set search (i.e. a set of documents where all documents relevant for essential element are present to a recall close to 100%. This can be achieved by using Boolean operators.
- Elimination of non-relevant documents by revising the keywords.

Online searching is evolving gradually and requires a high level of expertise which depends on the search frequency and which is not equally spread among people. Patent searching is a complex process which requires sound technical knowledge of the field in which the search is to be carried out, online searching techniques and knowledge of databases. Continuous developments in electronic tools, like visualization tools, available for searching need to be monitored. Hence, many

factors, which are discussed in this chapter, need to be considered for qualitative data mining and patent searching.

Conclusion:

A very significant change in scientific publishing is now underway. Innovations such as the American Chemical Society's "As soon as publishable" process for new journal articles make possible the appearance of Web editions of original research articles several weeks before the corresponding print versions. The shift to electronic journals as the archival record of science is nearly complete. Many chemistry libraries have decided to stop subscribing to printed journals. With so much new information available, there are other sources that help to sift through, condense, and re-package the most important discoveries. On the other hand, a new movement in scientific publishing called "**Open Access"**, is initiated as the free availability of literature on the open internet permitting users to read, download, copy, distribute, and print the full-text. In lieu of subscription income, open access (OA) journals are funded in a variety of ways including article processing charges (APCs), grants, and direct support from societies or institutions etc. However, unlike some fields, most of the prestigious journals in chemistry are still subscription based making them more attractive to authors.

Summary:

There are many different types of publications and databases in which the vast literature of chemistry is published. From the primary literature, through the secondary literature, the searcher has many options from which to choose. The goal of Chemical Information Sources is to acquaint users with information tools to make intelligent choices of source for chemical information needs. There is a need for librarian, at least to have an awareness of the existing tools to answer questions and queries.

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CHAPTER 6

LIBRARIES IN CHEMICAL INDUSTRIES AND ROLE OF LIBRARIANS

6.1 Introduction:

From the literature review it is observed that very few work is published on libraries in chemical industries. The concept of industrial libraries is now growing as industrialization is increasing fast and libraries are established to support the R & D activities. But the collection, librarian's positions, are poorly developed. But in few industries where R & D is carried out at large multinational level and Patent filing is a major activity, in such cases libraries are established but in some industries libraries are managed by the chemists working in the laboratory along with his normal task. Chemical information specialists are hired in industries for managing libraries. Chemical companies, market research firms, and management consulting firms gather data from different resources and after analyzing, information is reused for making decisions. There is very few literature available on industry and chemical industries library. But there is a demand for libraries in this sector and librarians have wide scope to work for industrial libraries.

6.2 Libraries in Chemical Industries:

Abell (1986) in the communication indicated that the role of the library is changing and developing in any field. The inertia for change must come from the librarian rather than the employer, whose view of change may be rather narrow as employer do not know the library system well. The industrial library's role is generally close to organization's business activities, and by identifying information needs efforts are taken to meet needs which is the main task of library and librarian. This covers exploitation of external resources to users, acquisition of special collections on demand and play an active role in the development of the "corporate memory" and develop integrated information systems. The role of the library within its own organization is reviewed, and its place within the information network is fixed. Industrial libraries try to integrate "internal" and "external" information resources to fulfill needs of the users.

(Abell, A (1986) the role of Industrial Library. Management Research News Vol 9(2) pp1-4)

Information is the key asset of every organization to be more competitive in this competitive globalized world. Information plays a major role in the growth of any industry or organization. Library of every industry needs to understand its role and it should redesign its sources and services in a way to support the growth of the sector.

Information and lack of competitive intelligence may cause problems in growth of any industry. Right information supports to competitive intelligence in tracking the market developments and planning for market strategy to make industry more competitive. Information plays very important role in business related problems such as market support, research support, administrative and business support.

Libraries associated with chemical and pharmaceutical industries supports to the information and research needs of the R & D Staff, chemists and researchers in their related areas. The chemical industry libraries have limited collection consist of books, journals, reports, thesis etc. covering research base of industries related to pharmacy, pharmacology, toxicology, medicinal chemistry, pharmacognosy, immunology, pharmaceutical sciences and chemicals. Library services mainly include reference and library instructions. The Librarians are graduated from the science stream with information science background. The library helps their users in getting on demand literature using different databases they have and the reference literature available in-house. It is observed that the librarians are more dependent on the commercial information sources more for authentic information gathering and browse Internet sources at the beginning to get the basic concepts. The chemical and pharmaceutical librarians provide more specific information references for research consultations. Libraries have small collection in which reference collection is more which provides fact finding answers. Access to various databases and Internet to provide access to a variety of information either free or commercial. Assistance to electronic information searching is available.

(http: //www.acs.org/content/acs/en/careers/whatchemistsdo/careers/chemical-information-specialists.html.).

Technoff and Price (www.ideals.illionis.edu) identified different information sources which are popularly used by chemical industries. All the sources may not be available in the libraries but librarian have to take care of collection development and try to collect or procure documents on demand. Generally chemical industries librarians' holds secondary and tertiary information sources rather than primary information sources. The following information resources are stacked in chemical industries to support instant information required to chemist.

- Popular scientific/trade/general/Journals
- Trade related newspapers
- Commercial and leaned society publications (books, journals, treatises, monographs, Handbooks, topics, reviews etc.)
- Patents on related works(every country has patent office and publishes patented data) which is useful for generating awareness as well as development innovative process
- Abstracting and indexing journals, e.g. Chemical Abstracts, Analytical Abstracts, Physics Abstracts, PubMed (This includes Databases)
- Thesis and Dissertation
- Technical Reports
- Standards (ASTM, BSI, ISI etc.)
- Internet search engines (Google, Google scholar, cirrus)
- Databases

6.3 Library Professionals in Chemical Industries:

Information requirements vary considerably depending on the area of chemical industries. Librarian's main task in industries is to act as indexers and document analyst**.** This is possible due to acquiring subject degree in chemistry, and degrees in information science (B Lib and M Lib) for managing more specialized work in industries. He has to act as chemical librarian or as a chemical information specialists in industries. The ability to search for chemical structures and for bio-sequences is necessary for the librarians in this field and has to acquire skills. Market researchers, consultants, and individuals in sales and management positions generally combine their technical training with a business degree. Chemical information specialists

manage technical information as an occupation. With the exponential increase in the number of scientific journals, papers, and patents published today, the management of technical information is becoming an increasingly complicated task. Research scientists are often unable to keep up with the periodicals and patent literature in their own fields. The primary role of all chemical information specialists is to organize information required by the chemist and make it available to researchers, industry professionals, and others on demand.

Opportunities for the professionals in managing chemical information designated differently as a scientific librarian, a technical information specialist, a market researcher or management consultant, a technical publisher, industrial librarian etc. Many people start their careers as document analysts or indexers and manages literature analysis. Some library professional worked as abstractor and indexers shift to industries and become technical information specialists or consultant. In chemical companies, they supports to the needs of research chemists by providing qualitative, synthesized, repackaged information necessary for developing new experiments. Sometimes individuals start their careers in laboratories as technical staff and later shift to managing technical information. These individuals can be successful, particularly as technical information specialists, because they have experience in handling information used for making decisions in chemical research. One of the fastest growing areas for chemical information specialists is in managing e-resources, databases and internet resources etc. Specialized databases helps to search for new and advanced molecular information for experimentation. (ACS) http://www.acs.org/content/acs/en/careers/whatchemistsdo/careers/chemical-information-specialists.html.

Feng (http:\\home.comcast.net\afeng\phd\) has rightly indicated the role of corporate librarian in an environment of web 2.0 and called it as librarian 2.0 which is a new core competency required in ICT era. Author has indicated that role of librarian as an information specialist is undergoing continuous change including corporate librarian. The evolution of information and information sources converge in ICT era. This has also magnified the growth in production of new drugs and chemicals in pharma and chemical industries, .in such environment corporate librarian faces challenges & need

better equipped libraries and requires advanced knowledge to manage new technologies and trends. The author has termed the profession as corporate librarian 2.0 as it require new set skills along with classical traditional skills.

The main drivers of charge since last few years are innovations in technologies and Google effect (internet).These have made impact on information specialist, users while accessing data, information gathering and research. Use of wikis, Blogs, VOIP, Social networking etc. changed the role of corporate librarians .The corporate librarians not only be aware of these technologies but be able to implant in business and this corporate librarian has to add value in profession.

6.4 Core Competencies for Corporate / Industry Librarians:

According to Feng (http:\\home.comcast.net\afeng\phd\) the core role of information professional is changing from information gatekeeper to information guru, corporate librarian is supposed to be an expert not as owner or sources of information but as value to company by using technologies. They have to guide users by disseminating information and translating information in to knowledge and can be called as "information enabler" and "knowledge creator".

An "information enabler", corporate librarian 2.0 acts to transfer information by searching information sources to the users. The main role is to provide simple tools to end users to search information and orient users by teaching how to use best tools for information gathering from different sources. For these activities librarian have to gain different core competency in the profession. The librarians not only have networking knowledge but apply tools and technologies for effective working for user of special categories. These qualities need knowledge of ICT, Intranet, network society, server applications, internet skills, web development. Apart from these information resources in areas need to be known which are useful to patrons. Make users aware of information resource in the field is also an essential competency.

The core competency needed in the present information explosion era is to be a "knowledge creator". Information is data but knowledge is application and integration of information to get actionable results. The corporate librarians has to provide customer alerts, information digest and intelligent data. For this librarian have to take support of technologies and tools like RSS and customer intranet application.

In case chemical, pharma, medical sciences users need information regulations, procedures, and products new avenues in the field. Hence the core competency required by information professional is to create actionable intelligence to provide information. Another core competency required is developing knowledge sharing methods.

Technoff and Price (www.ideals.illionis.edu) discussed role of industrial librarian may be chemical, mechanical, electronic, software, business etc. need programs to improvise quality of its products and services. The industrial librarians must be expert in:

- Online literature searching and ability to develop search query
- Identifying understanding qualitative database
- Conducting reference interview to find out needs of users
- Making awareness of standard reference tools both in print and digital resources in area of interest.
- Information Communication Technology Skills
- Interpersonal skills like communication, team working, group working, attitude towards customer, information services, adaptation of new tools and techniques etc.
- Aware of management or leadership or marketing skills, decision making skills
- Basic subject background in addition to LIS school education
- Service attitude, library operations
- Work experience

American chemical Society has identified the need of library professionals and elaborated role of information specialist for chemical industry libraries and suggested that librarian's job is very crucial and they have to acquire different advanced skills in addition to traditional skills. (http://www.acs.org/content/acs/en/careers/whatchemistsdo/careers/chemical-information-specialists.html). The role of librarian in industries is little different than managing the academic libraries and other libraries. The industrial libraries are part of the special libraries and though functions are similar to other libraries but systems and nature of work is different and hence librarians have to work along with chemist and

serve their needs. In chemical industry librarians have to manage libraries in limited financial resources or even without libraries information need is to be served economically from the vast ocean of information.

The role of industry libraries is crucial and librarian have to provide literature and services on demand. The role of the librarian is discussed in brief as under:

a) To Manage Technical Information:

Chemical information specialists manage technical information as an occupation. With the exponential increase in scientific journals, papers, patents published, the management of technical information is becoming an increasingly complicated job. Research scientists are often unable to keep pace with the published literature in different forms and formats in their own specialized areas. The primary role of all chemical information specialists is to organize this information and make it available and easily accessible to researchers, students, industry professionals, and others for different uses. To manage the information flow industry users need assistance and hence librarians' role is important in collecting information. The library professionals are called as scientific librarian, information scientist, technical information specialist / manager, market researcher or management consultant, technical publisher, etc. Many people start their careers as document analysts or indexers of literature in this field to support research. Sometimes in industries it is noticed that individuals start their careers in lab work and later moves into technical information tasks. These individuals can be successful, particularly as technical information specialists.

b) Use of ICT and Research Techniques:

One of the fastest growing areas for chemical information specialists is computers, software's and maintain data systematically to use at any place any time as per the need. Databases helps to search for periodical abstracts and molecular information for research purpose and predicting the future avenues. Chemical information specialists used computers to search information on line in Indian context and used international databases searching. Advanced use of ICT is now possible to get the information over the Internet also. Any-one with appropriate access skills can search and retrieve technical data. Information specialists serves users in industries as an intermediaries

who are subject experts, information specialist, aware of resources in the area, and aware of IRS tools and techniques. There is a real need felt in industries for such information experts with expertise skills in the use of data-bases and searching chemical information for research purpose.

c) Work With Industrial Professionals:

A job of chemical information specialist \is not only to manage technical and scientific information but work along with research professionals and isolate needs of information requirement and support to develop new activities in profession. Some chemical information specialists indicated that they enjoy working and interacting with industry staff. Whether they may work as consultants, librarians, information specialists etc. but need to combine their technical skills with good communication skills and increase the ability to work in a service-oriented position. It is also observed that in many industrial research organization, technical information specialists asked to participate in all aspects company activities so that information specialist can manage information and document for the ongoing projects. Because of their skills and experience in disseminating information, they may manage proprietary information resources, develop Intranets, Internet or work on document management efficiently.

d) Perform Jobs outside the Lab:

Opportunities outside the laboratory, such as managing chemical information, is open to a chemistry graduates because they have the knowledge to communicate with both scientists and lay users. Chemists need to know where their interest in chemistry fits into the overall picture. People who have made their careers in chemical information often find that they like the theory of chemistry more than the practice of it. They love the discipline of chemistry, but choose to apply it to careers outside the lab. A career in the field of chemical information enables them to keep this interest central to their work.

e) Work Description:

Chemical information specialists manage technical information in a variety of ways, depending on their positions and need of users. Most jobs require a good deal of reading and analyzing technical data. Chemistry background is vital to understanding the material. The presentation and organization of information is also a component of technical job. Chemical information specialists generally work in a business or industrial environment. Because it is a service industry, there is a high level of contact with other people.

f) Personal and other Skills:

A greater interest in scientific literature than in scientific method is a good sign and well suited to a career in chemical information. Most chemical information specialists stress the importance of being able to work with people and communicate well, both verbally and in writing.

6.5 Library and Information Services in Chemical Industries:

The Information Center plays major role in industries to enhance their business prospects. Every industry considers information as an important asset to meet the information needs of the organization. A library and information center is set up in the organization to manage the information published in different sources. The libraries provides various value added service to the organization depending upon their area of interests. Following different services are provided by the libraries in chemical industries:

- **Information Bulletins / Newsletters:**

Librarians / Information professionals identify the areas of interest of the industry and collect necessary information from different resources like books, journals, standards, patents and other useful resources and compile or repackage information and disseminate though the newsletter for internal use.

- **News Paper Clipping Service:**

The news appeared in different newspapers related to marketing of chemicals, prizes, policies, strategies, news about new developments, progress of related industries etc.

librarians must collect these clippings for the reference and circulate in industries. These news clippings are helpful to users for future reference.

- **Current Awareness Service (CAS):**

Librarian understands the needs of the various kinds of users and provides current information published in journals, magazines, newsletter etc. through a bulletin or newsletter to make every one updated and efficient in their area. Efforts have to be monitored by librarians by providing TOC, displaying information in libraries, circulating bulletins etc.

- **Selective Dissemination of Information (SDI):**

Librarians identifies the important areas of interest (Subject profile) of key persons and workers in industry by developing a user profile. Librarians have to collect information from different sources and circulate or send an email.

- **Competitive Intelligence Service:**

In this service the competitive industries activities are consolidated and disseminated among the users. This is also called as monitor watch services. Industry can plan for new products and marketing based on this data. Librarians have to develop skills for data collection from different market sources, newsletter and circulate to the respective group.

- **Training and Education:**

Librarians have to conduct orientation or training sessions / induction/awareness programs for their users to educate them about the library and different information sources used by them to enhance the efficiency of users in searching and using information. Scientific staff needs to become information and technology literate.

- **Inter Library Loan:**

ILL is an important activities in industry libraries. Since collection is limited and areas of research are not fixed it is difficult to develop collection in such libraries and hence ILL from the similar industry can be developed.

• **Institutional Membership:**

Industry libraries are not full of collection and hence they have to obtain membership of other libraries like IIT, Universities, CSIR, where collection of their area related collection is available.

• **Table of Contents (TOC):**

TOC services are managed using internet resources as well as collecting from the subject libraries literature. TOC is a good resource awareness service used.

• **Online Access to Databases:**

The research companies have to subscribe to specialized subject related databases on use or task basis also. The information on the topic can be searched and circulated among users and followed by full text supply activity on demand.

• **Discussion Groups and Forums:**

Librarians have to create a forum for developing resource sharing projects to help users economically by providing cumulative services.

• **Use of Social Networking Sites:**

Librarians form industries have to initiate use of web tools and social media which are the transforming power of 21st century Librarianship. Librarians have to develop libraries and services more innovatively and intellectual way to satisfy users need. Services through social network allow librarians to share ideas, activities, events, resources of user's interests. RSS feeds can be used for the data collection. RSS provides a platform to share news and information among users instantly. Librarians has to isolate useful links to useful and recommended Internet resource sites as well as search engines like Google Scholar, Cirus etc. to provide alert services like SDI and CAS and also have to communicate Book reviews, information about new books published. They have to build the special interest groups in various aspects of work to share and discuss their views, to share the AV material related to various aspects of

work and administration of SSIs, to assess the needs of the users through social networks, to educate the users about new and innovative services in the library. These are few services by the library which will help in the growth of small scale industries apart from these there are many opportunities to initiate new services according to needs of the SSIs. Librarians with self-motivation and interest must take the initiatives to reflect the role of Libraries in the growth of SSIs. These services are sufficient and after these initiatives librarians can think of many advanced services like using social networking, knowledge management and many more.

Digital Information Services:

With the explosion of information which has resulted in increase in the publication of books and other materials in soft or e-version. The effective and efficient use of new technology helps us to improve the library services. One of the basic functions of library is to make its resources readily available to its users. In this information age, Information communication & technology (ICT) plays important role for disseminating information to the users. Internet, WWW, digital library, electronic journals, and online databases are all such developments, which are changing the way libraries function today. They shall adopt with new technologies and provide different services using these technologies to their users. Users expect the 24X7 services from the library. Today users expect to have access to these sources directly from their desktops and this is possible only if ICT and e-resources / digital resources are used. Digital Information Services in the libraries includes all electronic information resources such as e-books, e-journals, CDs, DVDs and databases, etc., and computerized and networked online resources accessed through libraries. Digital information services provides variety of services to the users of the library with organizing collection of material or making them more widely available.

Information service is mixture of different components and based on target users, needs of the users, expectations of the users etc. To provide information services policies to be defined for information material collection, organizing sources suitably and information delivery systems as well as repackaging of information system to suit the needs of users.

6.6. Skill Sets for Chemical Industry Librarians:

Scammell (1997) defined core skills a competencies of information professionals required in present era as well as future libraries to manage needs of chemical industry users. The core information skills and competencies are summarized below –

- Business, Marketing and Negotiation skills.
- Capacity building.
- Collaboration and partnership skills.
- Communication skills.
- Consultancy skills.
- Cost effective skills.
- Evaluation skills.
- Identifying, anticipating and analyzing user needs as per industrial libraries.
- Information literacy skills.
- Information retrieval, storage, and online searching skills.
- Knowledge management skills.
- Leadership skills.
- Lifelong learning skills.
- Managerial skills.
- Publication skills.
- Research and teaching skills.
- Subject expertise.
- Technological and Networking skills.
- Value addition skills.

These skills are required in addition to traditional skills like technical, information processing, indexer, bibliographer etc. The most important skills are technological and management skills. Management skills are very important in industrial libraries as they perform different activities confidently. Management skills covers understanding needs of organizational or industrial culture, strategic planner, financial management, Human resource management, change management, vision and creativity etc.

Summary:

Chemical industry libraries are treated as special libraries as well as industrial libraries and hold very limited but precise collection maintained for reference purpose and on demand the documents are procured either from market or ILL. This chapter highlights the structure of libraries, the content of collection and role of librarian in managing chemical industry libraries. The jobs of chemical information specialists is very strong in future where R & D is strong. The use of computers in chemical information continues to be a real growth area; a high demand exists for people who can show both technical understanding and computer expertise with subject expertise.

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CHAPTER 7

DATA ANALYSIS: STATUS OF LIBRARIES AND USER NEEDS OF CHEMICAL INDUSTRY

7.1 Introduction:

Data analysis is a process used to transform, remodel and revise certain information (data) with a view to reach to a certain conclusion for a given situation or problem. Data analysis is the process of developing answers to questions through the examination and interpretation of data. The basic steps in the analytic process consist of identifying issues, determining the availability of suitable data, deciding on which methods are appropriate for answering the questions of interest, applying the methods and evaluating, summarizing and communicating the results. Data analysis can be done by different methods as according to the needs and requirements of different domains like science, business, social science etc. Data analysis, in a research supports the researcher to reach to a conclusion. Therefore, simply stating that data analysis is important for a research will be an understatement rather no research can survive without data analysis. Every researcher has to sort out huge pile of data that has collected, before reaching to a conclusion of the research question. Mere data collection is of no use to the researcher. Data analysis proves to be crucial in research process.

There are many benefits of data analysis however; the most important ones are as follows: -

1) Data analysis helps in structuring the findings from different sources of data collection like survey research.

2) Very helpful in breaking a macro problem into micro parts.

3) Data analysis acts like a filter when it comes to acquiring meaningful insights out of huge data-set.

4) Helps in keeping human bias away from research conclusion with the help of proper statistical treatment.

5) A researcher can filter both qualitative and quantitative data for an assignment writing projects.

Data analysis is of utmost importance for both the research and the researcher. Data analysis is as important to a researcher as it is important for a doctor to diagnose the problem of the patient before giving him any treatment.

Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains. Data do not carry out any meaning, researcher has to analyze and detect meaningful observation to enhance the quality of research.

7.2 Visit of Chemical Industry Librarians:

Researcher has also visited few chemical industry libraries like Gharda Chemical Dombivali, CIPLA Mumbai, Lupin Pune, Relience Mumbai, Aditya Birla Mumbai, and also understood the librarian's views. From the discussions observations deduced by researcher are:

- It is noticed that majority of large scale multinational industries have well set libraries and in Maharashtra out of 237 chemical industries only 32 industries have library facilities. The questionnaire was circulated to all 32 libraries/library professionals and received response from 22 i.e. 68%. It is thus observed that libraries and information centers are developed in large scale or among few medium scale industries where R & D, process and product development has given priority. Small scale industries do not have libraries in majority.

- The users of the chemical industries are mainly researchers, R & D scientists or chemist, managers, policy makers, analysts, predictors etc.

- The users need specific information related to their product, process, new developments, market strategies, future needs in the field etc. For this purpose there is no single source available but the librarian has to consult many

references and databases. Everything is not available in library and has to take special efforts to acquire.

- The collection of library consist of mainly journals, reference books, chemical guide books and internet as well as free and subscribed databases like SciFinder, Scopus, DERWENT patent databases etc.
- Librarian's task is to route the information and provide information services and user centered services.
- The literature published and available is not cost effective. Budgets are not certain, every time has to approach management to get the needful literature.
- Many libraries are managed by chemist and their role is specific. They are not professionals and hence qualified librarians are needed.
- Librarians need advanced skills. The management of library is simple but assisting needs of chemist are complex. Network of industrial libraries is needed to provide more information support.

7.3: Data analysis (Status of Chemical Industry Libraries):

To assess the status of Chemical Industry Libraries researcher circulated questionnaire to librarians where libraries and information centers are available in chemical industries. The different questions related to library's collection, library services, functions, users of libraries, etc. have been asked related to objectives. The response from librarians is good and librarians have provided information about their libraries which is useful to analyze the observations. The questionnaire was circulated among 32 libraries. The response received is from 22 chemical industry libraries (68%). The data analyzed and presented below:

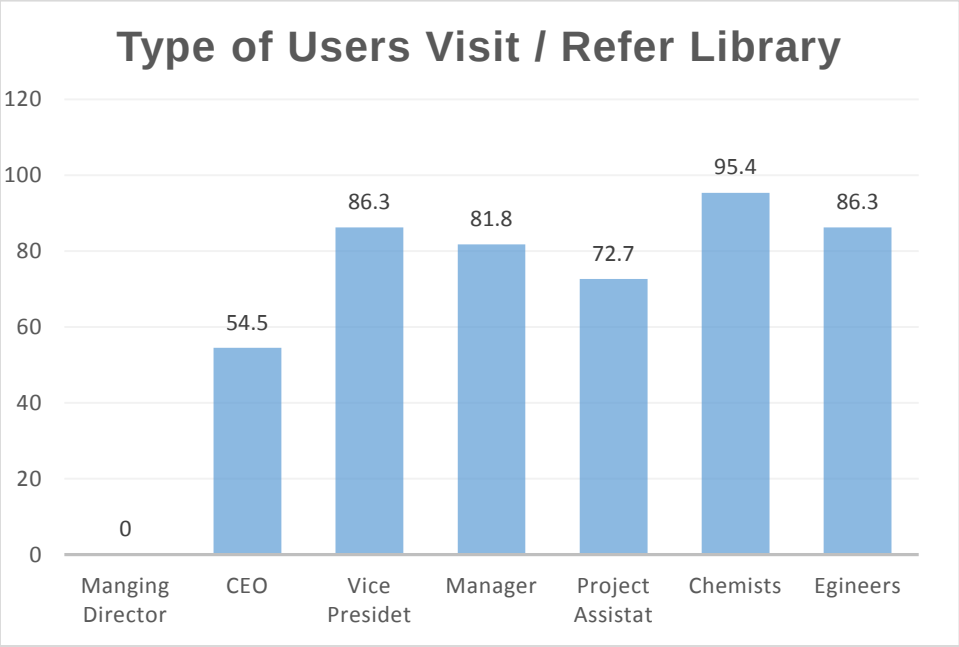
1. Type of Users Visit / Refer Library:

A question was asked to know the nature of users of chemical industry libraries. The response received is tabulated in Table 7.1.

Table-7.1: Type of Users Visit / Refer Library:

Type of Users Visit/refer Library				
Designation	**Yes**	**No**	**% (Yes)**	**% (No)**
Managing Director (MD)	0	22	0.0	0.0
CEO	12	10	54.5	45.5
Vice President (VP)	19	3	86.3	13.7
Manager R & D	18	4	81.8	18.1
Project Assistants / Chemists R & D	16	6	72.7	27.3
Chemists	21	1	95.4	4.6
Chemical Engineer's	19	3	86.3	13.7

Fig7.1: Type of Users Visit/refer Library



Observation: The main users of chemical industry are MD, CEO, V P, Managers, Chemists (senior scientists), Project chemist, and chemical engineers. All these are involved in R & D and process or product development. It is observed that MD and Presidents are using the libraries very less as they are involved in development and

management of company / industry and planning for the future growth and expansion. Chemists, chemical engineers, VP, refer to and make maximum use of libraries as they are really involved in R & D activities of the company. CEO rarely visits libraries, MD and CEO's if needed any information or data is provided at their desktop.

2. Timings:

The libraries are open during normal industry working timings in case of large multinational industries. In case of medium scale industries the timings are for few hours either in morning session or in the afternoon, as these libraries are operated and managed by chemist. The space of the library is restricted to few rooms. There is no facility for keeping libraries open till late in the evening.

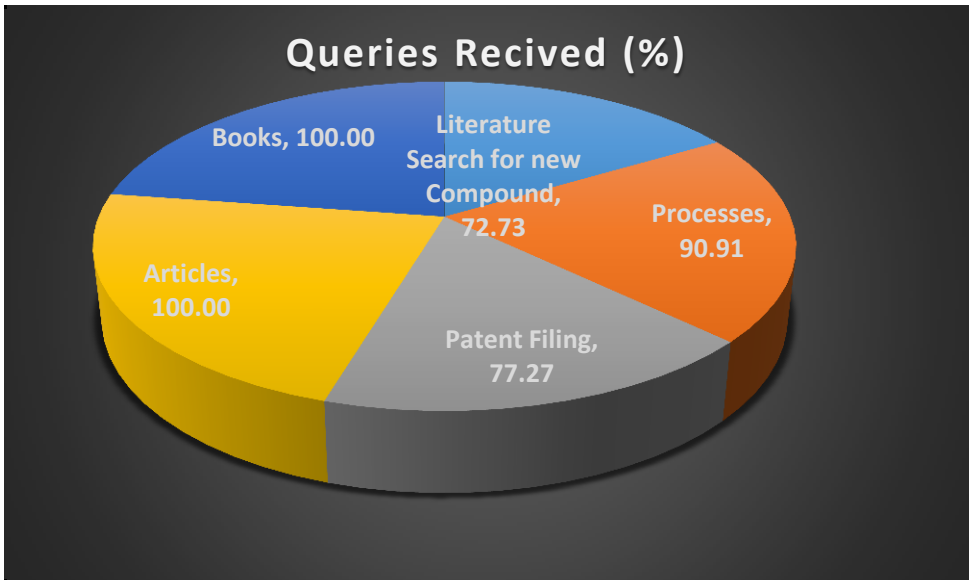
3. Queries Received

Since the chemical industries are also treated as Special Libraries the queries of the users are very specific to their needs. Researcher tried to analyze the needs and queries of chemical industry users. The nature of queries received by the libraries / librarians is analyzed below.

Table 7.2. Queries Received from User:

Queries received from Users			
Type of Queries Received	**Yes**	**No**	**% (Yes)**
Literature Search for new Compound	16	6	72.7
Processes and Product Development in R & D	20	2	90.9
Patent Filing	17	5	77.2
Articles	22	0	100
Books	22	0	100

Fig.7.2 Queries Received from User:



Observation:

It is observed that chemical industry users are in need of information published in their field of R & D. Industries try to develop new molecules, drugs, cosmetics etc. useful to society in economic way. Hence the chemists need literature form libraries pertaining to their use and applications. Among the literature all the users need articles from journals and books specially reference books (100%) for getting feedback on new activities and instant ready reference data respectively. Hence the priority is at top level in demand. Followed to this is information on product and process development (91%) which is dragged out from databases and e-resources. Literature search and patent filing is also needed (72%) to get new information. It is observed that the queries are purely related to the qualitative pinpointed information on topic of interest.

4. Library Collection:

Response to this question is not indicated in quantitative marks as many libraries do not archive the collection of physical documents as the need of literature is for project only. Once the project is over they do not need the material for future use.

The collection covers mainly society journals, standards , patents, reference books and standard text books, encyclopedia, pharmacopeia, trade related literature, technical reports, Lab notebooks (important archival collection), annual reports of industries in the related areas, now trend is shifting to e-resources and database searching having user license etc. Internet usage is very common and chemist collect the primary information using it. Thus collection is specific and limited. It is understood that collection ranges from 500-5000 documents housed in single hall with reading facility for users. In large scale industries 3-4 rooms are assigned.

5. Library Staff:

The library staff is not well organized in these industries. It is observed that large-scale industries having R & D have appointed qualified librarians. They have science graduation and B.Lib or M.Lib.ISc qualifications. They are treated as managers and not librarians in their organizations. The small scale libraries do not appoint any librarians or library qualified staff as the collection is ranging between (100-500) and it is managed with the help of chemist. The demands are met from the clearing houses or from other subject libraries like IIT, UDCT, universities etc. R & D staff visit to these libraries and collect the data. The library staff is restricted to only librarians post and in case of demand part time assistance is deployed.

In case of large scale and multinational companies librarians are hired and trained for their needs, and the skill sets are different than other academic and special libraries as librarians have to work as solo librarian and the skills required are both traditional and advanced.

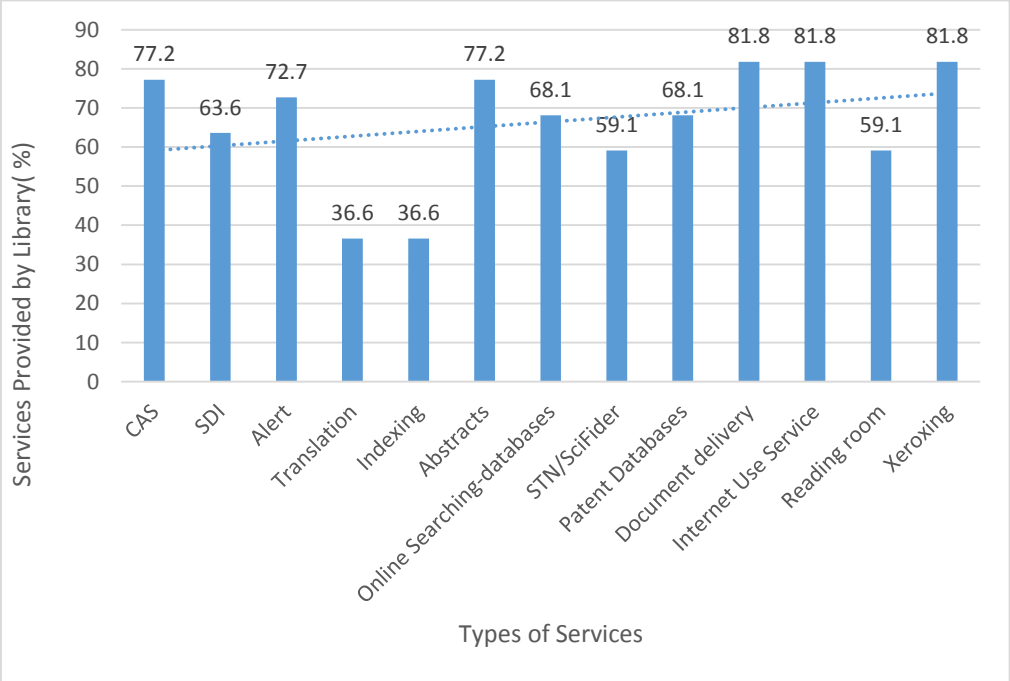
6. Library and Information Services:

To provide latest information to users there is a need to gather information and provide to needy users by means of services. To understand the library activities specially related to information and reference services questions were asked to know the services offered to users by chemical libraries, results are tabulated below:

Table 7.3: Library Reference and Information Services

Reference and Information Services			
Nature of Services	**Yes**	**No**	**% (Yes)**
CAS	17	5	77.2
SDI	14	8	63.6
Alert	16	6	72.7
Translation	8	14	36.6
Indexing	8	14	36.6
Abstracts	17	5	77.2
Online Searching-databases	15	7	68.1
STN/SciFider	13	9	59.1
Patent Databases	15	7	68.1
Document delivery	18	4	81.8
Internet Use Service	18	4	81.8
Reading room	13	9	59.1
Xeroxing	18	4	81.8

Fig 7.3: **Library Reference and Information Services**:



Observation: It is observed that Chemical Industry libraries provide various information services to users for their R & D support. Users are busy in experiments and hence rarely visit libraries. The users need information on desktop and information services plays a vital role. The main services in demand are Xeroxing of papers, Internet services, ILL, abstracting, alert, CAS are in more demand (70-80%). Followed by SDI, databases searching (online searching 68%). Translation and Indexing services are required rarely. Indexing means bibliographic compilation and translations services are required in case of patent filing and understanding process parameters developed and reported in other than English language. Though reading room facilities (59%) are required but this is for silence reading of subscribed literature and reports available in libraries.

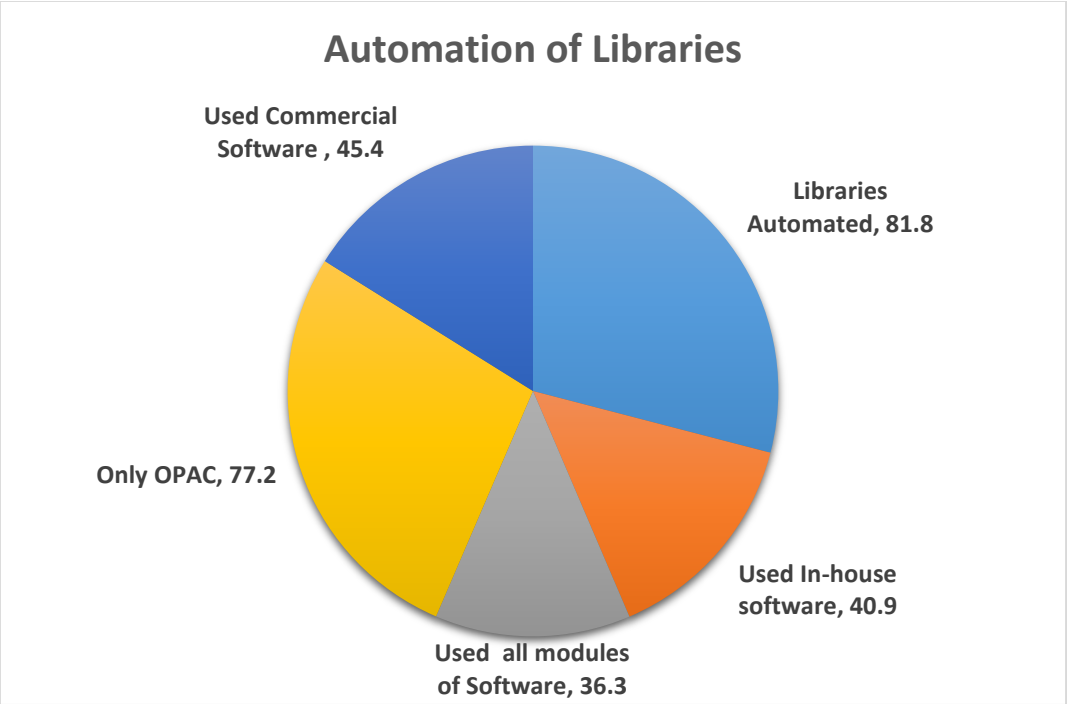
7. Automation of Libraries:

Automation is almost completed in all types of libraries especially academic and special. However in the area of chemical libraries the researcher has assessed the status by asking the question in questionnaire along with the software used.

Table 7.4: Automation of Libraries:

Automation of Library			
Library Automation	**Yes**	**No**	**% (Yes)**
Libraries Automated	18	4	81.8
Used In-house software	9	13	40.9
Used all modules of Software	8	14	36.3
Only OPAC	17	5	77.2
Used Commercial Software	10	12	45.4

Fig 7.4: Automation of Libraries:



Observation:

It is observed that about 80% libraries have been automated and only 20% libraries are not automated. 40% of Libraries have developed their in house library software and 60% have purchased the software's available in the market. It is observed that 36% libraries have used all the modules of the software's. 77% libraries have implemented OPAC module and is running successfully in the organization and available over the web as Web OPAC. It is also noticed that the automation is necessary in chemical industry libraries as librarians have to manage different queries from e-resources also.

8. Membership of Other Libraries:

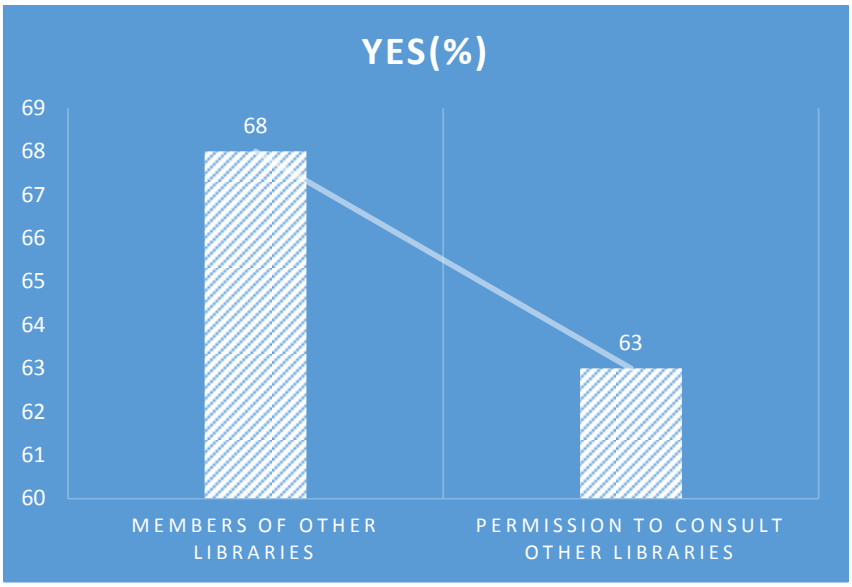
Libraries are not subscribing to all the resources required and needed by the users due to the cost and utilization of the literature. The demand of the literature is specific to the project and hence archival values are given less priority. In this case libraries have to depend on the ILL and other libraries like IIT, University etc. The use is based

on membership of other libraries which provides the services on charged basis i.e. membership fees. The response is analyzed as under:

Table 7.5: Membership of other Libraries:

Membership of other Libraries	Yes	No	% (Yes)
Members of other libraries	15	7	68
Permission to consult other libraries	14	8	63

Fig 7.5: Membership of other Libraries:



Observation:

It is observed that 68% of libraries have the membership of other libraries such as IIT, UDCT, and CSIR Labs like NCL etc. These libraries provide them required services such as full text article, database searches, and document delivery as and when required. These organization also permit chemical industry users to access libraries for gathering information either giving library membership or permitting to use library free but charge for the services provided based on cost involved in operation.

ILL and Library membership and well as getting help from clearing houses are very common in chemical industry libraries as the value of literature is restricted to a group of user and in future the literature is obsolete for them.

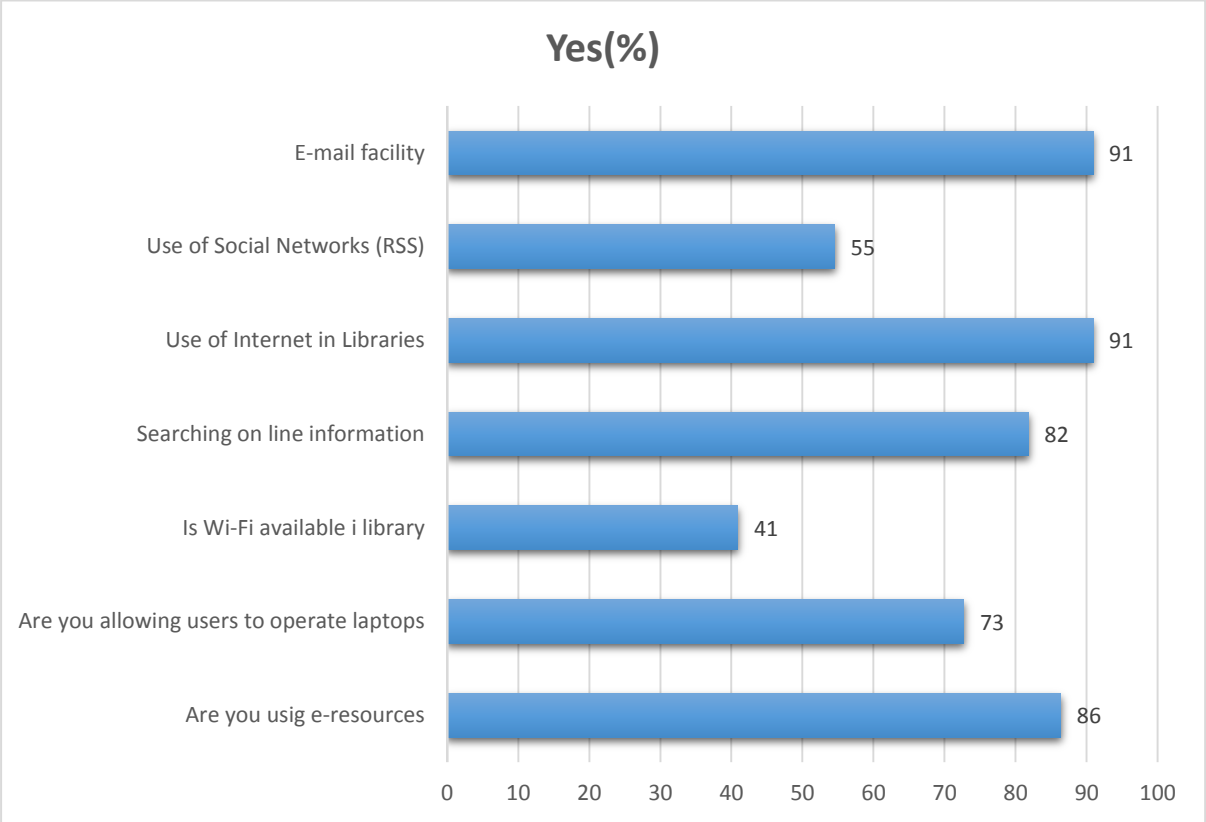
9. Modern Library Facilities

Modern facilities are available easily now a days. Hence researcher tried to analyze the availability of them in libraries.

Table7.6: Modern Library Facilities:

Library Services			
Services	**Yes**	**No**	**% (Yes)**
Are you using e-resources	19	3	86
Are you allowing users to operate laptops	16	6	73
Is Wi-Fi available i library	9	13	41
Searching on line information	18	4	82
Use of Internet in Libraries	20	2	91
Use of Social Networks (RSS)	12	10	55
E-mail facility	20	2	91

Fig 7. 6: Modern Library Facilities:



Observation:

It is observed that almost 90% libraries support to use of internet and e-mail facility from libraries as well as at the desktop of top management personalities. 85% libraries are providing e-resources and online searching facilities to their users. Use of Wi-Fi and social media is initiated in few industries (45%).

10. Library Budget:

The annual library budget is not fixed for these libraries as the collection is volatile. Library budget is based on the demands received from the users and librarians have to get cleared the expenses from the authorized staff of management. Every year tentative budgeting is calculated.

11. Library Infrastructure:

It is observed that libraries associated are having advanced infrastructure like computers, intranet connectivity, internet and Wi-Fi, scanners, photocopiers, digital cameras, kindle (for reading e-resources), storage devices, printers etc.

12 Remarks of Librarians:

Users are preferring to electronic information resources like e-journals, databases and online searching of databases etc. and hence more focus is given on procuring e-resources slowly. The collection mainly focused on reference materials in libraries covering handbooks, pharmacopeia, encyclopedias, dictionaries, and fact finding, MSDS data etc. which are required for reference purpose by the users.

7.4 Data Analysis - User Needs and Behavior:

The researcher has also made an effort to understand the information seeking behavior of chemical industry users along with status of the Library. To understand in detail user needs structured questionnaire containing 23 questions was prepared and circulated among the different users of the chemical industries. The population and sample is discussed in detail in the research methodology, chapter 1. A feedback received from 188 (79.3%) respondents (Out of 237), who are really engaged in R & D and uses libraries from Pune, Mumbai and from the different places of Maharashtra. The analysis of the data compiled and presented in the following paragraphs:

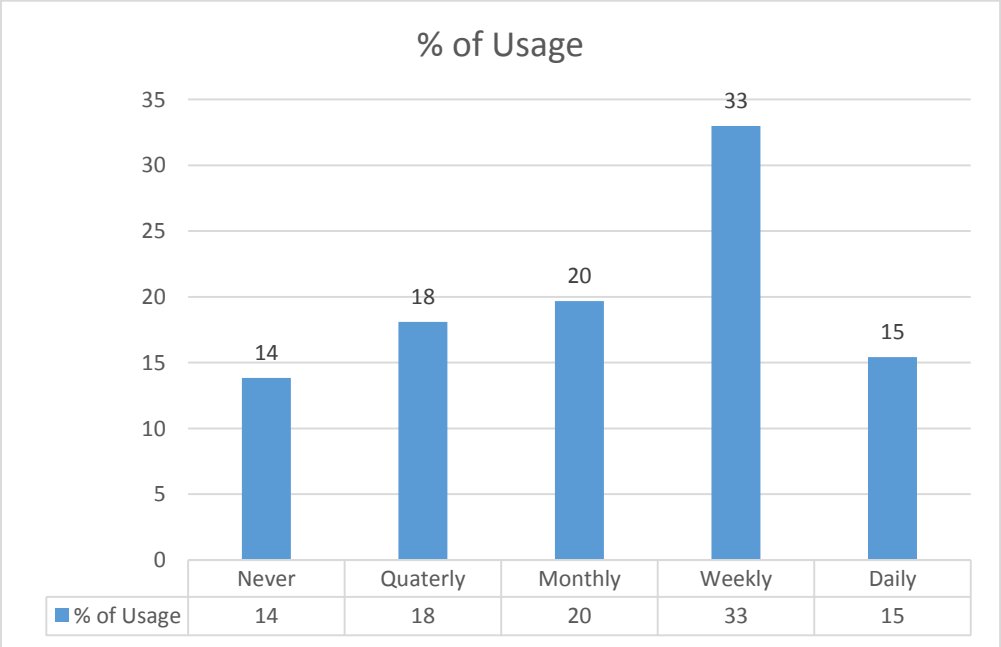
1. Use of Library and its Purpose:

In the questionnaire researcher tried to focuses on the usage of the library by the users and frequency of visits to library for getting information.

Table-7. 7: Use of Library:

Utilization of Library resources	Response	% of Usage
Never	26	14
Quarterly	34	18
Monthly	37	20
Weekly	62	33
Daily	29	15

Fig-7.7: Use of Library:



Observation:

It is observed that roughly 15% users are referring to library daily to know the latest developments in the area, using internet and searching databases etc., 20% users/visit library in a month. Whereas 18% users uses/visit libraries very rarely once in a quarter to take a review on its topic for general awareness. 14% users from the

industry do not approach to the libraries as they are technical and working in plants and their task is just to monitor the production and quality. Thus users engaged in R & D, Patent filing, keeping abreast of latest information are the regular users of libraries.

2. Services Encourages to Enhance Use of Library:

Researcher has observed that 14-20% users are not using/visiting library frequently, hence tried to analyze how these users can be encouraged to use the library. Many users have opined that library is situated far away from their workstations and hence unable to refer to the library. Most of the libraries are technical and they focus more on developing technical and scientific collection, hence management persons may not be interested, but if the collection in management subject, personnel development, communication skills, general knowledge etc. is made available in the library the users may take the benefits of the collection.

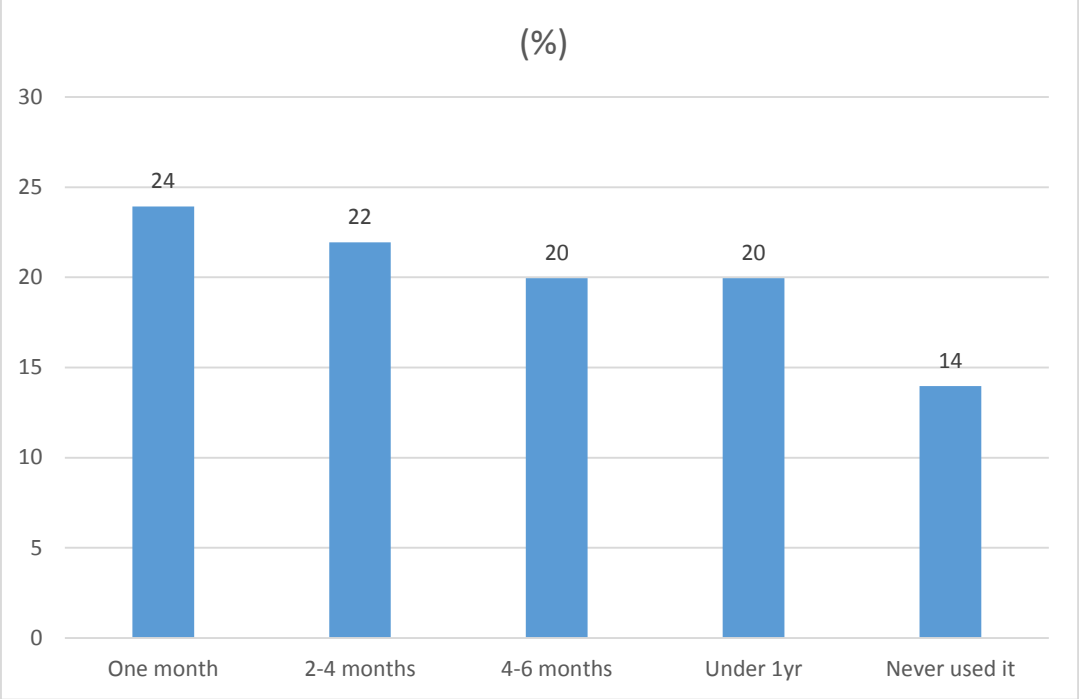
3. Use of Resources and its Frequency:

From the users, researcher tried to find out the use of resources and its frequency of use from the libraries.

Table 7.8: Use of Library Resources and its Frequency:

Use of Library Resources and its Frequency	Usage Frequency	(%)
One month	45	24
2-4 months	41	22
4-6 months	38	20
Under 1yr	38	20
Never used it	26	14

Fig 7.8: Use of Library Resources and its Frequency:



Observation:

It is observed that use of information resources from libraries is mainly used by the R & D users and 24% users uses resources at least once in a month, 22% users, uses resources once is 2-4 months, 20% employees have used resources either once in 6 months or less than a year. 14% employees do not use resources as they work in plants and monitor the R & D activities. The library usage by visiting libraries manually is less as they need the references on their table and they refer while conducting experiments. Hence it is noticed that the physical visits are very less as compared to desk top services.

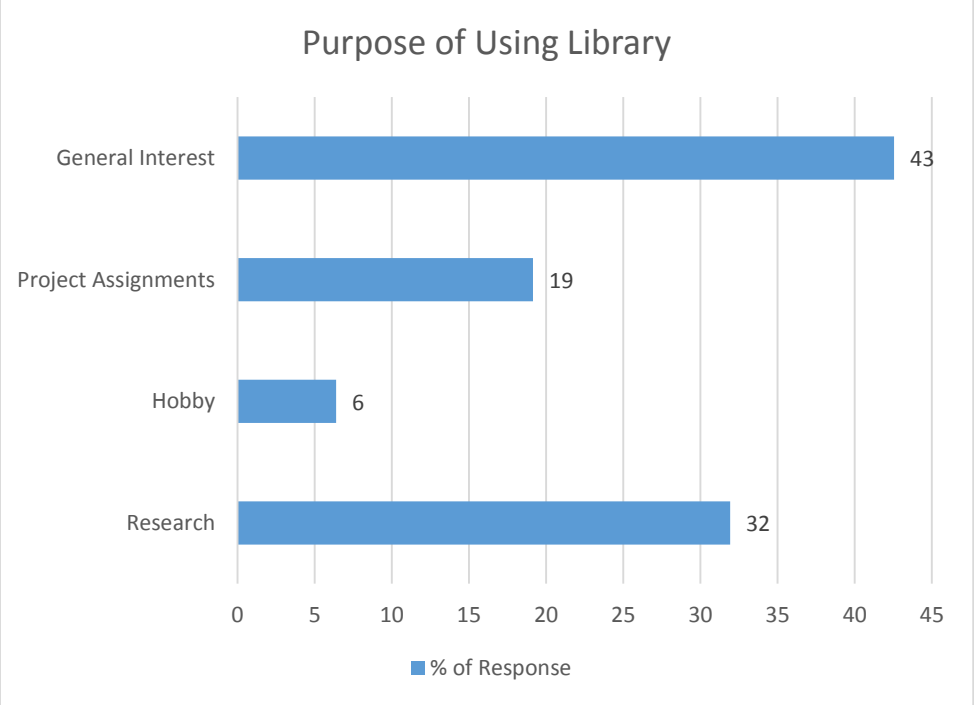
4. Purpose of using library:

To understand the better usage of library by the users, a question was designed to know the purpose of using the library by the users. This is utmost important to develop the collection of any libraries, librarian has to know the interest of the users so accordingly information or resources and collection can be developed by them.

Table 7.9: Purpose for use of Library:

Purpose of using Library	Responses	% of Response
Research	60	32
Hobby	12	6
Project Assignments	36	19
General Interest	80	43

Fig 7.9: Purpose for use of library:



Observation:

It is observed that 43% of users are interested in general information required for day to day activities but related to the work. But 32% users requires information for their research work. 19% requires information for the project initiation and assignments and 6% user's use library for their hobby and general reading.

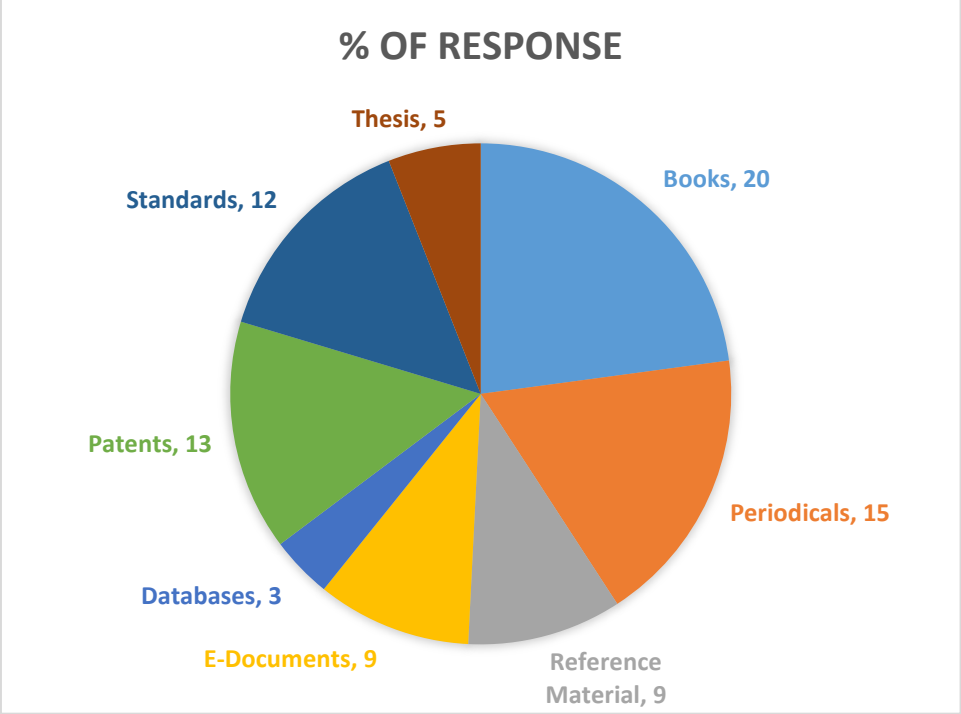
5. Type of Material Referred:

Type of materials referred by the users in chemical industries are analyzed and data is given below in table 7.10:

Table 7.10: Type of Material Referred:

Type of Material referred		
Material	**Response**	**% of Response**
Books	43	20
Periodicals	34	15
Reference Material	19	9
E-Documents	19	9
Databases	8	3
Patents	28	13
Standards	27	12
Thesis	11	5

Fig 7.10: Type of Material Referred:



Observation:

It is observed that the pattern of using information sources covers different type of materials. The users are more dependent on reference books, data books, MSDS etc. and they use reference material more including text books like Fieser and Fieser. It is observed that 20% of the users are referring books for their information needs. 15% users depends upon periodical as they provide nascent information as well as trade related data and 9% refers reference materials for getting fact finding data, 9% user refers e-documents which are more useful and available using net, 3% users refer different databases in the subject to track the development for the R & D,13% refers to patents as this is the base literature for R & D purpose, 12% refers to standards for setting analytical process and 5% refers to thesis to synthesize information on new compounds.

6. Information Sources not Available in the Library:

Since all the information required by R & D users cannot be made available from the library as its collection is need based, hence researcher has asked subjective question to users. Type of effort made by them and librarian to get the required material. It was

found that being a technical library, more focus is on the technical information and accordingly developed their collection and rendered different types of services. But some users opinioned that library should have a mix collection right from newspapers to technical databases. As it's necessary to refer newspapers or sometimes periodicals for finding information related to the latest news about companies and their competitors. Hence its felt that libraries should focus on technical development but also should have a few of the general interest documents such as newspapers, magazines etc. users also indicated that they search internet and collect primary information and also visit to neighboring university libraries. Institutional membership is paid and industries become member and the users can consult the libraries and avail services by paying charges if required e.g. for Xerox, database searching etc. Thus users try to find and get the information else request librarian to procure the same from the publishers, procurement sources or clearing houses.

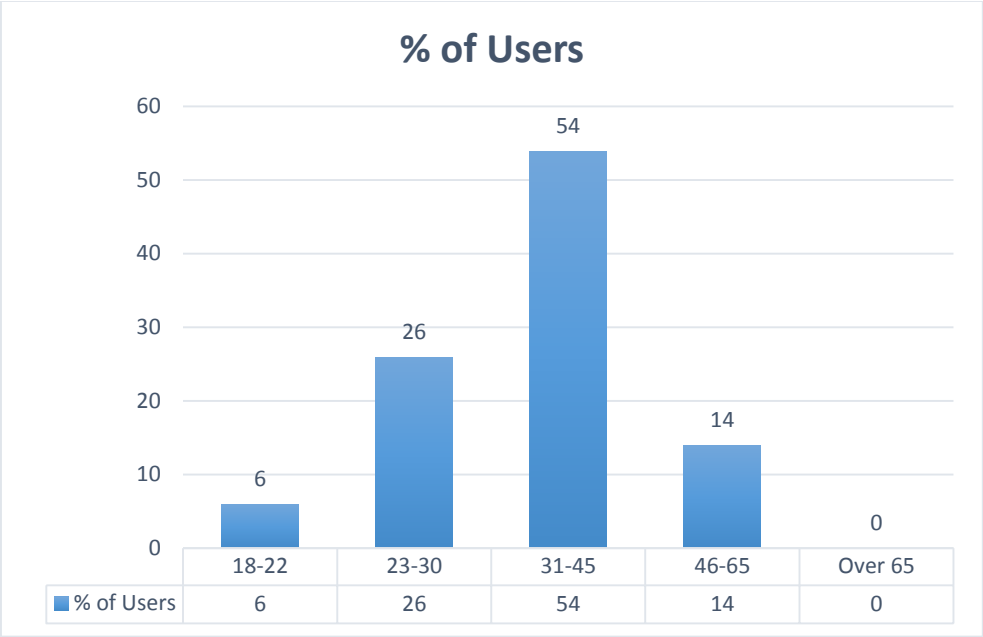
7. Age of the Users:

The user's age group is analyzed to find out the usage by particular age group. This provides the prospective user group.

Table 7.11: Age of the Users:

Age	Users	% of Users
18-22	11	6
23-30	49	26
31-45	101	54
46-65	26	14
Over 65	0	0

Fig 7.11: Age:



Observation:

It is observed that maximum use of the library is by the users belonging to the age group of 31-45 i.e. more than 50%. This means that users in this group are real R & D chemist and need the information support for carrying out their tasks. 26% Users are from 23-30 age group and they are initiating their R & D exposure, 14% from 46-65 age group which is senior most wing and hold senior positions and do not involve in R & D but they are decision makers and technology forecasters and plans for the future products. 6% users are from 18-22 age group who are just entered in to the industry and begins their carrier and need not consult library as they are under the control of seniors.

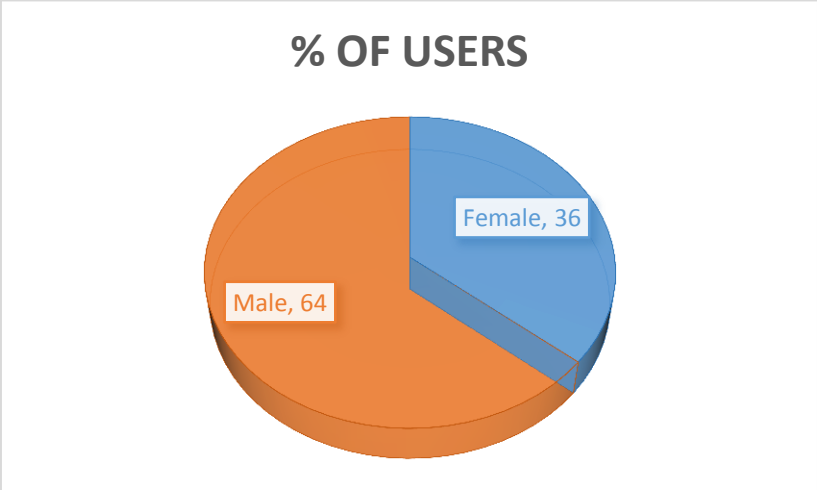
8. Gender Wise Users:

The user's gender was analyzed to find out the usage by articular gender and the status of female users in the industry.

Table 7.12: Gender:

Gender	Users	% of Users
Female	68	36
Male	120	64

Fig 7.12: Gender:



Observation:

It is observed that 64% male employee users are in chemical industries and 36% are female users and they need information on regular basis for R & D activities. It is observed that now female / ladies chemist employing are also took leading part in process development and R & D activities.

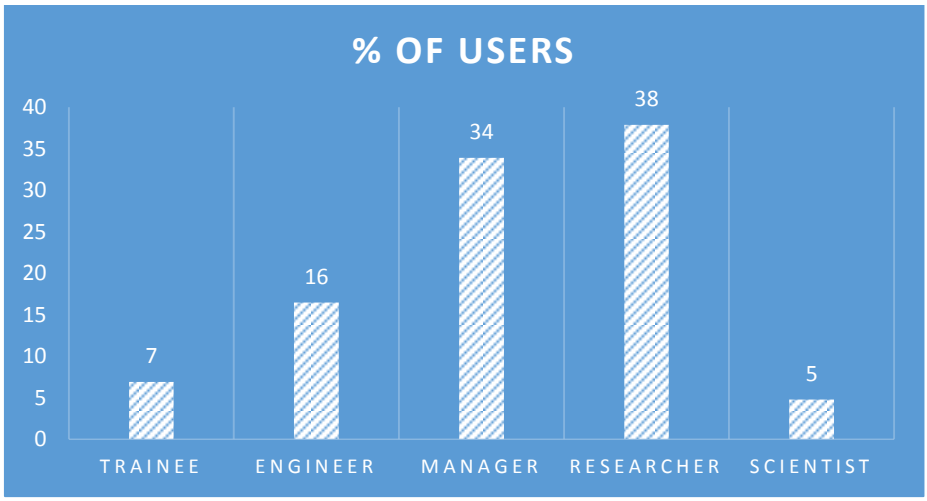
9. Designation of Users:

In industries different designation of users are noticed which depends on experience and work performance. The researcher observed that chemist, scientist are equivalent. The designations noticed are:

Table 7.13: Designation of Users:

Designation of Users	Users	% of Users
Trainee	13	7
Chemical Engineers	31	16
Managers	64	34
Research Assistants	71	38
Scientists / Chemists	9	5

Fig 7.13: Designation of Users:



Observation:

It is observed that out of the total staff Managers and Chemical engineers contribute 50% Managers (34% and Engineers 16%). They are the decision makers and the other team members contributes research assistants or project associates (38%), chemist, scientist and trainee (12%). Librarian maintain various resources and disseminate information as on demand through services to specific users as per the subject of interest.

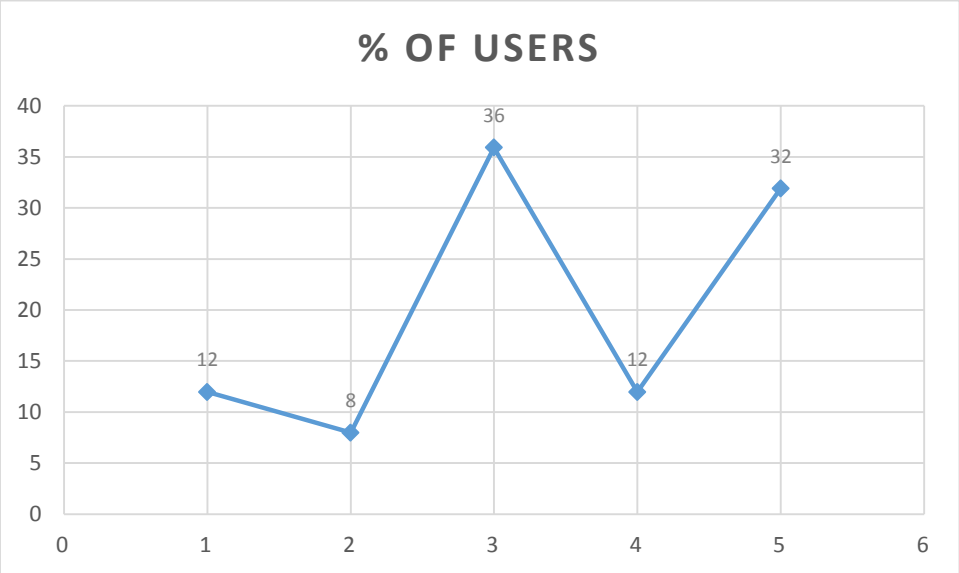
10. Users Ratings for Library Performance and Behavior of Library Staff:

Researcher tried to find out how users are treated in the library by the librarian and the performance of services from the survey analyzed based on ratings from the users.

Table 7.14: Library Performance:

User Ratings for Library Performance		
Rating	**Users**	**% of Users**
1- Least	23	12
2 - Average	15	8
3 - Good	68	36
4 - V Good	23	12
5 - Highest	60	32

Fig 7.14: Library Performance:



Observation: 36% users have ranked the performance of library services as Good (3) and about 32% users ranked it as (5) Highest. This ranking of performance is by the actual users and the efforts of librarian in maintaining the libraries in spite of varied demands are appreciate by the users. 20% users are not using libraries as they are busy in pilot plant operations and maintaining reaction parameters. Library performance is based on the services provided to the users and not collection of the libraries. Librarians are taking care of the users by conducting ISB. Users have pointed out that library staff is very cooperative and try to provide the required information from the different places.

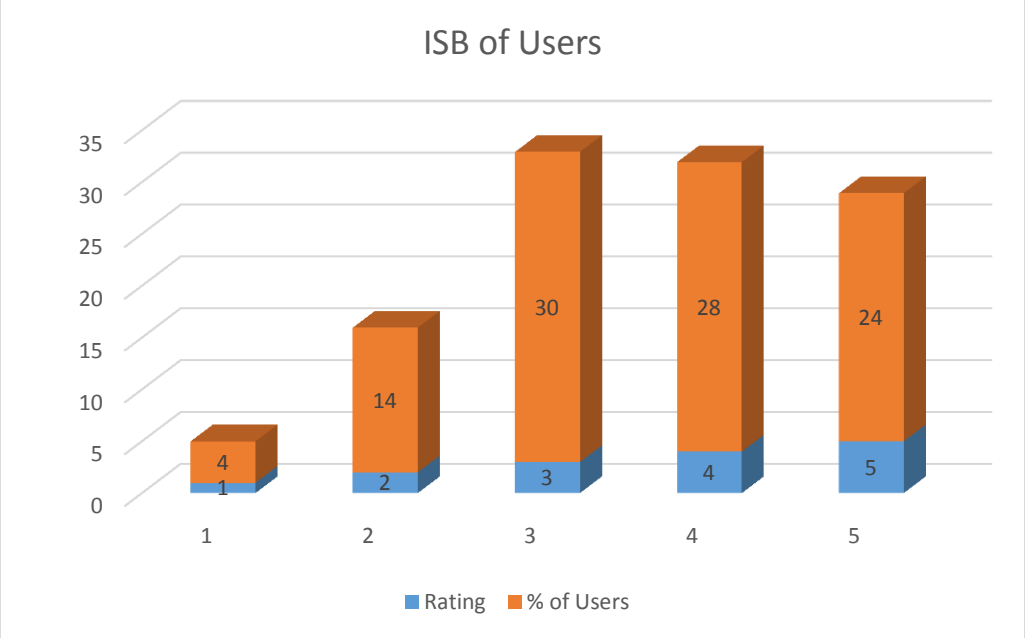
12. ISB of Users

Researcher tried to find out the information seeking behavior of the Users. It is necessary to understand the needs of the users to provide them the useful services. Hence this question was asked and the data collected is analyzed in the table 7.15.

Table 7.15: ISB of Users:

Consistently courteous to the Users		
Rating	**Users**	**% of Users**
1 - Least	8	4
2 - Average	26	14
3 - Good	56	30
4 - V Good	53	28
5 - Highest	45	24

Fig 7.15: ISB of Users:



Observation:

52% users have suggested information needs are satisfied by librarian and preferences given for the library services. 18% users are engaged in the technical field and rarely consulting libraries have not responded to the question but 30% users have shown satisfaction for the activities and services rendered by the libraries/librarians to them. The real R & D chemist have suggested some additions to the library activities. Users have also pointed out that librarian is very cooperative and manages the information needs of the users form the different sources.

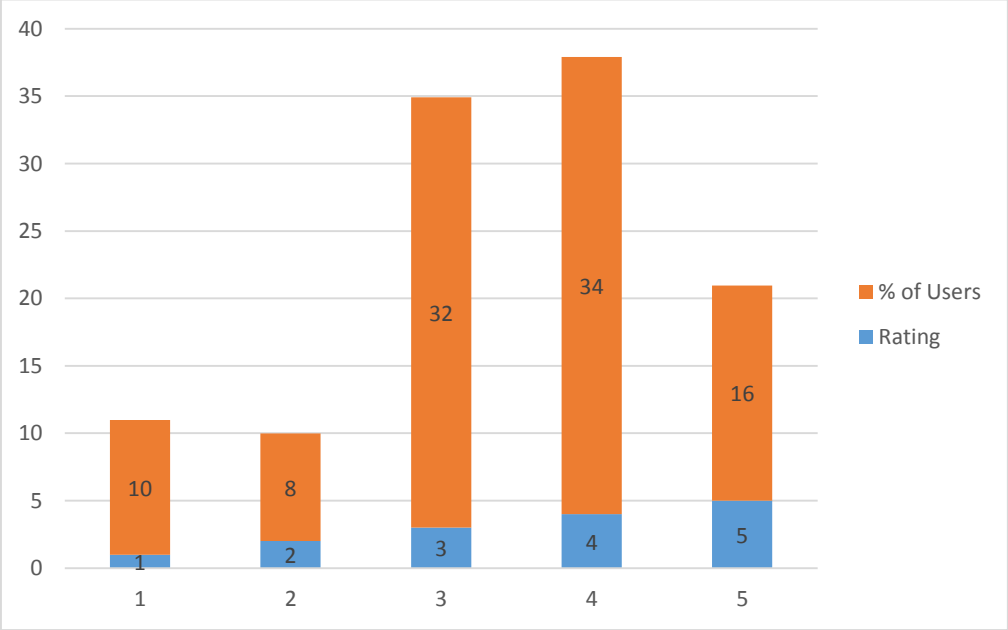
13. Library Collection:

Researcher would like to know from the users whether libraries have required collection and provides the information to users for their research work. The responses from users are tabulated below:

Table 7.16: Library has materials I need for work or research:

Library has materials I need for work or research		
Rating	**Users**	**% of Users**
1 - Least	19	10
2 - Average	15	8
3 - Good	60	32
4 - V Good	64	34
5 - Highest	30	16

Fig.7.16: Library has materials I need for work or research:



Observation:

It is observed that almost 32-34% users are able to get the information required. 16% users able to find all the information required by them. Hardly 8-19 % are unable to find out the material required by them as they are from the maintenance and management of industry. It can be analysed that almost 50% users working in

reserach, as well as R & D sector are getting their required information from library may or may not be in the colelction but librarian takes care of getting the information.

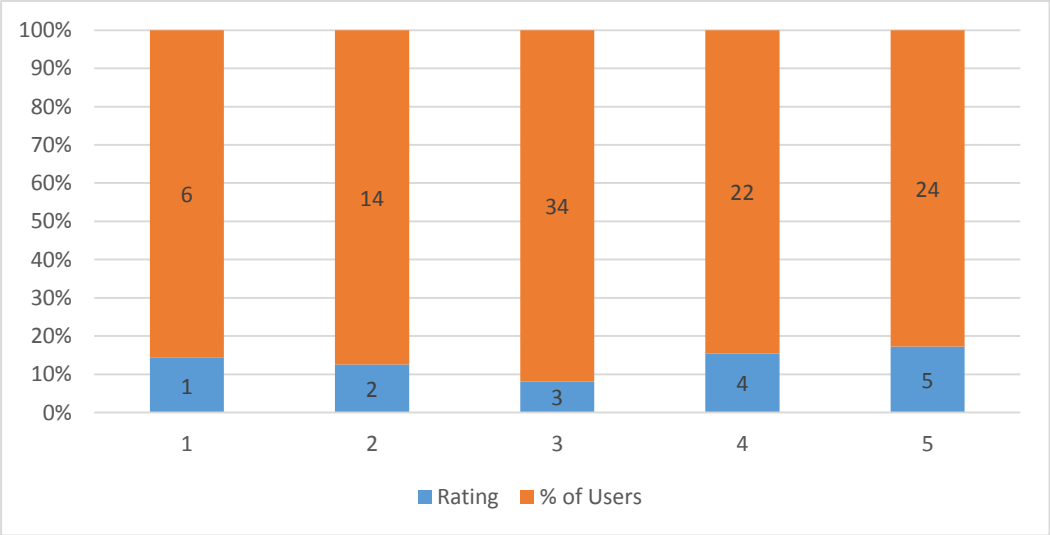
14. Response from Librarian to User Queries:

The question was asked to understand the responses to the user's queries by the librarians. It is also necessary to understand the efficiency of library staff towards library user requirements.

Table 7.17: Response from Librarian to User Queries:

Response from Librarian to User Queries		
Rating	**Respondents**	**% of Users**
1 - Least	11	6
2 - Average	26	14
3 - Good	64	34
4 - V Good	41	22
5 - Highest	45	24

Fig. 7.17: Response from Librarian to User Queries:



Observation:

It is observed that resposne by librarians are prompt and ready for rendereing the service to their users and providing the literature needed for their project. Almost 24% users are getting instant respond from the Libraries, where as 56% users have shown satisfaction on the services provided and settlement of queries. 6% Users have not responded as they are only working on plants and not in R & D units.

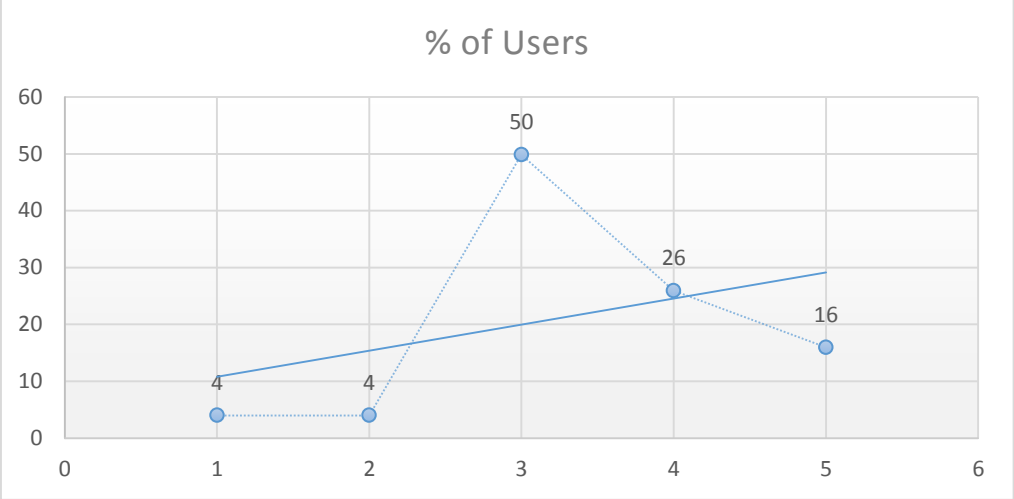
15. Knowledge to Answer User Queries?

This question was included to understand the qualities of librarian working in chemical industries. Since the queries are very specific librarians have subject knowledge and professional library and information skills while replying to the queries. The responses from the users are tabulated below:

Table 7.18: Knowledge to answer user Queries:

Knowledge to Answer User Queries		
Rating	**Users**	**% of Users**
1 - Least	8	4
2 - Average	8	4
3 - Good	94	50
4 - V Good	49	26
5 - Highest	30	16

Fig. 7.18: Knowledge to answer users Queries:



Observation:

It is observed that almost 50% users have indicated that librarians since qualified in basic chemical sciences and in addition to LIS experience they handle the quries and librarians have knowledge of anserwing to user queries, rarely in 4% users have found librarians were not able to answer to their queries as they are not covering the area. 42 % users have marked the knowledge of librarians as an excellent which helps the users by provinding needed information.

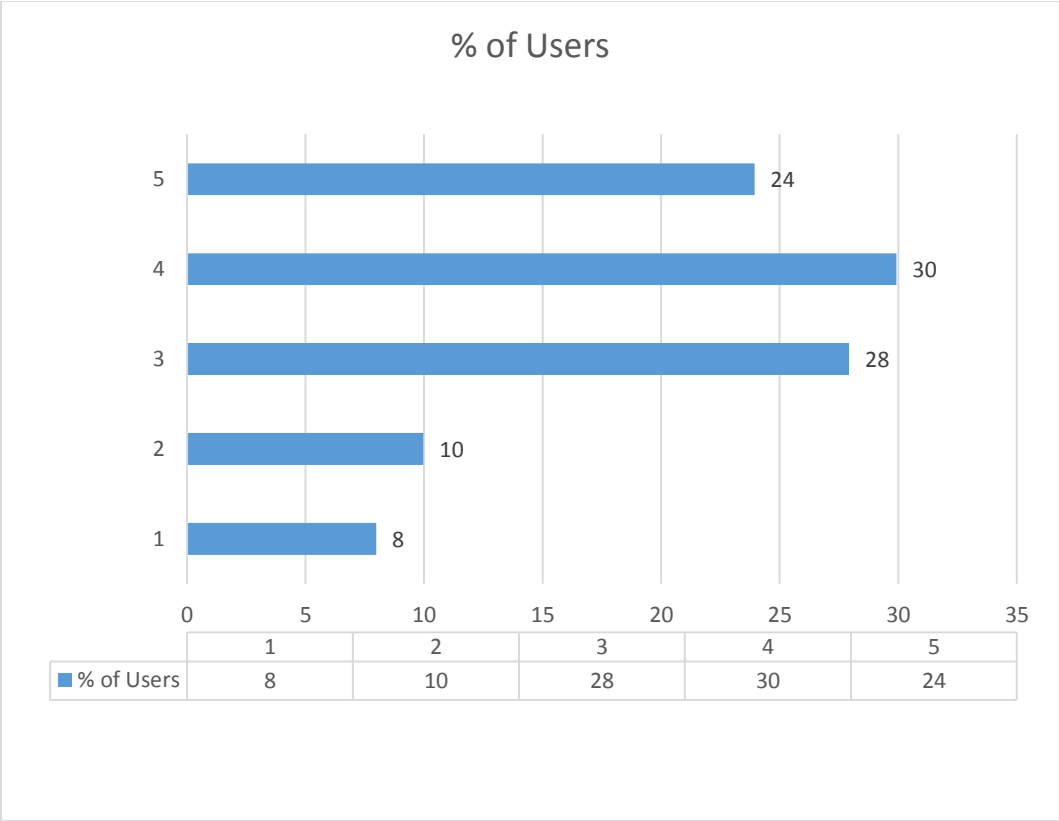
16. Access to Modern Equipment and Technology:

In the era of ICT it is important to know whether libraries and users are having access to the modern equipment. Responses are tabulated as follows:

Table 7.19: Access to Modern equipment:

Access to Modern Equipment		
Rating	**Users**	**% of Users**
1 - Least	15	8
2 - Average	19	10
3 - Good	53	28
4 - V Good	56	30
5 - Highest	45	24

Fig 7.19: Access to Modern equipment:



Observation:

It is observed that almost 54% libraries are providing access to the modern equiment and using ICT for libray functioning especially library automation, infomation searching, inetrnet usage etc. Both library staff and users are permited to use ICT for data collection. Hardly 8% libraries do not provide access to the modern equipments as these are the cases where these are been looked by the non-professional or chemist in the organization. 28% users marked the rating as good and the remaining 18% have not replied suitably as they are not using the library.

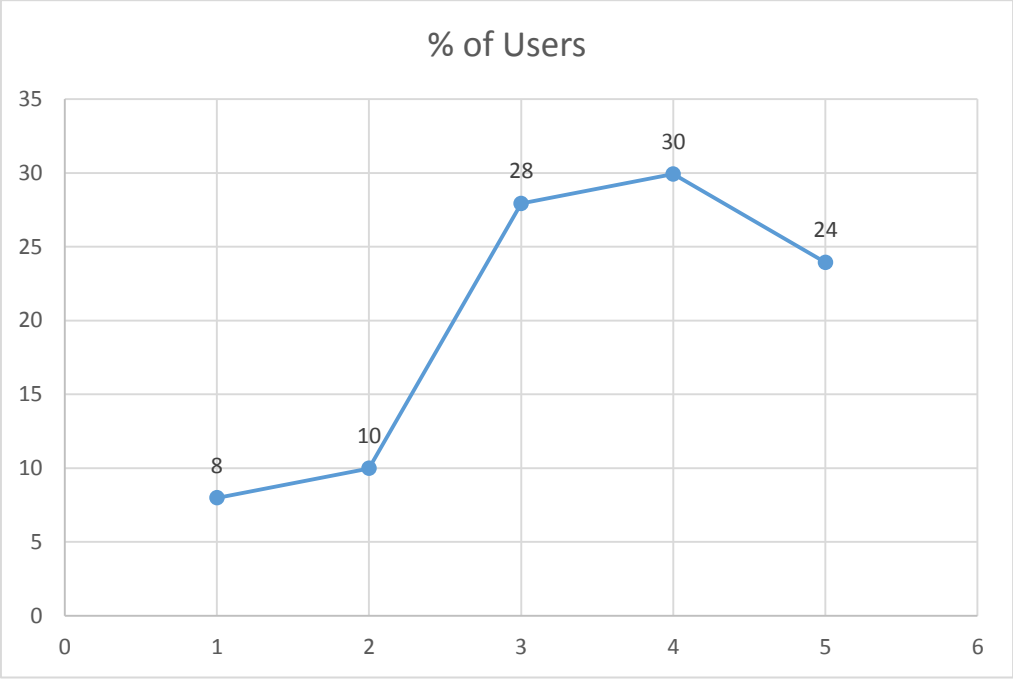
17. Understanding the Needs of Users:

It is important to understand the needs of the users by librarian and accordingly try to fulfil the same by applying different techniques. The question was asked to find out whether librarians conduct user surveys to analyze the needs.

Table 7.20: Understand the Needs of Users:

Understand the Needs of Users		
Rating	**Users**	**% of Users**
1 - Least	15	8
2 - Average	19	10
3 - Good	53	28
4 - V Good	56	30
5 - Highest	45	24

Fig. 7.20: Understand the Needs of Users:



Observation:

It is observed that 24% users have responded positive and pointed out that librarians conduct the survey for needs but difficult to satisfy from single source. 58 % users

have marked the rating that the user surveys are indirectly measured by the librarians. Librarian takes care of the demanded literature and performs the searches from different databases and provide the information which is not synthesized and filtered.

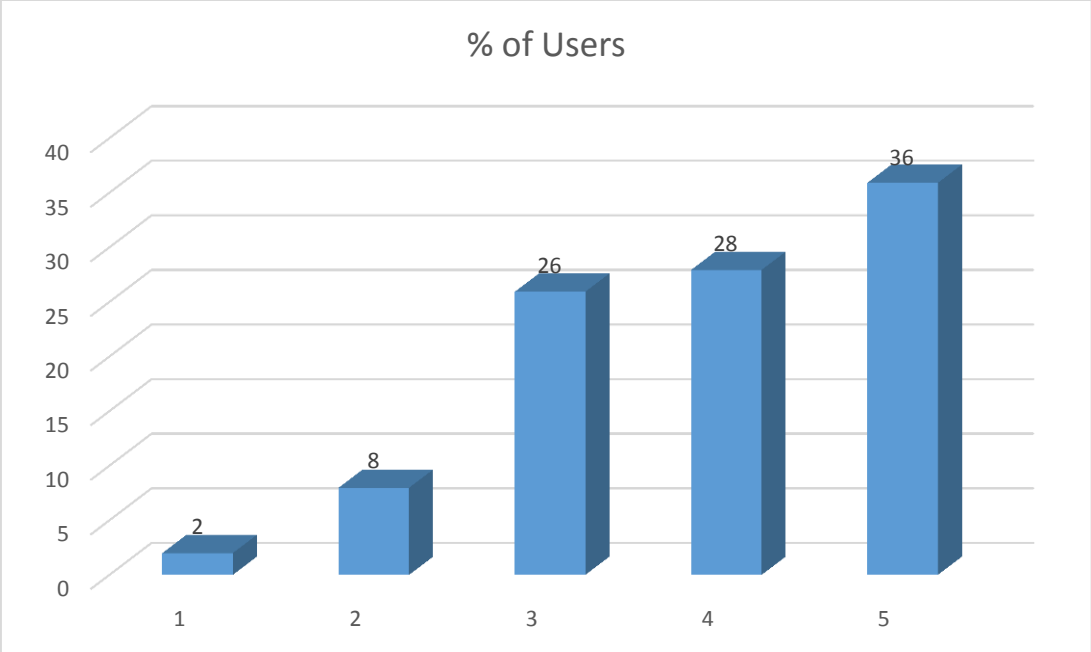
18. Act as Gateway for Information:

From this question researcher tried to find out whether users feels whether their libraries are providing them study material required for their research work.

Table 7.21: Act as gateway for Information:

Act as gateway to Information		
Rating	**Users**	**% of Users**
1 - Least	4	2
2 - Average	15	8
3 - Good	49	26
4 - V Good	53	28
5 - Highest	68	36

7.21: Fig: Act as gateway for Information:



Observation:

It is observed that 36% of users are of opinion that library provides them with the material/information required for their studies and research. It helps them in keeping themselves continuously updated. Only 2% users are of the opinion they are not finding the material/information required from library since they need general purpose reading books.

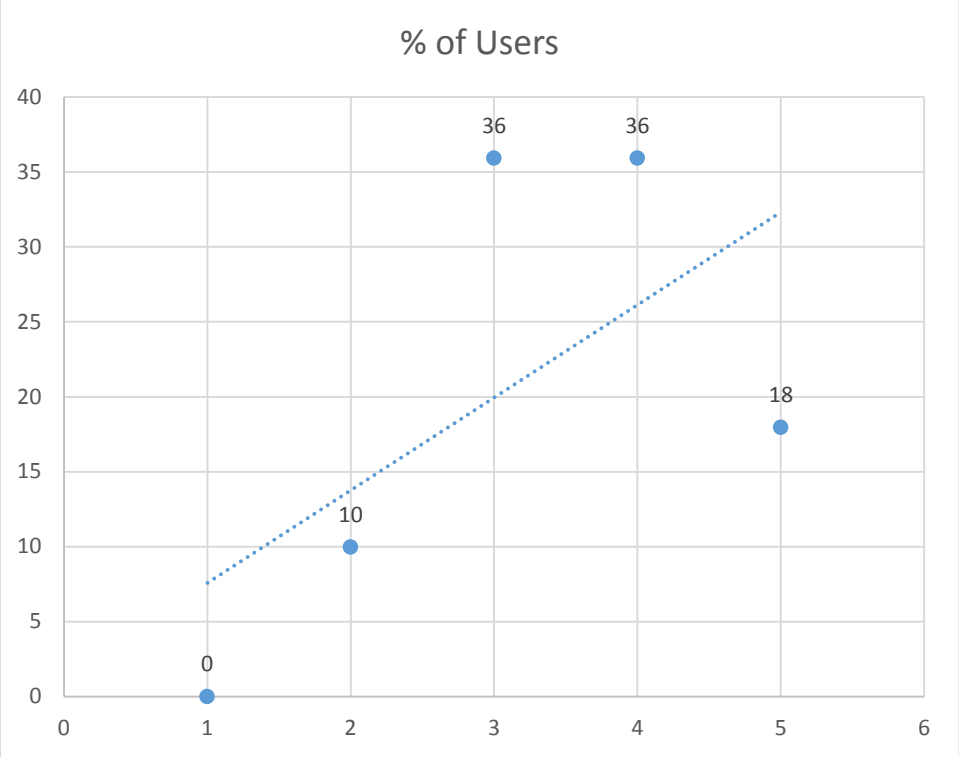
19. Delivery of Authentic Information:

In research authentic and trustworthy information is required hence it is necessary to assess the fact from the users whether they are getting authentic information from libraries which help in taking decisions.

Table 7.22: Authenticity of Information:

Authenticity of Information		
Rating	**Users**	**% of Users**
1 - Least	0	0
2 - Average	19	10
3 - Good	68	36
4 - V Good	68	36
5 - Highest	34	18

Fig. 7.22: Authenticity of Information:



Observation:

It is observed that almost 36% users stated that librarians help them in providing authentic information from the sources. Librarians make sure that users refer to the authentic information for their day to day information needs as research needs original data to rely on. 72% users are also of the opinion that librarians provide users authentic information published in different sources. Librarians searches information from the specialized databases and hence purity of information is disseminated. The internet information is properly evaluated and supplied to the users. Librarians are skillful in searching information both from e-resources and print resources. Librarians visits to different libraries and collect the information and provide it to the users.

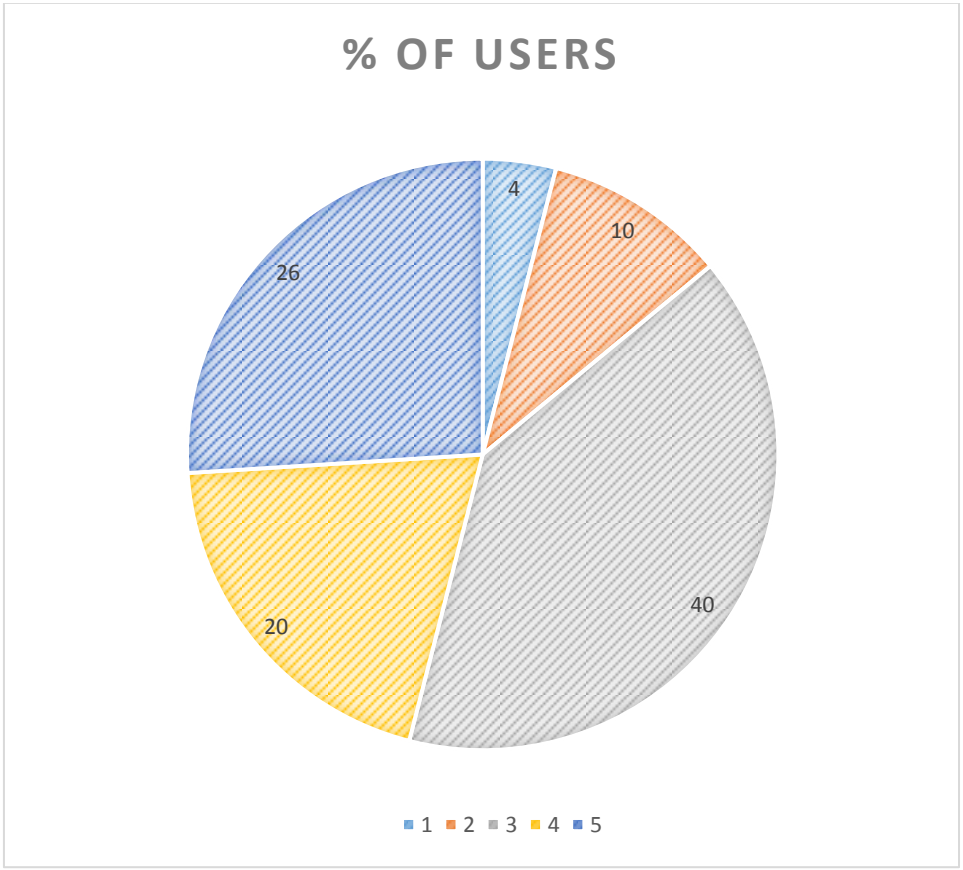
20. Level of Satisfaction from the Library:

Efforts were made to find out whether users are getting satisfaction from the libraries by way of supporting to their needs.

Table 7.23: Rate of Satisfaction:

Rate of Satisfaction		
Rating	**Users**	**% of Users**
1 - Least	8	4
2 - Average	19	10
3 - Good	75	40
4 - V Good	38	20
5 - Highest	49	26

Fig. 7.23: Rate of Satisfaction:



Observation:

It is observed 26% users are maximum satisfied might be working at higher level and almost 40% users felt libraries are treating equally to all the users and no descrimination found by them. Hardly 4% users have been felt the treatment or attention was not given to them as the desired literature is not available in the library for them. Satisfaction is observed among the users.

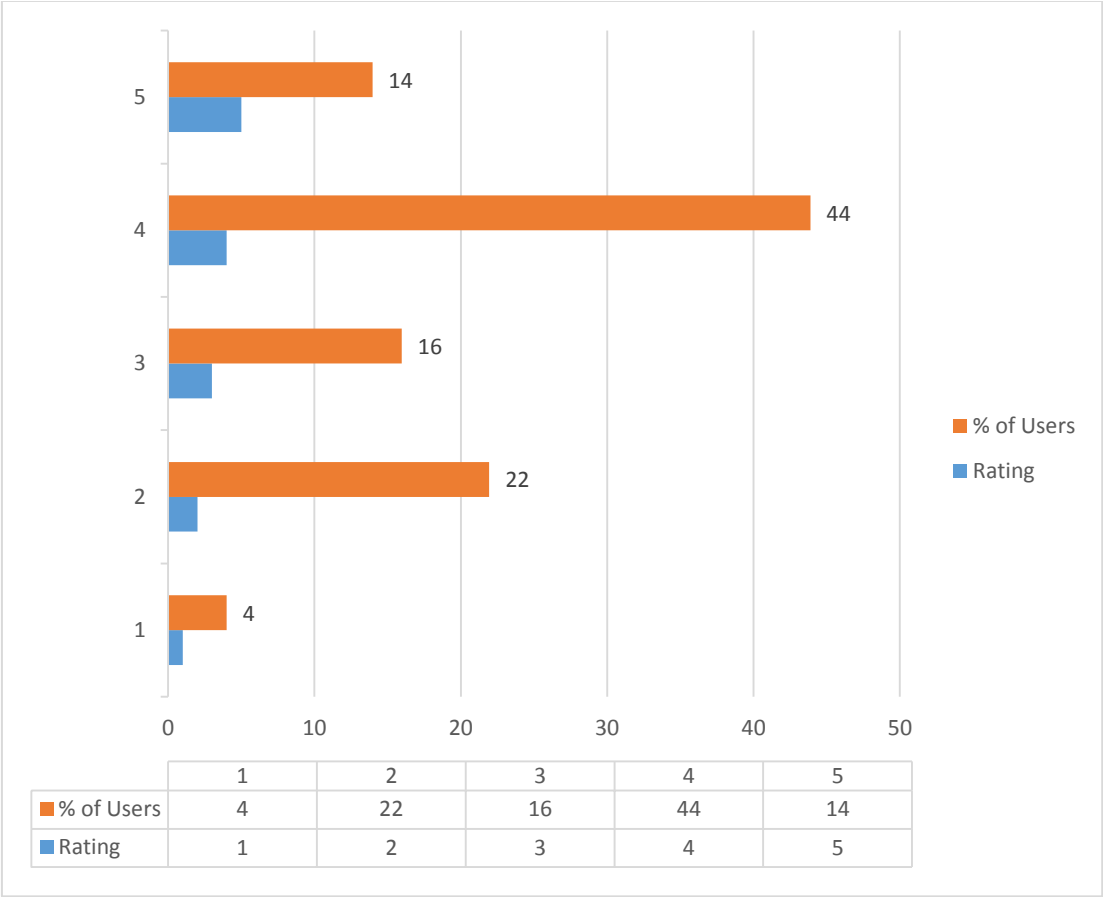
21. Overall support from Library:

The researcher tried to find out whether users feel libraries are supporting them in their research needs, and responses are tabulated as follows:

Table 7.24: Overall Library Performance:

Overall Library Performance		
Rating	**Users**	**% of Users**
1 - Least	8	4
2 - Average	41	22
3 - Good	30	16
4 - V Good	83	44
5 - Highest	26	14

Fig: 7.24: Overall Library Performance:



	1	2	3	4	5
% of Users	4	22	16	44	14
Rating	1	2	3	4	5

Observation:

It is observed in almost 58% users feel happy from the library services and rated the overall satisfaction from libraries as they are supporting users in their research, and needs. In only 26% cases users do not have commented as they are not concerned with the library services.

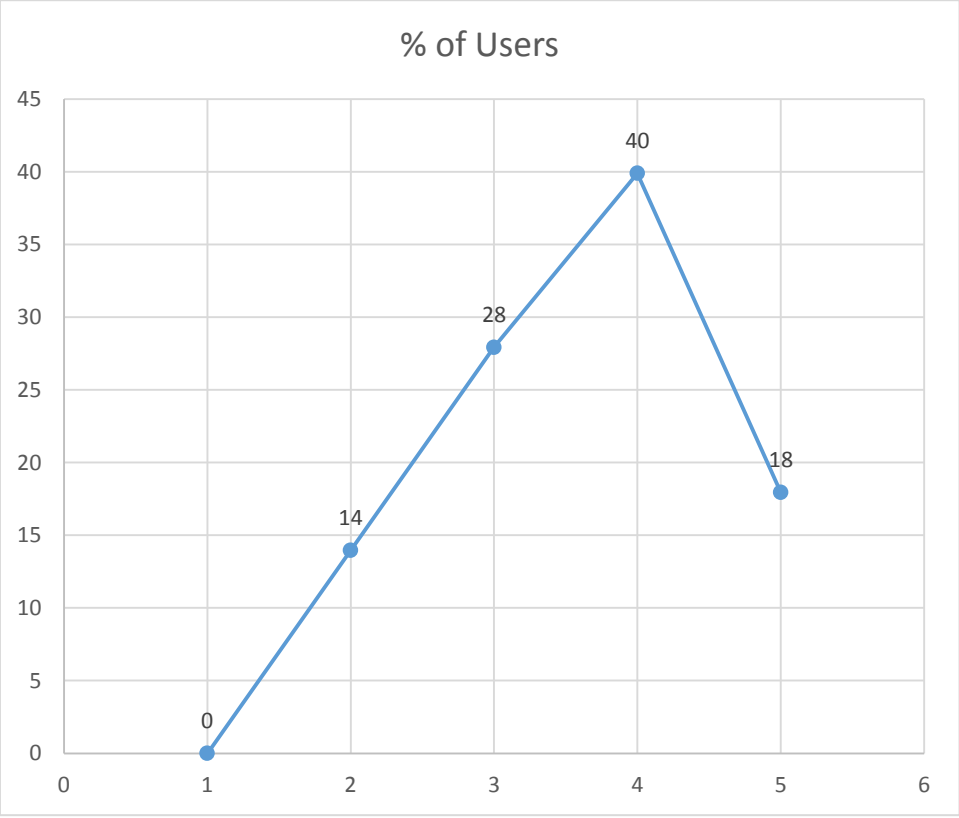
22 Overall Quality of Service from Library:

Overall satisfaction by the users for the different services provided by the library is analyzed as under.

Table 7.25: Overall Quality Services from the Library:

Quality of the service provided by the library		
Rating	**Users**	**% of Users**
1 - Least	0	0
2 - Average	26	14
3 - Good	53	28
4 - V Good	75	40
5 - Highest	34	18

Fig 7.25: Overall Quality Service of the Library:



Observation:

It is observed that 40% users have rated very well for quality services provided by the library, 18% have rated highest and 42% users have rated overall satisfaction level as good.

User Comments (Remarks):

- Users need better information services from different sources.
- Users demands are for the CAS and SDI but in advanced industries thy need trade and patent related information
- On line searching needs powerful tools and data download systems
- User needs desktop information on their demand
- Users are more interested in Alert and Digest services.

Summary:

1. Only large scale industries where libraries are available are only considered for the survey. In the survey total research staff involved in R&D activities and production are considered and it is noticed that on an average 40-50 employees are working at various levels among these chemical industries and only 50% users are randomly selected from each industries from where librarians responses have been received, Researcher isolated form Mumbai and Pune area which is more proliferic in chemical industries and listed out 32 units having R&D and Libraries in which 22 have responded to the survey very positively and remaining due to administrative issues cannot responded to survey. Few prominent chemical industry libraries visited by the researchers are:
    - Aditya Birla Mumbai
    - Cipla Limited Mumbai
    - Clariant Colour Chem Pvt. Ltd. Mumbai
    - Gharda Chemicals Ltd Dombivali Mumbai
    - Glenmark Pharmaceuticals Mumbai

- Nicholas Pirmal India Mumbai
- Pidilite Industries Mumbai
- R C F Chembur Mumbai
- Reliance Industries Limited Navi Mumbai
- United Phosphorous Ltd Mumbai
- Lupin Limited Pune
- Emcure Pharma Pune

2. User's population and sampling is based on R and D Industries having libraries and from each R&D center approx. 20 users, have been selected. From 12 industries 237 users were selected randomly out of them 188 responded and the data received from the users is tabulated. Thus sample of users survey consist of 188 respondents and this is considered for the user analysis.
3. Aurangabad and Nasik have large scale industries but do not have library hence they have not been considered for the survey.

CHAPTER 8

FINDINGS, SUGGESTIONS AND CONCLUSION

From the data collected, researcher analyzed the data and interpreted in the previous chapters and from the observation (Survey, Literature review and expert, librarians view) deduced the findings in respect of chemical industry library in this chapter. The findings indicate the overall status of the chemical industry library. The researcher listed few major findings and based on them suggested few viable suggestion to enhance the status of the chemical industry libraries to support R & D activities by providing sufficient information published and available globally.

8.1 Findings:

Findings are deduced from the opinions of scholars published in literature, from the actual survey of libraries, users and opinions of librarians and experts in the field. They are presented below.

(A) General Findings:

1. Chemical industry is growing fast in all countries of the world including India. This industry is helping in increasing the GNP of country.
2. The Indian chemical industry is one of the oldest indigenous industries, which has been contributing significantly to both industrial and economic growth of the country.
3. Chemical industry libraries sometimes also called as industrial libraries, corporate libraries, chemical R & D libraries etc.
4. Libraries are found in large chemical industries and multinational industries were research element is more powerful along with product and process development. In small scale industries only manufacture products and market them, hence libraries are not associated with them. In case of medium scale industries the same situation like small scale is reflected but the researcher need information which they collect from neighboring university libraries or special libraries like CSIR-NCL, NISCAIR.

5. It is also found that sometimes in the company name the word "Chemical" appears but they are dealing with distribution and sales ,marketing, wholesaler agencies, distributors etc. and do not need any information base and hence these are not covered in product and process industry.

6. Chemical industries slowly started library services in USA since professional training for librarians initiated in 19th century.

7. It is observed that libraries associated to chemical industries are managed by research and development staff and collection is very limited and for the specific purpose. Such Libraries are not open throughout the day but few hours in a day libraries are kept open for consultation. In case of large scale industries full fledge librarians manage the information resources and provide access to user more than having ownership.

(B) Literature Survey:

1. Chemical Industry libraries initiated since 1870 (Imperial changing Industry use) and flow was in large chemical Industries and in medium scale industries.
2. Libraries are found in large chemical industries where R&D and product /process development is powerful. In medium and small scale industries they are only act as manufacturing unit and manufacturing product, market. These are sold to other industries however few industries have libraries but not heavily used and monitored by chemist only.
3. There are different types of industries and they also need information to manage their R & D activities. It is noticed that industries are also establishing libraries to support their R & D users for the information required. Chemical industries are more prominent in industry sector.

4. Industrial librarianship is flourishing due to need of information in every sector like engineering, software, electronics, chemical and pharmaceuticals etc. Library Science syllabus has also included industrial librarianship as a subject to develop industrial librarians with special skills.

5. Industries are generally categorized in to large scale, multinational, medium scale and small scale industries. It is found that libraries are developed very

well in industrial sector especially large scale, multinational and medium scale where R & D and product / process development is more prominent and need current information available globally for the new developments in the products as well as filing patents and publishing results.

6. Libraries attached to industries are covered in special library category but they are slightly different in carrying out activities and need of the users are different and not predicted. The needs are based on projects in hand and future developments.

7. The users, need specific information related to their product, process, new developments, market strategies, future needs in the field etc. For this purpose there is no single source available but the librarian has to consult many references and databases.

8. It is noticed that all the resources required by the users cannot be acquired in advance and librarians try to cullet the resources from different sources either free or paid. Everything is not available in library and has to take special efforts to acquire.

9. The collection of library consist of mainly journals, reference books, chemical guide books and internet as well as free and subscribed databases like SciFinder, Scopus, DERWENT patent databases etc. The resources required by the users are not common and hence collection is limited and developed on demand basis.

10. Instead of collection development, librarian's task is to route the information and provide information services to user cantered services to make them aware of new development in their R & D area.

11. The users consult to reference books, journals, technical reports, patents, standards, thesis, etc. either in print of e-form. Mainly users hunt for their own information and ask the librarian to procure. The literature published and available is not cost effective. Budgets are not fixed, every time has to approach management to get the approval for procurement of demanded needful literature form the users.

12. Generally librarians manages the libraries but in many cases especially small scale and medium scale libraries are managed by chemist and their roll is specific. They are not professionals and hence qualified librarians are needed to manage libraries.

13. Librarians need advanced skills to manage chemical industry libraries. The management of library is simple but assisting needs of chemist are complex. There is no network of industrial libraries to provide more information support.

A) Survey of Chemical Industry Libraries:

1. Different types of libraries are basically known to all: academic, public and special libraries in which libraries attached to industries and different subject areas were treated under special libraries. Now different terms are being used for subject libraries, and libraries associated to industries are called as industrial libraries, business group, business libraries, engineering libraries, law libraries, corporate libraries etc.
2. Chemical industries are of two types: process industries and product industries. In both types R&D activities are carried out. Wherever R & D, Patent filing activities are carried out they need information and libraries are established in such cases to support information needs of chemists
3. Industries are divided in three group's viz. large scale, middle scale and small scale industries. Chemical industries also have the same groups but under this basic chemicals, cosmetics and are again grouped with process and product industries. Chemical industry libraries sometimes also called as industrial libraries, corporate libraries, chemical R&D libraries etc.
4. It is noticed that majority of large scale multinational industries have well set libraries and in Maharashtra out of 237 chemical industries only 32 industries have developed library facilities.

5. The main users of the chemical industries are researchers, R & D scientists or chemist, managers, senior consultants, policy makers, analysts, predictors, etc. MD, CEO, V P, Managers, Chemists (senior scientists), Project chemist, and chemical engineers. All are generally involved in R & D and process or

product development activity. It is observed that MD and Presidents are using the libraries very less as they are involved in development and management of company / industry and planning for the future growth and expansion. Chemists, chemical engineers, VP, refer to and make maximum use of libraries as they are really involved in R & D activities of the company. CEO rarely visits libraries, MD and CEO's if needed any information or data is provided at their desktop.

6. The libraries are open during normal industry working hours only but it is in case of large multinational industries. In case of medium scale industries the timings are for few hours either in the morning session or in the afternoon, as these libraries are operated and managed by chemist or administrative staff. The space of the library is restricted to few rooms only. There is no facility for keeping libraries late in the evening.

7. It is observed that chemical industry users are in need of information published in their field of R & D. Industries try to develop new molecules, drugs, cosmetics etc. useful to society in economic way. Hence the chemists need literature form libraries pertaining to their use and applications. Among the literature all the users need articles from journals and books specially reference books (100%) for getting information on new activities and instant ready reference data. Followed to this is information on product and process development (91%) which is dragged out from databases and e-resources. Literature search and patent information searching for filing patents is also needed (72%) to get new information on the product. It is observed that the queries are purely related to the qualitative pinpointed information on topic of interest only.

8. The collection covers mainly society journals, standards , patents, reference books and standard text books, encyclopedia, pharmacopeia, trade related literature, technical reports, lab notebooks (important archival collection), annual reports of industries in the related areas, now trend is shifting to e-resources and database searching having user license etc. Internet surfing is very common and chemist collect the primary information using it. Thus collection is specific and limited. It is understood that collection ranges from

500-5000 documents housed in single hall with reading facility for limited users. In large scale industries 3-4 rooms are assigned for library purpose.

9. It is observed that large-scale industries having R & D have appointed qualified librarians. They have science graduation and B. Lib or MLISc qualifications. They are treated as managers and not librarians in their organizations. The small scale libraries do not appoint any librarians or library qualified staff as the collection is ranging from 100 to 500 and it is managed with the help of chemist. The demands are met from the clearing houses or from other subject libraries like IIT, UDCT, universities etc. R & D staff visit to these libraries and collect the data. The library staff is restricted to only librarians post and in case demand some assistance part time is deployed. In case of large scale and multinational companies librarians are hired and trained for their needs and the skill sets are different than other academic and special libraries as librarians have to work as solo librarian and the skills required are both traditional and advanced.

10. It is observed that chemical industry libraries provide different information services to users for their R & D support. Users are less visiting to libraries as they are busy in experiments. The users need information on desktop and information services plays a vital role. The main services in demand are Xeroxing of articles, internet services, ILL, abstracting, alerts, CAS etc. (70-80%). Followed by SDI, databases searching (online searching 68%). Translation and Indexing services are required rarely. Indexing means bibliographic compilation and translations services are required in case of patent filing and understanding process parameters developed and reported in other than English languages. Though reading room facilities are (59%) are required but this is for silence reading of subscribed literature and reports available in libraries only.

11. It is observed that about 80% libraries have been automated and only 20% libraries are not automated. 40% libraries have developed their in house library software and 60% have purchased the software's available in the market. It is observed that 36% libraries have used all the modules of the software's. 77% libraries have implemented OPAC module and is running

successfully in the organization only. It is not available over the web as Web OPAC. It is also noticed that the automation is necessary in chemical industry libraries as librarians have to manage different queries from e-resources also.

12. It is observed that 68% of libraries have the membership of other libraries such as IIT, UDCT, and CSIR Labs like NCL etc. for getting information for users. These libraries provide them required services such as full text articles, database searches, and document delivery as and when required. These organization also permit chemical industry users to access libraries for gathering information either giving library membership or permitting to use library free but charge for the services provided based on cost involved in operation. ILL and Library membership as well as getting help from clearing houses are very common in chemical industry libraries as the value of literature is restricted to a group of user and in future the literature is obsolete for them.

13. It is observed that almost 90% libraries support to use of internet and e-mail facility from libraries as well as desktop of top management personalities. 85% libraries are providing e-resources and online searching facilities to their users. Use of Wi-Fi and social media is initiated in few industries (45%).

14. The annual library budget is not fixed for these libraries as the collection is volatile. Library budget is based on the demands received from the users and librarians have to get cleared the expenses from the authorized staff of management. Every year tentative budgeting is calculated.

15. It is observed that libraries associated are having advanced infrastructure like computers, intranet connectivity, internet and Wi-Fi, scanners, photocopiers, digital cameras, kindle (for reading e-resources), storage devices, printers etc.

16. Users are preferring to electronic information resources like e-journals, databases and online searching of databases etc. more and hence more focus is given on procuring e-resources slowly. The collection mainly focused on reference materials in libraries covering handbooks, pharmacopeia, encyclopedias, dictionaries, and fact finding MSDS data etc. which are required for reference purpose by the users.

17. Users are mainly depending on the librarians efforts in getting information available anywhere for their work and hence librarians need qualified and know advanced skill sets.

B) Librarians Views:

1. For keeping flow of information among the R & D staff Internet and intranet is essential

2. There is a need to develop network of chemical industry libraries to provide enhanced library services

3. ICT facilities to be made available to librarians and sufficient additional funds for its establishment to be provided.

4. Librarians need preference to get trained by himself both professionally and supporting libraries

C) User Need Analysis:

1. Roughly 15% users are referring to library daily to know the latest developments in the area, using internet and searching databases etc. 20% users/visit library once in a month. Whereas 18% users uses/visit libraries very rarely once in a quarter to take a review on its topic for general awareness. 14% users from the industry do not approach to the libraries as they are technical and working on plants and their task is just to monitor the production and quality. Thus users engaged in R & D, Patent filing, keeping abreast of latest information are the regular users of libraries.
2. Researcher has observed that 14-20% users are not using/visiting library frequently, hence tried to analyze how these users can be encouraged to use the library. Many users have opined that library is situated far away from their workstations and hence unable to refer to the library. Most of the libraries are technical and they focus more on developing technical and scientific collection, hence management persons may not be interested, but if the collection in management subject, personnel development, communication skills, general knowledge etc. is made available in the library the users may take the benefits of the collection.

3. Use of information resources from libraries is mainly used by the R & D users and 24% users uses resources at least once in a month, 22% users, uses resources once is 2-4 months, 20% employees have used resources either once in 6 months or less than a year. 14% employees do not use resources as they work in plants and monitor the R & D activities. The library usage by visiting libraries manually is less as they need the references on their table and they refer while conducting experiments. Hence it is noticed that the physical visits are very less as compared to desk top services.
4. 43% of users are interested in general information required for day to day activities but related to the work. But 32% users requires information for their research work. 19% requires information for the project initiation and assignments and 6% uses for their hobby and general reading.
5. Pattern of using information sources covers different type of materials. The users are more dependent on reference books, data books, MSDS etc. and they use reference material more including text books useful for reactions and basics in chemistry like Fieser and Fieser. 20% of the users are referring books for their information needs. 15% users depends upon periodicals as they provide nascent information as well as trade related data and 9% refers reference materials for getting fact finding data, 9% uses e-documents which are more useful and available using net, 3% uses different databases in the subject to track the development for the R & D initiatives,13% refers to patents as this is the base literature for R & D purpose, 12% refers to standards for setting analytical process and 5% refers to thesis to synthesize new compounds.
6. All the information required by R & D users cannot be made available from the library as its collection is need based only. Being technical libraries, library are more focused on the technical information and accordingly developed their collection and rendered different types of services. But some users opined that library should have a mix collection right from newspapers to technical databases. As it is necessary to refer newspapers or sometimes periodicals for finding information related to the latest news about companies and their competitors. Hence it is felt that libraries should focus on technical development but also should have few general interest documents such as

newspapers, magazines etc. users also indicated that they search internet and collect primary information and visit to neighboring university libraries. Institutional membership helps industries to become member and the users can consult the libraries and avail services by paying charges if required e.g. for Xerox, database searching etc. Thus users try to find and get the information else request librarian to procure the same from the publishers, procurement sources or clearing houses.

7. Maximum use of the library is by the users belonging to the age group of 31-45 i.e. more than 50%. This means that users in this group are real R & D chemist and need the information support for carrying out their tasks. 26% Users are from 23-30 age group and they are initiating their R & D exposure, 14% from 46-65 age group are senior most staff and hold senior positions and do not involve in R & D but they are decision makers and technology forecasters and plans for the future products. 6% users are from 18-22 age group are just entered in to the industrial profession and begins their carrier and need not consult library as they are under the control of seniors.
8. It is found that 64% male employees are in chemical industries and 36% are female employees and they need information on regular basis for R & D activities. It is observed that now female / ladies chemist employing are also at leading level in process development and R & D activities.
9. Out of the total staff Managers and Chemical engineers contribute 50% (34% Managers and Engineers 16%). They are the decision makers and the other team members contributes research assistants or project associates (38%), chemist, scientist and trainee (12%). Librarian maintain different resources and they disseminate information on demand through different services to specific users as per the subject of interest.
10. 36% users have ranked the performance of library services and facilities as Good (3) and about 32% users ranked it as (5) Highest. This ranking of performance is by the potential users and the efforts of librarian in maintaining libraries in spite of varied demands are appreciated by the users. 20% users are not using libraries as they are busy in pilot plant operations and maintaining reaction parameters. Library performance is based on the services provided to the users and not collection of the libraries. Librarians are taking care of the

users by conducting ISB. Users have pointed out that library staff is very cooperative and try to provide the required information from the different places.

11. 52% users have suggested information needs are satisfied by librarian and preferences given for the library services. 18% users since in the technical field and not consulting libraries have not responded to the question but 30% users have shown satisfaction for the activities and services rendered by the libraries/librarians to them. The real R & D chemist have suggested some additions to the library activities. Users have also pointed out that librarian is very cooperative and manages the information needs of the users form the different sources.
12. 32-34% users are able to get the information required form the collection. 16% users able to find all the information required by them. Hardly 8-19 % are unable to find out the material required by them as they are from the maintenance and plant operation processes. It can be analysed that almost 50% users working in reserach, as well as R & D sector are getting their desired information from library may or may not be in the colelction but librarian takes care of getting the information.
13. reposne by librarians for the queries are prompt and ready for rendereing the service to their users and providing the literature needed for projects. Almost 24% users are getting instant respond from the Libraries, where as 56% users have shown satisfaction on the services provided and settlement of queries. 6% Users have not responded as they are only working on planys and not in R & D units.
14. Almost 50% users have indicathed that librarians since qualified in basic chemical sciences and in addition to LIS qualified having professional experience handle the quries and librarians have knowledge of anserwing to user queries, rarely in 4% users have found librarians were not able to answer to their queries as they are not covering the area and are of complex nature. 42 % users have marked the knowledge of librarians as an excellent which solves difficulties by provinding needed information to all.
15. 54% libraries are providing access to the modern equiment and using ICT for librray functioning especially library automation, infomation searching,

inetrnet usage etc. Library staff and users are permited to use ICT for data colelction. Hardly 8% libraries do not provide access to the modern equipments as these are the cases where libraries are managed by the non-professional or chemist in the organization. 28% users marked the rating as good and the remaining 18% have not replied suitably as they are not using the library.

16. 24% users have responded positive and pointed out that librarians conduct the survey for needs but difficult to satisfy from single source. 58 % users have marked the rating that the user surveys are indirectly measured by the librarians. Librarian takes care of the demanded literature and performs the searches from different databases and provide the information which is not synthesized and filtered.
17. 36% of users are of opinion that library provides them with the material/information required for their studies and research. It helps them in keeping themselves continuously updated. Only 2% users are of the opinion that they are not finding the material/information required from library since they need general purpose reading books.
18. 36% users stated that librarians help them in providing authentic information from different sources. Librarians make sure that users refer to the authentic information for their day to day information needs as research needs original data to rely on. 72% users are also of the opinion that librarians provide users authentic information published in different sources. Librarians searches information from the specialized databases and hence purity of information is disseminated. The internet information is properly evaluated and supplied to the users. Librarians are skillful in searching information from both e-resources and print resources. Librarians visits to different libraries and collect the information and provide it to the users.
19. It is observed 26% users are maximum satisfied might be working at higher level and almost 40% users felt libraries are treating equally to all the users and no descrimination found by them. Hardly 4% users have been felt the treatment or attention was not given to them as the desired literature is not available in the library for them. Satisfaction is observed among the users

20. It is observed in almost 58% users feel happy from the library services and rated the overall satisfaction from libraries as they supporting users in their research, and needs. In only 26% users do not have commented as they are not concerned with the library services. It is observed that 40% users have rated very well for quality services provided by the library, 14% have rated highest and 42% users have rated overall satisfaction level as good.

Users commented on the following:

- Users need better information services from different sources.
- Users demands are for the CAS and SDI but in advanced industries they need trade and patent related information
- On line searching needs powerful tools and data download systems
- User needs desktop information on their demand
- Users are more interested in Alert and Digest services.

8.2 Suggestions:

1. There is a need to appoint qualified librarian in libraries associated with chemical industries to provide information support to develop R & D activity. Since many libraries associated to chemical industries are managed by chemist or temporary staff. The library services are not provided properly to the user hence it is suggested well trained & qualified librarian is a need to develop support to scientists and researchers.

2. The collection of chemical industry library is not strong like other libraries as collection is need based & procured on demand basis. Hence the librarian need to acquire free information from the different sources available & make aware the users about new developments in their research area.

3. Since industries are advanced & using advance technologies, librarians have to implement latest technologies & technics useful for information support so that they can collect synthesize, evaluate, repackage information & disseminate to desired user regularly.

4. The collection development focused on e-publications rather than print .The information required by users many times available over the internet resources. Librarians have to find out different search engines which can provide better chemical information & inform the users like – Google, Google scholar, Cirus, Google library, Google patent, dog pile, Ask Jeeves etc.

5. Librarians cannot rest on its own available collection but have to obtain membership of other libraries, based on subject e.g.: university libraries, IIT's, special subject library (CSIR-NCL, CSIR-IIC, and NESCAIR).

6. User needs are very specific , but diversified though on a particular point & hence librarians have to depend on different sources especially chemical information databases like SciFinder, Derwent, WIPO, Scopus etc.

7. Librarian need different skill sets to manage user needs which covers information literacy, searching of information from internet, specialized subject databases like chemical pharmaceuticals, drugs, marketing, safety data etc.

8. Librarians cannot rely on available information in library, but has to make aware of latest development in the area by providing access to information resources using web page of library & providing links of URL to different sources useful to scientist like reference collection, chemical institutes, patents, standards, full text documents available over the net /web.

9. Librarians can use advance technologies and provide services based on internet, database, soil media, web tools etc. to quickly disseminate information among the group of users over the electronic mail.

10. The traditional services are not very useful to industrial community & they need advance services from library like CAS, SDI, ALERT, DIGEST etc. So that scientific community do not waste time in finding out information on particular topic.

11. Librarians also have to play important role in educating the users 7 make them information literate so that they can find information required from different sources using technologies of their own.

12. Librarians have to demonstrate new information products available in the market which are more useful to their community by permitting trail access for few days to make them aware of the sources which covers latest information useful to them.

13. In case of chemical industries libraries are available where research and development activities & IPR activities are flourished. From recent past due to collaborative activities with multinational companies, libraries are establishing I this sector & hence the existence of libraries is upcoming. The researcher would like to strongly suggest that if the existing library establish library network among these libraries a good resource sharing program may exist & information available among different libraries may help to strengthen the collection development activity & based on this information services can be generated.

14. Libraries in this sector many times open for a limited period were as R & D activity is carried out 24 X 7 & they need information at any time. If Wi-Fi & remote access to information base is provided to industry users they may appreciate 24 X 7 library usage.

15. Instead of having documents in libraries, Librarians can take license to access databases useful to them on subscription base & search the bibliographic information & provide to users for review along with abstract .After consulting this the desired articles can be obtained from the neighboring libraries or clearing centers on payment.

16. Since automation is not taking place in this group of libraries it is very difficult to develop new initiatives & hence librarians have to automate their libraries using either commercial or open source software's for managing library activities.

17. Instead of print collection industrial libraries have to look for digital information collection as the need is to support the projects , after completing the project information may or may not be required , hence it is suggested that there is a need to develop e-collection which is project need base.

18. Internet & intranet facilities as well as extranet facilities must be strengthened, if centralized facilities are available.

19. Since users are in need of latest information in their areas libraries can subscribe to RSS feeds, to obtain the information & disseminate them which helps in generating new concepts which can be marketed & the industry can be flourished.

20. To enhance library use libraries have to provide better information services which helps in making researchers aware of nascent information which may benefit to users community.

21. It is observed that users are not fully aware of information resources available in their subject areas, & hence it is suggested that librarians have to prepare compilation or a subject guide which covers different information resources & circulate among the users. So as to make them aware of the information resources & use them efficiently.

22. There is a need to initiate "Ask Librarian " & FAQ's on portal to get the instant information at the time of need .Since many information resources available on net, it is possible for librarian to provide preference services, using technology this practice if initiated , users can satisfy even if he is at remote place discussing with other pears from industry.

23. Industrial librarian must be expert in searching information from various databases. Librarians have to acquire skills of database searching, online searching, internet searching, federated searching etc. These skills helps librarians in providing various types of information to their users on demand & saves money in subscribing printed resources.

24. Best practices in industrial library can be adopted to provide core library services which users are demanding hence librarians have to initiate following services …

    a. Research support services.

    b. User assistance (Training).

c. Basic reference service.

d. Analytical & value added services.

e. Marketing services.

f. User outreach services.

g. Knowledge management.

h. Website / Portal services.

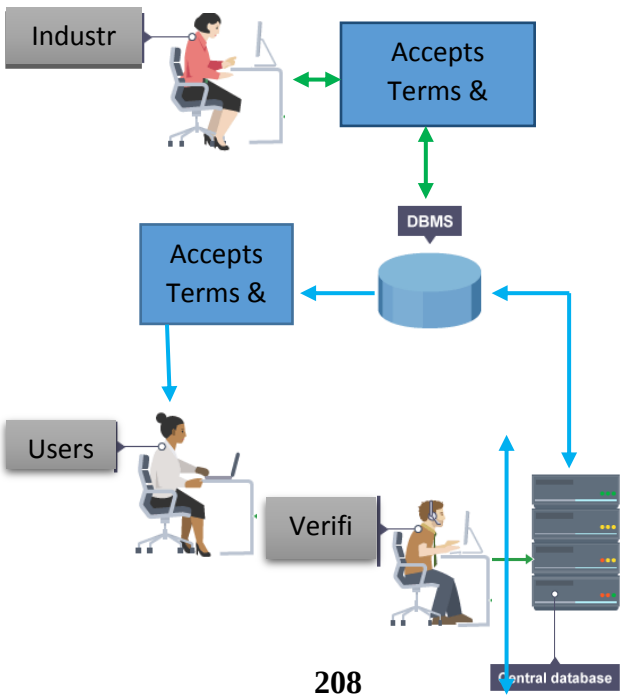
25. As suggested by industrial librarians networking of libraries may provide economical ways & hence it is suggested that a network can be developed using ICT tools. The need for network of chemical industry library is presented.

8.3 Chemical Industry Libraries Network: CILN Proposed Model:

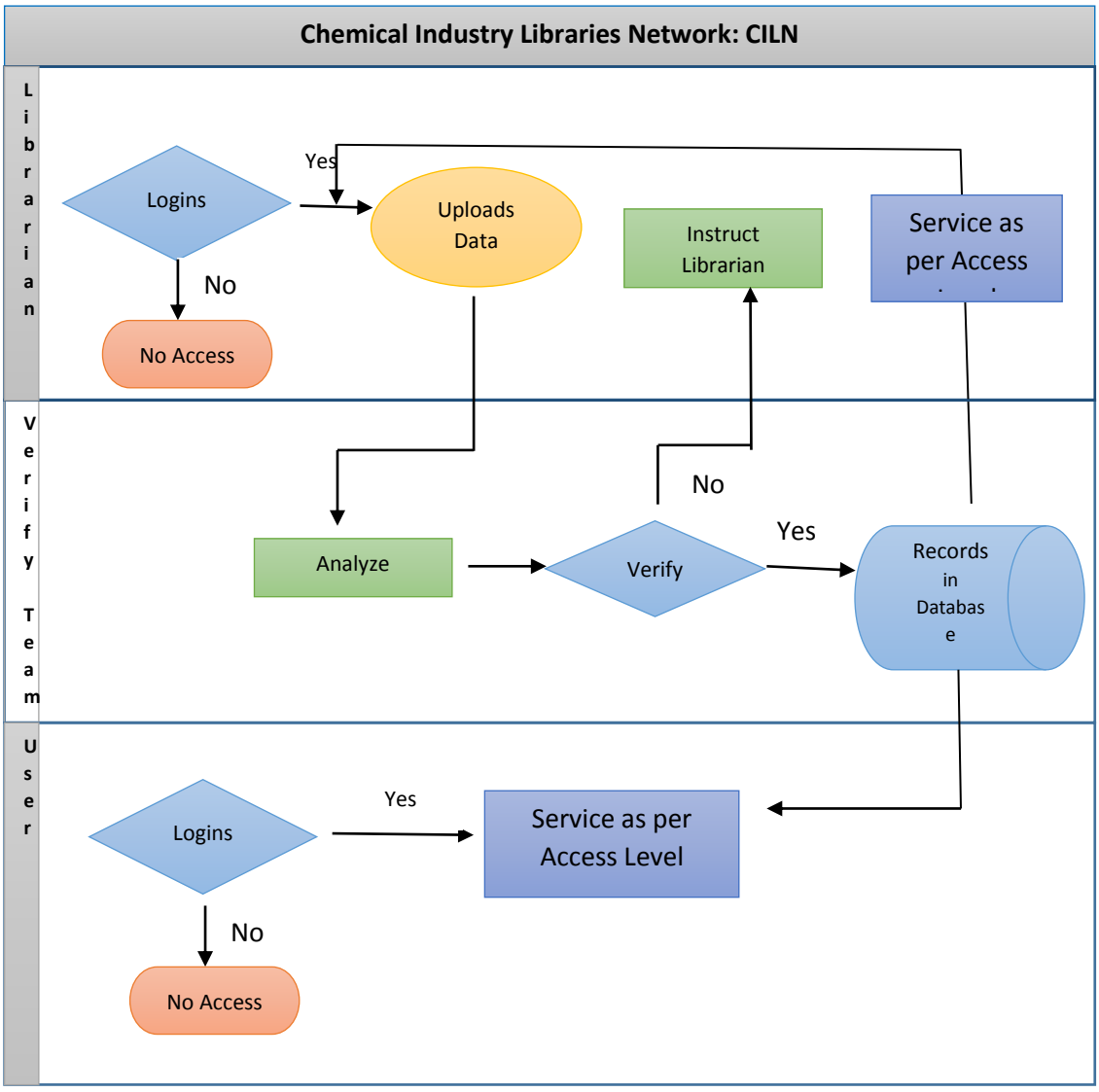
As per the suggestions given by librarians of chemical industries to initiate a network of industry libraries, researcher has tried to develop a network model based the use of ICT. The proposed model is presented below:

8.3.1 Flow Charts of Model:

8.3.1.1 Pictorial Diagram:



8.3.1.2 Flow Chart Diagram:



8.3.2 Explanation of Proposed Model: Chemical Industry Library Network (CILN):

Chemical Industry Library Network will consist collaboration with one or more libraries to access resources of other libraries by sharing the collections of the cooperating libraries. In today's era resource sharing provides the cooperating libraries opportunity of utilizing the maximum resources available in electronic format and with an easy access also results in a cost savings.

It was observed that many of the libraries are not been able to procure each and every resource for fulfilling their users as they are very expensive or availability is very less. Thru CILN libraries can be able to access the resources if available in other libraries, also on mutual understanding libraries can develop the collection in respective fields and can be shared via consortia. This will result in cost saving and maximum access to the information resources.

In industrial libraries or any physical libraries they main constraint is space, availability of library professionals and limited storage space, if networking of libraries are established accessibility to accessing of books, archives and various types of information becomes easy and rapid.

Individual libraries are limited by the collection development of the library but if libraries are networked they have access to much more information, because other participating libraries may have the information required. Hence the library have more chances of having required information without spending or adding to their budget. As individual library have expenses for procuring the books, subscription to journals/databases which can be shared by all the participating libraries. Library collection can be accessed through the common catalogue and access can be given to the users to locate and retrieve information, if information is in physical form users can get the library name having the required information. Libraries can provide users with wikis and blogs by the experts from the fields on their common portal. Hence by networking of libraries the access to the information availability increases which was not possible in the case of individual library, due to geographic location or organizational affiliation. The few advantages are elaborated below:

- **Easy availability of information resource:** The user is not required to visit any library physically, access to the information is made available to a single portal via internet at his desktop 24X7.
- **Accessibility:** N number of users can have access to the same information/resources simultaneously, except the copyright material or a licensed database etc.
- **Document delivery services:** The information Library can provide document delivery to the other libraries
- **Selective dissemination of information:** Selective information can be disseminated to the Libraries depending upon their interest and access levels.
- **Current Awareness Services:** Bulletins containing abstract, bibliographic data can be published by the libraries on shared basis i.e. specialized topics can be allotted to the respective libraries and sent it to the central team who coordinates publication and after reviewing same can be published.
- **Access to various Databases:** Access to the databases can be provided depending upon their access level as well as keeping in mind the copyright issues by each subscribing libraries.
- **Reduces subscription cost:** Subscription to journals can be shared by the libraries, each library can subscribe to the journals depending upon their interest and same should be shared to others, duplicate subscription can be avoided resulting in cost saving.
- **Minimum Human resource required:** Data, information and all the resources will be stored on line at a central server hence minimum man power will be required to maintain and update the same.
- **Easy availability of information resources:** Information being available on-line, accessibility to it will be easier, if information I sin hard copy User will get information of the library having the required information.
- **Avoiding duplication:** The utmost in consortium is avoiding duplication of resources. Libraries in advance should plan the collection development of respective libraries and should subscribe, acquire the information accordingly.

Working of CILN:

The Chemical Industry libraries Network will have a central team consisting of subject experts and experienced industrial librarians who will have rights to decide the content management, data updation and verification of the participating libraries. A dedicated web server will be subscribed by the libraries and costing will be divided among them. The working of CILN is explained below:

Step 1: Create a central team who will authenticate, verify and grant rights / access to the libraries and users.

Step 2: Categorize the information in different levels depending upon their confidentiality

Step 3: Decide the Library collection development, subscription to the databases and acquiring of the new books.

Step 4: Provide rights of uploading, updating information to the respective libraries.

Once the above steps are finalized, the working of networking will be as follows:

Step 5: Librarian will upload the data available at their library and decided in the consortium.

Step 6: Once the data is uploaded on the server, verification team will verify the data and accordingly update the information on server or will inform the librarian if any issues are found.

Step 7: Access will be provided to each users by the central team. Login ID and Password will be generated on verification of central team. Access levels will also be decided by the team.

Libraries will be benefited a lot by participating in **CILN**, they have advantages such as access to information, avoiding duplication, and cost saving etc. by participating in the consortium. Responsibility of collection development and updating also gets

divided among the libraries and focuses more on the specialized subject interest which make them more resourceful.

8.4 Conclusion:

Special libraries in corporate and industrial sector are responsible for many duties and functions involved in libraries. The librarian's responsibility very high as he is a solo expert in the profession and has to manage selection, acquisition, processing, organizing providing services and disseminating information as when needed by the users. Users are expert in the chemical productions, innovations and their needs are varied. Librarian has to assess the user needs and understand their expectations and provide the library services to them. The main role of the librarian in industrial and chemical libraries is to search for the nascent information on the ongoing projects and provide to the users for supporting their task. Libraries are subscribing to the online access of the specialized databases and provide the information to the users. Corporate and chemical librarians needs to acquire searching skills in addition to the traditional skills. Generally it is observed that chemical libraries do not hold more collection as the collection development is need based. The main role is in searching the desired information from various online and offline sources and provide to users on demand. Main services provided by chemical libraries are reference services and online searching services useful for scientific investigations.

Industrial libraries including chemical industry libraries are slightly different than special libraries in its philosophy, objectives, structure, activities, in which flow of information is more important than storage and archives. Information is gathered on specific request of chemist. Corporate libraries are applying ICT in automating their libraries and services. Though libraries are having very less collection but they are searching information online and giving it users which is current and relevant to their needs. On demand information resources are acquired from the online vendors and online shops like Amazon, Flipkart and clearing houses. The chemical libraries are shifting towards e-collection development and subscription to online resources. More trace is on online searching of specialized subject databases. The information required by the users are on properties, manufacturing processes, uses, toxic data, analysis , trade and marketing information, structure searches, patent filing etc. The queries are

multiple at single time and librarians has to acquire special skills in managing users demands.

In the present research study, researcher tried to find out the status of chemical industry libraries in Maharashtra as a sample. It is noticed that libraries are only well established in case of large scale multinational industries where R & D is carried out in large scale and need information support to develop new chemicals or molecules. Libraries are small and managed by librarians or chemist. Collection is demand based and rely more on online searching of databases. The libraries need specialized data in respect of compounds. This study is sort of SWOT and analyzed many uniqueness. The survey results are useful in analyzing the concepts and suggesting few aspects like networking of libraries in this zone and enter in to resource sharing projects.

The researcher would like to state few best practices to manage chemical libraries in ICT era.

- Automation of libraries using standard software or using open source software's like KOHA and e-granthalaya.
- Analyzing need of users
- CAS, SDI, Digest and alert services more including translation services
- Organization of information literacy programs and trading to users on new information products
- Display new arrivals and management stories regularly.
- Starching skills adoptions for better searching information free as well as paid

The role of chemical library in any field is changing and developing fast. The impetus for change must come from the librarian rather than the employer, whose views of change may be rather narrow and also not realistic to library profession. Increasingly the industrial library's role is close in involvements in the organization’s business activities, identifying information needs and giving advice to meet those needs. This includes exploitation of external resources, acquisition of special collections and an active role in the development of the “corporate memory” and integrated information systems. The role of the library within its own organization is reviewed, and is placed within the information network.

The research has satisfied the objectives and the hypothesis considered are proved true and it is felt that industrial libraries need proper library system and networking of these libraries definitely help to the user's community. The objectives selected are discussed in different chapters as noted against each. 1) To study the need, growth and development of Chemical Industry (Chapter 3) 2) To study the information needs of the chemical industry users (chapter 4), 3) To study the expectations of industrial and research users from chemical industry libraries (chapter 6), 4) To identify the different information resources used and needed by the users (chapter 5, 7), 5) To identify and list information resources available in both print and electronic media (chapter 5), 6) To develop a model for networking chemical industry libraries in a city and state.(chapter 8). Since studies in this area are very less there is a ample scope to undertake more studies on corporate and industrial libraries working in different specializations like chemical industries is analyzed in this study. This study is useful to librarian of chemical industry libraries and also for the other librarians as a model.

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Appendix -1

Librarian's Questionnaire

A. General

1. Nature of Chemical Industry
2. Area/Premises
3. Communication Details
4. Head Office
5. Branch Office
6. Factory
7. Employee (approx.)
8. Do you have R&D Center - Yes/No
9. Do you have Library and Information Center - Yes/No

   If No then omit sections B to F and approach to section G of the questionnaire

B. About Librarian/Information Specialist

10. Have your industry its own Library? Yes/No

    If Yes -

    a) Name of Librarian / Information specialist

    b) Qualifications

    c) Library Committee- Yes/No

    d) Budget for Library (Annual)

    e) Number of Users

C. About Library Collection

11. Type of Document available

    a) Books:

    b) E-books:

c) CD-ROM:

d) Journals:

e) Standards& Codes:

f) Patents

g) Any other

12. Periodicals Subscribed : Indian _____ Foreign _____

13. Collection of Reference books

14. Volume of Collection

15. Special collection if any other than above

16. Library Timings

D. About Users

17. Which type of Users use Library?

a) Managing Director

b) CEO

c) Vice President

d) Manager

e) Project Assistant

f) Chemists

g) Engineers

18. What are the general queries received

a) Literature Search for new Compound

b) Processes

c) Patent Filing

d) Articles

e) Books

E. Library Services

19. Are you providing following services to users from library?

    a. CAS

    b. SDI

    c. Alert

    d. Translation

    e. Indexing

    f. Abstracts

    g. Online Searching from databases

    h. STN/SciFinder

    i. Patent Databases

    j. Document delivery

    k. OPAC

    l. Internet Use Service

    m. Reading room

    n. Xeroxing

F. About Modernization

20. Is your library Automated-Yes/No

21. If automated which Software do you use (In-house developed or purchased?)

22. Are you using all modules of Software- Yes/No

23. If no, which module

24. Is this software satisfy your needs? Yes / No

25. Are you subscribing to e-books/ e-journals? Yes / No

26. Are you using e-resources? Yes / No

27. Are you allowing users to operate laptops? Yes / No

28. Is Wi-Fi available in library? Yes / No

G. If Library is not available

29. Do you need research data for your work? Yes / No.

30. From where do you get research information? Mark multiple √

    a. From other libraries.

    b. From friends and colleagues.

    c. From R & D Center.

    d. From Internet.

    e. From Social media.

    f. Any Other.

31. Are you member of any other library? Yes / No

32. Does your company permit you to consult any other libraries? Yes / No

33. Are you involved in process development activity? Yes / No

34. Do you involved in developing new molecules of products? Yes / No

35. Do you engaged in product development? Yes / No

36. Are you aware of patenting activity? Yes / No

37. Suggest your opinion about your requirement to get information in brief

_____

***

Appendix - 2

User Questionnaire

1.) How often do you use resources in the library?

- ☐ Daily
- ☐ Weekly
- ☐ Monthly
- ☐ **Q**uarterly
- ☐ Never

If "never," please indicate the reason. _____

2.) What is the purpose behind using the Library? (Please Specify)

_____

3.) How long are you using the company Library?

- ☐ < 1 than year
- ☐ 2-4 years
- ☐ 4-6 years.
- ☐ Never used it.

4.) For what purpose do you use the library?

- ☐ Research
- ☐ Hobby
- ☐ Project Assignments
- ☐ General interest

5.) What kind of materials do you refer in the library?

- ☐ Books
- ☐ Periodicals
- ☐ Reference Material
- ☐ E-Documents
- ☐ Databases
- ☐ Patents
- ☐ Standards
- ☐ Thesis

6.) What kind of materials have you not been able to find at the library? Please specify.

_____

Please mark:

7.) Age Group:

- ☐ 18 - 22
- ☐ 23 - 30
- ☐ 31 - 45
- ☐ 46 - 65
- ☐ Over 65
- ☐ Other

8.) Sex:
- ☐ Male
- ☐ Female

9.) Please indicate your work place.

_____

_____

10.) Please indicate your designation:

- ☐ Trainee
- ☐ Engineer
- ☐ Manager
- ☐ Researcher
- ☐ Scientist.

Please answer the following questions by rating your response from 1-5. (1 indicates the least amount of agreement, 5 is highest). Please circle one rating for each statement.

11.) Does Users get individual attention in library?

1. 2. 3. 4. 5.

12.) Is Library Staff consistently courteous?

1. 2. 3. 4. 5.

13.) Does your Library has desired information materials required for your research work.

1. 2. 3. 4. 5.

14.) Do Library Staff respond to your queries?

1. 2. 3. 4. 5.

15.) Does Library Staff have sufficient knowledge to answer your queries?

1. 2. 3. 4. 5.

16.) Do you use modern equipment to access information online?

1. 2. 3. 4. 5.

17.) Does Library Staff understand the needs of user?

1. 2. 3. 4. 5.

18.) Is Library act as a gateway for linking to research resources?

1. 2. 3. 4. 5.

19.) Does Library helps in distinguishing trustworthy and authentic information?

1. 2. 3. 4. 5.

20 Are you satisfied with the library collections and service?

1. 2. 3. 4. 5.

21.) If satisfied rate the level of satisfaction?

1. 2. 3. 4. 5.

22.) How would you rate the overall quality of the service provided by the library?

1. 2. 3. 4. 5.

23.) Please comment on any other subject related to library

_____

Appendix – A

List of Chemical Industries in Maharashtra

Sr. No.	Name	Place	Address	Contact No.	Large/Medium/Small	R&D	Library
1	Aarushi Speciality Chemicals Pvt. Ltd.	Pune	Shreeprasad, Plot No.4, Sadashiv Shyamsundar Society, Pune-411030	020-24331381	S	N	N
2	Adity Birla	Mumbai	Plot No. 1 & 1- A/1, MIDC, Tal. Dist. 410208,, Panvel,Navi Mumbai, Maharashtra 410208	9967018634	L	Y	Y
3	Ajanta Pharma Ltd	Aurungabad	Sector-E, Plot No-139, Ajanta Pharma Depat, Walanj, Near Rly Stn-431005	9922409025	S	N	N
4	Akzo Nobel Chemicals India Ltd	Pune	501/502, San Mahu Complex, 5Th Floor, Bandh Garden Raod, Opp Puna Club, Pune-411001	020-25560384	L	Y	N
5	Alkyl Amines Chemicals Ltd	Pune	20/06 Hadapsar Industrial Estate, Hadapsar Pune-411013	020-26874981	L	Y	Y
6	Anupam Colour & Chemicals	Mumbai	101-102, Kaveri Complex,Next To Hotel Holiday Inn,Jagannath Mandir Road,Sakinaka Junction, Mumbai – 400 072	022-2850 6532, 022-2850 6586 Fax No : 022-2852 5954	S	N	N

7	Apte Amelgamates	Mumbai	14A - The Club Near Mangal Anand Hospital, Swastik Park, Chembur,Mumbai - 400071 Sharex Dynamic (India) Private Limited	022-25277504, 022-28515606 / 44	S	N	N
8	Apurva Chemicals	Nashik	Plot No. 65, Gat 78, Satpur Nashik-422007	0253-2357525	S	N	N
9	Aquapharma Chemical Company Pvt. Ltd	Pune	2A, 3Rd Floor, Atur Chamber, Malodina Road, Camp Pune-411001	020-66090033/66090000	M	Y	N
10	Aquarius Chemicals	Pune	3 Umed Bhavan, Station Road, Pimpri, Pune-411018	9823208315	S	N	N
11	Asian Paints	Mumbai	Head Office Asian Paints Limited,Asian Paints House 6A, Shantinagar, Santacruz (E),Mumbai - 400 055,	022-39818000 Fax: 022 - 3981 8888	L	Y	Y
12	Atlas Chemicals	Pune	156/1B, 1St Floor Akshay Building, Barne Road, Mangalwar Peth, Parag Chowk, Pune-411011,	020-26127700	S	N	N
13	Atlas Fine Chemicals Pvt. Ltd	Nashik	Dehbanoo Mansion, Nashik, Pune Highway, Nashik Road-422101	0253-2465174	S	N	N
14	B K Chemicals	Pune	B 2 Shrusti Apartments, 1St Floor, Century Enka Colony 2, Pune Nasik Highway, Bhosari, Pune-411039	8447569063	S	N	N
15	B.M. Thakkar	Mumbai	Quarry Road, Malad (E) Mumbai	8355251, 8835252	M	N	N
16	BASF India Limited	Pune	94/3/1 Paud Road, Pune-411038	020-25280114	L	N	N

17	BASF India Limited	Mumbai	BASF India Limited Plot 37, Chandivali Farm Road, Chandivali, Andheri (East), Mumbai - 400 072, Maharashtra Basf India Limited Thane-Belapur Road, Turbhe, Plot No. 12, TTC Area, Navi Mumbai - 400 705, Maharashtra	022-28580200	L	Y	Y
18	Bharat Serums & Vaccines Limited	Mumbai	Hoechst House, Nariman Point, Mumbai-400021	022-66560900	M	Y	N
19	Bhawani Chemicals	Pune	365/14, Ghorpade Peth, Swargate, Pune-411042	020-24267316	S	N	N
20	Blue Circle corporation	Mumbai	34, Ist Floor, Empire Building, 146, Dr Dadabhai Naoroji Road, Dr Dadabhai Naoroji Road, Mumbai, Maharashtra 400001	022-22071691	M	N	N
21	Bombay Drug house	Mumbai	Nair Baug Akuli Road, Kandivli (East),Mumbai - 400101 (Maharashtra) India	022 - 8891370 /8890082 Fax : 022-8890856	S	N	N
22	Cadmosil chemicals Pvt. Ltd	Pune	12 Mrutyunjay Colony, Kothrud Pune- 411029	020-25456670	S	N	N
23	Campex Chemicals Pvt. Ltd	Pune	Survey No. 224, New Nana Peth Road, Pune-411002	020-26351200, 26355048	S	N	N
24	Catapharma	Nashik	C/O Aditya Industries, Sharanpur Road, Sharanpur, Nasik 422002	0253-2310778	L	N	N
25	Centak Chemicals Ltd	Pune	Office No. 401, 4Th Floor Century Arcade, Narangi Baug Road, Pune Station, Pune-411001	020-26122136	S	N	N

26	Century Rayon	Mumbai	Century Bhavan, Dr. Annie Besant Road, Worli, Mumbai-25, Maharashtra	022-22027570	L	N	N
27	Chemishield Systems	Mumbai	W-12, MIDC Indus. Area, Kulgaon, Badlapur, Dist- Thane	0251-2693401	S	N	N
28	CHROMATIC INDIA LTD.	Mumbai	207,Vardhan Complex Lbs Marg Vikhroli (W) Mumbai:-400083,	022-25793367	S	N	N
29	Cipla Ltd	Mumbai	Cipla Ltd.Mumbai Central,Mumbai – 400 008	022-23082891 022-23095521	L	Y	Y
30	Clariant Colour Chem Pvt. Ltd.	Mumbai	Reliable Tech Park Behind Reliable Plaza Thane-Belapur Road, Airoli Navi Mumbai - 400 708	022-71251000	M	Y	Y
31	Colgate (I) Palmolive	Mumbai	Colgate Research Centre Main Street, Hiranandani Gardens Powai, Mumbai 400 076	022 - 67095050 Fax: 25705088	L	Y	Y
32	Coromandal Fertilizers Ltd. (Pary Ltd. Earlier)	Mumbai	Thane Belapur Road, Mahape	022-27781261	L	N	N
33	Dai-Ichi Karkaria Ltd	Pune	105 Mile Stone, Pune Mumbai Road, Kasarwadi, Pune-411034	020-66308800/66308811	L	Y	N
34	DBS Chemicals	Pune	Yashodeep Building A, Block-2, Rambaugh Colony Sadashiv Peth, Pune-411030	020-24460717	S	N	N
35	Deccan Dyes & Chemical Industries	Pune	Shardha Center Off Pune Road, Pune	020-25466390	L	Y	N
36	Deccan Mechanical and	Pune	78, Bhosari MIDC, Pune	020-27120020	L	Y	N

	Chemical Industries						
37	Deepak Fertilizers and Petrochem Corporation Ltd.	Mumbai	Jail Road, Opp. Golf Course, Shastri Nagar. Yerawada, Pune-411006	020-66458000	L	N	N
38	Deepak Nitrate Ltd	Pune	Deepak Complex, National Games Road, Yerwada, Pune-411006	020-66458000/66458080/66090200	L	Y	Y
39	Demech Chemical Products Pvt. Ltd	Pune	T-77, Bhosari Industrial Estate, Pune	020-40775500	L	Y	N
40	Diamond Chemical	Pune	Plot No. 66, S Block, Bhosari Industrial Estate, Pune-411026	020-27122247	S	N	N
41	Dow Agro Sciences	Mumbai	1St Floor, Block B, Gate 02, Godrej It Park, Godrej Business District, Pirojshanagar, L.B. S. Marg, Vikhroli (West) Mumbai- 400079	02356-272034-40	L	Y	Y
42	Elkay Chemicals pvt. Ltd	Pune	J-152/3, MIDC Bhosari Pune	020-30624166	L	Y	N
43	Emcure Pharma	Pune	Emcure House, T 184, MIDC, Bhosari, Pune-411026	020-30610000	L	Y	Y
44	EPIC - Enzymes Pharmaceuticals and Industrial Chemicals Ltd.	Mumbai	Plot No. 102, Sector - 12, Vashi Ho:New Mumbai , Maharashtra - India Pincode :400703	022-27895042,27892405	S	N	N
45	FDC Ltd.	Mumbai	Fdc Limited 142-48, S. V. Road Jogeshwari (West) Mumbai - 400 102	022 - 26780652 / 26782653 Fax: 022 - 26788123	L	Y	N

46	Fem care Pharma Ltd	Nashik	Plo No. D-55, Ambad, Addi MIDC, Nashik-422010	0253-2383146	L	Y	N
47	Frost & Sullivan	Mumbai	4Th Floor, Tower-Vi, Solitaire Corporate Park, Chakala, Andheri E, Mumbai-400093	228324705	S	N	N
48	Garware Chemicals Ltd	Aurungabad	Aurangabad Pune Road, Walanj, 431133	0240-564567	L	N	N
49	Garware Plastics	Mumbai	Garware Polyester Ltd., 50-A, Swami Nityanand Marg, Western Express Highway, Vile Parle (East), Mumbai 400 057, India Email: Ho@Garwarepoly.Com	022-66988000 Fax: 022-28248155, 022-28248199	L	Y	Y
50	Gaurav Nitrate Pvt. Ltd	Nashik	H-42, Ambad Nashik-422010	0253-2381437	S	N	N
51	Gauri Fine Chemicals	Pune	T-140, Industrial Estate, Bhosari Pune	020-66114273/4271	M	Y	N
52	Gayatree Chemical Industries	Pune	37/2 Ashatavinayak Industries Estates, Narhe Dhayari Rooad, Narhe Goan, Pune-411041	020-24690792	S	N	N
53	Gharda Chemicals Ltd	Mumbai	Gharda Chemicals Ltd. B-27, Phase-1 MIDC. Dombivili (East) District: Thane Maharashtra. India. Email Ghardadom@Gharda.Com	0251-2803380 – 86 Fax 91-0251-2430581	L	Y	Y
54	Glenmark Pharmacuticals	Mumbai	Glenmark Pharmaceuticals Limited Glenmark House, B D S Marg, Chakala, Off Western Express Highway Andheri (E), Mumbai - 400099	022-40189999 Fax : +91 22 4018 9990	L	Y	Y

55	Globe Chemie	Pune	Chandraneel Apartment, Near Dsk Ranwara, Bhawdan, Pune	20-32309500 / 64730705	S	N	N
56	Godrej Agrovet Ltd	Mumbai	Godrej Agrovet Pirojshanagar, Eastern Express Highway Vikhroli (E), Mumbai – 400079, India	022-25188010 Fax: 022-25188485	L	N	N
57	Godrej Hi-Care	Mumbai	Hicare Services Pvt. Ltd. 1303/1304, 13Th Floor, Jaswanti Landmark, Mehra Industrial Estate, Vikhroli (W), Mumbai- 400 079.	022-25197072	L	N	N
58	Goodwill Chemical Industries	Mumbai	Chadha Building, Wadala, Plot No 95 Ne T To Lijjat Papad Depot, Wadala, Mumbai, Maharashtra 400031	022-24146465	L	N	N
59	Grauer & Well (India) Ltd	Mumbai	Akruli Road, Kandivli €- Mumbai-400 101	9819776674	M	N	N
60	H.K. Industries	Mumbai	H K Industries 15,Swastik Industrial Estate 178,Vidyanagari Marg,Kalina Mumbai-400098 India	022-26526736 022-26526686	S	N	N
61	HAB Pharma	Mumbai	18/1 Dewan & Shah Industrial Complex, Waliv Phata Vasai, Vasai East, Vasai East, Mumbai, Maharashtra 401208	022-24941933	S	N	N
62	Halides Chemicals Pvt. Ltd	Pune	3, Nilashree, Plot No.16, Prashant Chs, Paund Road, Pune	020-39545566	L	Y	N
63	Hankel Adhesives technologies	Pune	234/235/245 Phase-1, Hinjewadi, Pune-411057	020-39803100	L	Y	N

64	Headway Chemicals India Pvt. Ltd	Pune	6, Bagheshree Art, Kalyani Nagar, Pune-411014	9890245986	S	N	N
65	Hema Chemical Co.	Mumbai	B-9, Garibdas Soc, Juhu, Mumbai - 400049	022-26718115, 28668110	S	N	N
66	Hikal Limited	Pune	Plot No. 3A, Hinjewadi, 2Nd Phase, International Biotech Park,Pune-411057	020-4200411	L	Y	N
67	Hindustan Organic Chemicals Ltd.	Mumbai	Rasayani, District. Raigad, Maharashtra	02192-50041-46	L	Y	Y
68	Hiran Orgochem Ltd	Mumbai	908, Ijmima Complex, Off Link Road, Malad (West), Mumbai - 400 064. India.	022-40144127	S	N	N
69	Indian Oxides and Chemicals Limited	Pune	F2 Block, Plot No. 11, MIDC, Pimpri, Pune	020-66359377	S	N	N
70	Indica Chemical Industries Pvt. Ltd	Pune	Gat No. 153, Pune Nagar Road, Lonikand, Pune-412216	02137-253799	S	N	N
71	Indofil Chemicals Company	Pune	105 Bldg No. C2, Bramha Estate, Kondhwa Road, Kondhwa Khurd, Pune-411048	020-26831849	M	N	N
72	Indofil Industries Ltd.	Mumbai	Kalpataru Square, 4Th Floor Kondivita Road, Opposite Andheri Kurla Road, Andheri East, Mumbai 4000059	022-66637373	M	N	N
73	Indo-Nippon Chemical Co Ltd	Mumbai	Maker Bhavan No.2, 18, New Marine Lines, Mumbai 400 020, INDIA	22-22051723 / 22051897 / 22051612 / 22051821	M	Y	N

74	Innovasynth Technologies (IOCL)	Mumbai	Old Mumbai-Pune Road, Khopoli, Dist. Raigad, Pin - 410203 Maharashtra (India) Email:- Itil@Innovassynth.Com	02192 - 260100 Fax :02192-263628	M	Y	N
75	Innovative Organics	Mumbai	A-19 MIDC Ph Ii, Dombivli Industrial Area-Dombivli East, Thane - 421203	0251-2438479	M	N	N
76	Invert Pharma Pvt. Ltd.	Mumbai	Gala No.2, P.V.K. Compound, Laxmi Narayan Mandir Marg, Kherani Road, Sakinaka, Mumbai - 400 072, Maharashtra, India.	022-28521608 / 28594877 / 28592878 FAX : 28521608	S	N	N
77	IOCL	Mumbai	Indian Oil Corporation Ltd., Indianoil Bhawan, Plot No.33, G Block, Bandra Kurla Complex, Bandra (E) Mumbai - 400051	022-26722701	L	Y	Y
78	Ion Exchange India Ltd	Mumbai	Ion House, Dr. E. Moses Road, Mahalaxmi, Mumbai-400 011, India R-14, TTC, MIDC, Thane-Belapur Road, Rabale, Maharashtra, Navi Mumbai - 400 701, India	022-39890909 / 30472042	L	Y	N
79	IPCA Laboratories	Mumbai	123-Ab, Kandivli Industrial Estate, Kandivli (West) Mumbai 400 067, Maharashtra	022-66474755 / 66474757	L	Y	N
80	Isagro (Asia) Agrochemicals Pvt. Ltd.	Mumbai	Unit No.1 Ground, 2Nd& 3Rd Floor, Brady Gladys Plaza, 1/447, Senapati Bapat Marg, Lower Parel, Mumbai-400013	022-56955656	M	Y	N
81	Ivax India Pvt. Ltd.	Mumbai	Address: 76, Makwana Rd, Andheri	022-, 6676251	S	N	N

			East, Mumbai - 400059 Landmark: Marol Naka	0 Fax: 022-66762500			
82	J B Chemicals & Pharmaceutical	Mumbai	Neelam Centre, B Wing, 4Th Floor Hind Cycle Road, Worli Mumbai 400030 India	022-24822222 / 24930918 Fax: 022-24930534 / 24939633	L	N	N
83	J P Fine Chemicals	Pune	Block S, 113/5, MIDC Bhosari, Pune	020-21142008	M	Y	N
84	Jain Chemical Industries	Pune	153/152, Dhayari Village, Ganesh Nagar, Pmc-Pune-411051	020-24373046	S	N	N
85	Jame Robinson India Pvt. Ltd.	Mumbai	110, Bhaveshwar Complex,Kirol Address2: Village,Vidyavihar West City : Mumbai State : Pin:400086	022-25145357/25144402	S	N	N
86	Jay Chemicals	Mumbai	504, Damji Shyamji Trade Centre, Station Road, Vidhya Vihar West, Mumbai, Maharashtra 400086	022-25119081	L	Y	N
87	Jaybee Chemicals	Pune	Shop No. A-4 Kunal Park, Municipal School, Chinchwadgoan Pune-411033	020-27610396	S	N	N
88	Kamdhenu Chemical & Fertilizers Industries Limited	Pune	A-25, Pune Satara Road, Balaji Nagar, Pmc Area, Pune-411042	020-24371831	M	Y	N
89	Kangaru Polymers Pvt. Ltd	Pune	Somnath Apts, Revenue Colony, Shivajinagar Pune-411005	020-25513367	S	N	N
90	Key Biotech Ltd	Mumbai	8-B, Piccadilly Flats, Ground Floor, 57, Clare Road, Byculla,	022-26731244/ 6698928	S	N	N

			Mumbai - 400008, Maharashtra, India	3/23076869			
91	Kirti Chemicals	Pune	Bhosari Gaonthan, Near Sathayae MIDC, Pune-411039	020-27121821	S	N	N
92	Kopran Ltd	Mumbai	Parijat House, 1076, Dr. E. Moses Road,Worli, Mumbai - 400 018, Maharashtra (India).	022-43661111	L	Y	N
93	Kores (I) Ltd	Mumbai	301/302 Ashford Chambers Lady Jamshedji Road,Mahim West, Mumbai - 400016 Email: Response@Kores-India.Com	022-24476800 Fax No: 91-22-24476999	L	N	N
94	Kubo Combustion Efficiency Pvt. Ltd	Mumbai	401, Amit Industrial Estate, 61, Dr. S. S. Rao Road, Parel, Mumbai - 400 010, India	022-24167589	M	Y	N
95	Kulkarni organics Pvt. Ltd	Pune	172, Trambekeshwar Chs, Shanivar Peth, Pune	020-24250672	S	N	N
96	Kumbha Chemicals Pvt. Ltd	Pune	C-11, Green Park, A, Munthwa Road, Magarpatha Hadapsar, Pune	020-26890775	S	N	N
97	Lanz Labs	Mumbai	Lanz Labs Pvt. Ltd. 4, Vivekanand Villa, 139, Sv Road, Andheri (W), Mumbai - 58 India.	022-26205525 / 56750780. Telefax: 91 22 6201515	M	N	N
98	Laxmi Organic Industries Ltd.	Mumbai	Chandermukhi, Third Floor, Nariman Point, Mumbai 400021	022-49104444	M	Y	N
99	Lona Industries	Mumbai	Gharkul, 82, Dr. M. B. Raut Road, Shivaji Park, Dadar West, Mumbai - 400028, Factory : Ladivali,	022-24442791 022-24451007	M	N	N

			New Rasayani Taluka: Panvel, Dist. Raigad Pin- 410 207.				
100	Lona Industries Ltd.	Mumbai	Alta Bhavan, 532, Senapati, Bapat Marg,P.O Box No.17006, Dadar, Mumbai-400028	022-24307441/693	M	Y	N
101	Lubrizol India	Mumbai	2Nd Floor, V I P Building , Plot No 88 C, Old Prabhadevi Road, Prabhadevi, Mumbai - 400025	022 - 67759000, 24300672, 66255100	L	N	N
102	Lupin Ltd	Mumbai	Laxmi Towers B Wing, 5Th Floor, Bandra Kurla Complex, Mumbai-400051	022-66402222	L	Y	Y
103	Lupin Ltd	Pune	1St Floor, Go Square, S.No. 249/250 Wakad Rd, Kaspate Wasti, Wakad, Pimpri-Chinchwad, Maharashtra	020-67917400	L	Y	Y
104	Macleods Pharma Ltd	Mumbai	Atlanta Arcade, Marol Church Road, Andheri (East), Mumbai - 400059, India. Email 1: Exports@Macleodspharma.Com Email 2: Customercare@Macleodspharma.Com	022-6676-2800 Fax : 022-2925-6599	M	Y	Y
105	Mahabir Chemical	Nashik	22-A/14, Ambad Satpur Link Road, Ambad Nashik-422010	0253-2380178	S	N	N
106	Mak Glit Chem India Pvt Ltd	Pune	Gat No.126/127, Plot No.1, Pirangut Pune-412111	020-64730233	S	N	N
107	Marathwada Chemical Industries	Aurungabad	S. No. 43/2, Satara Road, Usmanpura, Aurangabad-431001	0240-2376994	S	N	N

108	Mehta Pharmaceutical India	Mumbai	313 - 314, Janki Centre 29, Shah Industrial Estate, Off Veera Desai Road, Andheri (W),Mumbai - 400 053	022 - 93204040150	M	N	N
109	Melzer Chemicals Pvt. Ltd	Pune	S132/Z, Plot No.22, Gulmohar Park, Itt Road, Aundh, Pune-411007	020-41004800	S	N	N
110	Mercantile Essentia oil	Mumbai	44, Mint Road, Fort, Mumbai - 400001 View Map	022-2611357, 2616351, 2617272	M	N	N
111	Merck Development Center Pvt. Ltd.	Mumbai	Plot 1A/2, MIDC Industrual Estate Taloja, Panvel 410208 Raigad	022-27402900	L	N	N
112	Merind Ltd.	Mumbai	Okad Enterprises, Mulund Goregaon Link Road, Bhandup, Bhandup, Mumbai, Maharashtra 400078	022-25642583	L	Y	N
113	Metropolition Eximchem Ltd.	Mumbai	5/283, Meghdoot, Flank Road, Sion East, Sion East, Mumbai, Maharashtra 400022	022-24081528	M	N	N
114	Mohnish Chemicals Pvt. Ltd	Pune	S No. 29/3, P No. 99 & 20, Off Pune Nagar Road, Khardi Pune-411014	020-64101990	S	N	N
115	Monarch Catalyst (P) Ltd	Mumbai	Plot No. F-1/1, F-1/2, A-94, MIDC, Phase-I, Dombivli (E), Dombivli East, Dombivli, Maharashtra 421203	0251 243 1013	M	N	N
116	Murlikrishna Pharma Pvt. Ltd.	Mumbai	101, 1St Floor, Ganesh Bhuvan Co-Op, Housing Society, Opp, Palmacres Soc, Mahatma Phule Road, Mulund (East), Mumbai 400 081 Email : Vishalbene@Mkppl.Com , Marketing@Mkppl.Com	022 - 25631595 / 25631594 / 25637534	M	N	N

117	Nagarjun Fertilizers & Chemicals	Pune	Survey No 126, Vishal Enterprises, Pune Saswad Road, Phersuji Pune-412308	020-26982566	M	N	N
118	Naiknavare Chemicals	Mumbai	1 Vidyabhuvan Society (Thakur Hospital Bldg), Above Gypsy Restaurant Shivaji Park, 121 Keluskar Road, Dadar West, Mumbai - 400028	09769200353, 9820150477	M	N	N
119	Naprod Life (Neon Antibiotics Pvt. Ltd.)	Mumbai	304, 3Rd Floor, Town Centre, Near Mittal Industrial Estate, Andheri Kurla Road, Andheri East, Mumbai - 400059	022-40939000	M	N	N
120	NAV Gases & Chemicals	Pune	50 A, Hadapsar Industrial Estate, Near Viaduwadi Police Chowky, Hadapsar Pune-411013	020-26818911	S	N	N
121	Navrang Chemical Industries	Mumbai	Andheri-Kurla Road, Marol,Marol & Sakinaka, Andheri E-400069	022-26361548	S	N	N
122	Neelikon Food Dyes & Chemicals Ltd.	Mumbai	D-8, Everest, 5Th Floor, Pandit M.M. Malaviya Marg,Tardeo , Mumbai - 400 034	022-23525257,6661415	M	N	N
123	Neon Laboratories	Mumbai	Damji Shamji Industrial Complex, Andheri West, Maharashtra	022 -6875366	L	Y	N
124	New Star Chemicals	Pune	Plot No. A 27 H Block, Mohawadi Road, Pimpri, Pune-411018	020-27472868	S	N	N
125	New White Excel Super	Pune	Survey No. 679/2A/6, 2Nd Floor, Off No.4, Bhosari Colony,	8880784339	S	N	N

	Chemical Company		Landewadi, Pune-411039				
126	Nicholas Pirmal India	Mumbai	Piramal Enterprises Piramal Tower, Ganpatrao Kadam Marg, Lower Parel – West Mumbai – 400 013.	022-30466666	L	Y	Y
127	Nitson Laboratories	Mumbai	409-410, 4H Floor, Lotus House, 33-A, New Marine Lines, New Marine Lines, Mumbai, 400020	022-22065303	S	N	N
128	NOCIL	Mumbai	Nocil Limited C-37, T.T.C. Industrial Area, Off Thane-Belapur Road, Pawne Village, Post Turbhe, Navi Mumbai - 400 705	022-66730551 Fax: 022-27671862	L	Y	N
129	Nutun Chemicals	Pune	J 37, MIDC Bhosari Industrial Estate Pune-411026	020-27120295	S	N	N
130	OM Pharmaceutical Industries	Mumbai	B - 006, Jayraj Nagar C. H. S. Ltd. Opp. Manav Mandir Complex, Ambadi Road, Vasai (W). Dist - Thane - India Pin Code - 401202	0250 - 2338315 0250 - 2344639 Fax : 0250 - 2338315	M	N	N
131	Orchid Chemicals & Pharmacuticals Ltd	Aurungabad	Walaj Aurungabad-431133	0240-2554992	M	N	N
132	Oswal Chemical Industries	Pune	S R No. 37, Pisoli Road, Pune	020-26931253	S	N	N
133	Pacific Chemical	Mumbai	W-111, MIDC Kharvai, Badlapur East, Thane, Maharashtra 421503	094 22 679057	S	N	N
134	Panchasheel Organic Ltd	Mumbai	1St Kapadia Chamber, 1St Cinema Lane, Near Metro Cinema, Mumbai – 400 020. Email : Poltd@Vsnl.Com	022-43454200, 4345 4214 / 4216,	M	N	N

135	Parag Gases & Chemicals Pvt. Ltd	Pune	S No. 224 A319 Kalpataru Plaza, Bhawani Peth, Ramoshi Gate Police Chowki, Pune-411042	020-26387676	S	N	N
136	Paras Chemical Industries	Pune	497/1, Shabbir Lane, Near Old Motor Stand, Bhavani Peth, Pune	020-2645000	M	Y	N
137	Paras Organics Pvt. Ltd	Mumbai	D-119, TTC Indl. Area, MIDC, P.O. Nerul, Navi Mumbai - 400 706.	022-27685275 / 6511 4912	M	Y	N
138	Perstorp Chemicals India Private. Ltd.	Mumbai	501, 5Th Floor, Kesar Solitaire, Plot No.5, Sector-19, Sanpada, Navi Mumbai-400705	022-27818000	S	N	N
139	Pharma Chem Consultec (I) Pvt. Ltd.	Mumbai	1, Ratnamanjusha, Ravi Industries Compound, Panchpakhadi, Thane (W), Mumbai - 400602	022-5415259 / 5436790 Mobile : Fax : 022-5436790 / 5418430	S	N	N
140	Pharmaceutical Product India Ltd (PPIL)	Mumbai	Swastik Chamber, V N Purav Marg, Chembur, V N Purav Marg Mumbai, Maharashtra	022 2523 3053	L	N	N
141	Pidilite	Mumbai	Corporate Head Office Ramkrishna Mandir Road Off Sir Mathuradas Vasanji Road, Andheri (East) Mumbai - 400059	022-3308 7000 Fax: +91 22 2835 7700	L	Y	Y
142	Piramal Healthcare	Mumbai	Piramal Enterprises 247 Business Park A-Wing, 6Th Floor Lbs Marg, Vikhroli (West) Mumbai – 400 083.	022-3095 6666	L	Y	Y
143	Polygram Industries	Pune	Gat No.768, Sheetal Chowk, Pawarvasti, Kudalvadi, Chikli, Pune	098903 24751	S	N	N

144	Polyolefins Industries Ltd	Mumbai	Mafatlal Chent, Nariman Point, Mumbai - 400021	022-22024226, 25392912	M	N	N
145	Poona Acid & Chemical Co.	Pune	Plot No. 2, Gat No. 189, Talawade Pune-412114	020-27690570	S	N	N
146	Poorva Chemicals Pvt. Ltd	Nashik	2, Mangal Murti Apartment, Gangapur Road, Nashik-422002	0253-2318544	S	N	N
147	Praj Industries Limited	Pune	Praj House Bhawdan, Pune	020-71802000	L	Y	Y
148	Prakash Nitrate Pvt. Ltd.	Nashik	Green Estate, Nashik Road, Gandharva Area, Nashik-422002	0253-2468711	S	N	N
149	Prasanna Industries	Pune	21,Hadapsar Industrial Estate, Pune-411013	020-24470592	S	N	N
150	Pratap Organics	Mumbai	Plot No. C - 481 /4, 481/5, 481/6, M.I.D.C. Land, TTC, Pawana Village,Thane Belapur Road, Navi Mumbai - 400 701	022-27670445, 27633555 Fax : 022 27670445	M	N	N
151	Pratichem	Mumbai	Plot No 51, Sector 2, Vasai Taluka Co-Op Industrial Estate, Vasai East, Thane - 401207, Goraipada, Vasai €	9970206789	S	N	N
152	Precise Chemipharm Pvt. Ltd	Mumbai	Address: No. 108, Malwa Patanwala Industrial. Estate, L. B. S Marg, Ghatkopar West, Mumbai - 400086	022-25000416	M	N	N
153	Promtech Chemicals Pvt. Ltd	Pune	314/2, Vijayshree, Chinchwadgaon, Pune-411033	020-27455750	S	N	N
154	PSA chemicals & Pharmaceuticals Ltd	Mumbai	605, Arneja Corner, Sector-17, Vashi	022-27890164	S	Y	N

155	R L Chemical Industries Pvt. Ltd	Mumbai	M-7, Abhishek Building, 303, Samuel St, Vadgadi, Masjid Bandar West, Masjid Bandar, Mumbai, Maharashtra 400003	022 2342 3229	S	N	N
156	Rajput Organixs Pvt Ltd	Mumbai	D-206, MIDC Estate Turbhe, Behind Pfizer Ltd, H.P.Road Navi Mumbai - 400 703	022-2768428	S	N	N
157	Rallis India Ltd.	Mumbai	156/157, Nariman Bhavan, 15Th Floor, 227 Nariman Point, Mumbai-400021	02356-272618,	L	Y	Y
158	Rapscos Chemical Industries	Nashik	426, Ghankar Lane, Nashik City, Nashik-422001	9890153 777	S	N	N
159	Rashtriya Chemicals & Fertilizers	Mumbai	Priyadarshini Building, Eastern Express Highway Sion,Mumbai-400 022	022-25548300	L	Y	Y
160	Ratiopharm India Pvt Ltd	Mumbai	601 Omega, Hiranandani Business Park, Powai, Mumbai - 400076	022-66412100, 66412132 |	S	N	N
161	Renuka Chemiclas	Pune	S No.528/9, Block No.7, 3Rd Floor, Yogeshwar Complex, Dandekar Bridge, Pune-411030	020-24331993	S	N	N
162	Research Support International Ltd	Mumbai	Dil Complex, Ghodhbunder Road, Majiwada Thane, West, Maharashtra, 400610	022 6798 0888 022 6798 0800	S	N	N
163	Resource Rasayan Pvt. Ltd.	Mumbai	Plot No. F-1/27, Makaveli, MIDC Industrial Estate, Badlapur - 421509, Maharashtra, India	0983339 9219	M	N	N
164	Rex-Tone Dye Ltd	Mumbai	309, Laxmi Plaza La Mi Industrial Estate, New Link Road, Andheri West, Andheri West, Mumbai, Maharashtra 400053	022-2840 8193	S	N	N

165	Reliance Industries Limited	Mumbai	Reliance Industries Limited Makers Chambers - IV, Nariman Point,Mumbai 400 021.	022-2278 5000	L	Y	Y
166	RIL Life sciences Pvt. Ltd	Mumbai	Dhirubhai Ambani Life Sciences Center,R-282, TTC Industrial Area Of MIDC,Thane-Belapur Road, Rabale,Navi Mumbai 400 701	022-6767 8000	L	Y	Y
167	Rotam India Ltd.	Mumbai	Floral Deck Plaza,C-512Wing Road, No.23MIDC Central Road Andheri(East)Mumbai 400 093.	022-2831212 2 2830229 6/2824608 1	M	N	N
168	Row2 technologies Pvt. Ltd	Mumbai	Raheja Point One Pt. J. Nehru Road, Vakola, Santacruz (East), Mumbai 400 055, India	022-6693140 0 Fax: +91 22 6691051 0	M	N	N
169	RPG Lide Sciences Ltd	Mumbai	463, 4 Th Floor, Rpg House, Dr. Annie Besant Road, Worli, Mumbai – 400 030. Maharashtra	022-2498 1650 / 51/ 6660 6375 / 76 / 7	L	Y	Y
170	RSB Chemicals Industries	Pune	T-136, MIDC Bhosari, Pune-411026	020-2712 0805	S	N	N
171	S A Pharmachem Pvt. Ltd.	Mumbai	220, Udyog Bhavan,Sonawala Road,Goregaon (East), Mumbai - 400 063 Maharashtra India	022-2681 9999 Fax:022-2686 2742	M	Y	N
172	S H Kelkar & Co. Pvt. Ltd.	Mumbai	Vashivali, S. No. 12 - 5,6, And S. No. 30 - 34 & 36, Near Balrajeshwar Temple, Village Vashivali - Vadgaon, Mulund (West), Mumbai - 400 080	022-2164 9163-69	S	Y	N

			Near Patalganga, Dist. - Raigad, Maharashtra - 410 220				
173	S V Plastochem	Nashik	A 1/ 2, Shriramkunj Complex, Takali Road, Dwarka Circle, Nasik - 422011	077099 45530	S	N	N
174	Sadhana Nitro Chem. Ltd.	Mumbai	207, Kakad Chambers , Second Floor, 132, Dr, Annie Besant Road, Worli, Mumbai-400018	022-6660 4881-5	S	Y	N
175	Sagar Chemicals	Mumbai	A-48, NEW EMPIRE INDUSTRIAL ESTATE KONDIVITA ROAD ANDHERI € MUMBAI - 400 059. MAHARASHTRA. INDIA.	022-2820284 7 / 2837960 8 Fax.:022-2838338 4	M	N	N
176	Sailife	Mumbai	Building 1, Plot 2, Chrysalis Enclave, International Biotech Park, Phase Ii, Hinjewadi, Pune - 411057, Maharashtra, India	020-6674360 0	S	N	N
177	Sandoz Pvt. Ltd (NOVARTIS)	Mumbai	Plot No 8/A/2 8/B, TTC Industrial Area, Village Digha Kalwe Block, Thane Belapur Road, Airoli, Navi Mumbai	022-2769000 1, 2763900 0	L	Y	N
178	Sanofi India Limited	Mumbai	54/A, Sir Mathuradas Vasanji Road, Andheri East, Mumbai 400 093	022-2827800 0	S	N	N
179	Serum Biotec Ltd	Mumbai	502, Citi Centre, 39/2, Erandwane, Karve Road Pune, 411 004, Maharashtra, India	020-2545848 1, 2545961 9	M	N	N
180	Shakti Chemicaot Pvt. Ltd	Nashik	B-26, Slice Ind Estate, Malegoan, Sinnar, Nashik-422113	9987031 541	S	N	N

181	Shamrock International Ltd.	Mumbai	1008, MAKER CHAMBERS, NO. V, 221, NARIMAN POINT, Mumbai - 400021, Maharashtra, India	022-22840346	M	N	N
182	Shaper Chemicals	Mumbai	203/206 Shrikant Chambers S T Road Chamber, Chembur, Chembur, Mumbai, Maharashtra 400071	022-27455712	M	N	N
183	Shivam Fine Chemicals Limited	Pune	77/2, S Block MIDC Bhosari, Pune	020-27111328	S	N	N
184	Shourya Chemicals	Pune	1278, panyeshwar Road, Kasba peth,Pune-411011	020-39614085	S	N	N
185	Shree Balaji Bio Chem Industries	Pune	S No. 106, Talewade, Jyotiba Nagar, Pune-412114	020-64104920	S	N	N
186	SI GROUP –INDIA LIMITED	Mumbai	(Formerly Schenectady Herdillia Limited)Thane-Belapur Road, Navi Mumbai-400705	022-30782039, 30782000	L	Y	N
187	Sigma Aldrich Chemicals Pvt. Ltd	Pune	203, Suyog Fusion, B S Dhole Patil Road, Pune-411001	020-41464700	M	N	N
188	Sigma Chemical Industries	Nashik	A-73, Shree Samarth Industrial Estate, Pimpalgaon Basawant, Niphad, Nashik-422007	0253-251037	S	N	N
189	Somaiya Organo Chems Ltd	Mumbai	Fazalbhoy Building 45-47, Mahatma Gandhi Road, Post Box No.384, Fort,Mumbai	022-22858430, 22858440/50	M	N	N
190	Somani Petrochemicals Co.	Pune	664/A, Near Garware Bridge, deccan Gymkhana, Pune-411004	09890324751	S	N	N
191	Sonal Palsrub Industries P Ltd	Mumbai	3, Girikunj, M G X Road 4, Kandivali(W), B/H Patel Nagar, Kandivali(W),	022-28064278	M	N	N

			Mumbai, Maharashtra 400067				
192	Span Chemicals	Mumbai	Plot No. D- 284, TTC Industrial Area, MIDC, Turbhe, Navi Mumbai, Maharashtra 400705	022-27683544	M	N	N
193	Spectrum Ethers Ltd.	Mumbai	No 5, 1st Floor, Daulat Sagar Apartment, Nehru Road, Santacruz East, Santacruz East, Mumbai, Maharashtra 400055	022-26195399	M	Y	N
194	STS Chemicals Ltd	Pune	Unit Excel Phosphochem MA Ltd Compound, Pimpri, Pune-411018	020-27425648	S	N	N
195	Subhash Chemical Industries Pvt. Ltd	Pune	Plot No.3, S Block, MIDC Bhosari, Pimpri Chinchwad Pune	094220 28064	S	N	N
196	Sudarshan Chemical Industries	Pune	162, Wesley Road, Near Sangam Bridge, Pune- 411001	020-2605888	L	Y	N
197	Sudarshan Chemical Industries Ltd.	Mumbai	Jolly Maker Chamber, Nariman Point, Nariman Point, Mumbai, Maharashtra 400021	022-22020912	L	Y	N
198	Sujalam Chemiclas	Pune	D-1 Pragati Park, Hadapsar, Gadital Near Sanjivani hospital, Pune-411028	9422560 788	S	N	N
199	Sujanil Chemo Industries	Pune	S No. 158/159 Mukund Nagar, Pune-411037	020-24270228/24270248	S	N	N
200	Sun Pharma Industries Ltd	Mumbai	AC ME Plaza, Andheri Kurla Road, Mumbai-400059	022-66455645	L	Y	Y
201	Sunrise Fine Chemical Industries	Pune	28, Kondwa Satara Road, Dhankawadi, Kondwa Pune	020-24268665	S	N	N

202	Sunshine Fine Chemical India Pvt. Ltd	Pune	N 8 State Bank Nagar, CHS, Bibvewadi, Pune-411037	9011050 347	M	Y	N
203	Sunshine Paints & Allied Chemicals	Nashik	Plot W/90 A, Ambad, Nashik-422010	0253-2382991	S	N	N
204	Supranil Chemical Industries	Pune	Gavane Estate, Padmavati, Near Landewadi, Pune-411039	020-2422159 1	M	Y	N
205	Surekha Chemical Industries	Pune	916,Opp Jeevn Medicines, Baristar Gadgil street, Sadashiv Peth, Pune-411030	020-2447 3586	S	N	N
206	Surtec Chemicals India Pvt. Ltd	Pune	Gat No. 318, Pune Nagar Road, Lonikand, T1, Havel, Dist. Pune	020-6678580 1	S	N	N
207	Suyog Chemicals	Nashik	Plot No. B-73, Nice Area, Satpur, Nashik-422007	0253-2350256	S	N	N
208	SVS Chemicals Corporatio n Limited	Nashik	1, Bhupali Park, Dwarka Nashik-422001	0253-2592769	S	N	N
209	Tata Chemicals Ltd	Pune	Survey No. 1139/1, Urawde Road, Mulsi Pune-412108	020-6654970 0/ 9223056 289	L	Y	Y
210	Tata Chemicals Ltd.	Mumbai	Bomay House, 24 Homi Mody Street, Fort,Mumbai-400001 Maharashtra	02892-665264	L	Y	Y
211	Technova Imaging System Ltd	Mumbai	TechNova Imaging Systems (P) Limited Plot No. E1/2/3, M. I. D. C. Taloja 410 208, District Raigad,	022-2741 2463	M	N	N
212	The Dharamsi Morarji Chemical Co Ltd	Pune	211 Morta Heights, Nityanand Hsg. Scty, Dhankawadi, Behind Rajashri Shahu Bank, Pune-411043	020-2436892 3	L	N	N

213	Thermax	Mumbai	2nd Floor, Dhanraj Mahal, Near Gateway Of India, Chhatrapati Shivaji Road, Fort, Mumbai, Maharashtra 400001	022-67542255	L	N	N
214	Thermax Limited	Pune	97 E, General Block, MIDC, Telco Road, Bhosari, Pune-411026	020-66051200	L	Y	Y
215	Thirumalai Chemical Limited	Mumbai	Plot No 101 S. No. 6, Road No.29, SION-Matunga Estate, Mumbai-400022	022-24017834	M	Y	N
216	Trichem Life Sciences Ltd	Mumbai	Address: 209, C-5, Abhishek Bldg, Dalia Industrial Estate,, Off New Link Rd, Andheri (W), Mumbai, Maharashtra 400053	022 - 66688142	M	N	N
217	Trigon Chemie	Pune	722/AB/15, Nirmal Laxmi Park colony, Navi peth, Pune	020-24530071	S	N	N
218	U Vitamins Ltd	Mumbai	Arvind Vithal Gandhi Chowk, BSD Marg, Station Road, Govandi East,Mumbai - 400 088.	022-2556-4048 & 022-6786-1111	L	Y	N
219	Ultra-Tech Speciality Chemicals Pvt. Ltd	Mumbai	113 JK Chambers, Sector-17, Navi Mumbai-400705	022-27891443	M	N	N
220	Unichem Labas Ltd	Mumbai	Address: Unichem Bhavan, Prabhat Estate, Off S.V.Road, Jogeshwari (West), Mumbai, Maharashtra 400102	022-66888333	L	Y	N
221	United Chemicals	Pune	S No. 22, E Street Hadapsar, Pune-411028	9372888874	S	N	N
222	United Phosporous Ltd	Mumbai	Readymoney Terrace 167, Dr Annie Besant Rd, New Ambalal Chawl, Bhim Nagar, Mahalakshmi Nagar, Mumbai	9819547749/022-24930681	L	Y	Y
223	Usha Chemical Company	Pune	C-9, Morya Gosavi Raj Park, Chinchwad Pune	020 20270207	S	N	N

224	V V Pharma Industries	Mumbai	Plot No. 48, Additional M.I.D.C, Ambernath East, Thane, Maharashtra 421506	0251 262 1891	M	N	N
225	Vamshi Chemiclas Pvt. Ltd	Mumbai	B-48, Baria Apt., Marwadi Chawl, S. V. Road, Malad (W), Mumbai, Maharashtra 400064	022-2417 5215	M	N	N
226	Vardhman Fertilizers Seed Pvt. Ltd	Pune	Pratibha Tower 3rd Floor, 18A/2B, Wakdevadi, Pune Mumbai Road	020-4141 2204	S	N	N
227	Varusak Plastic Paints and Chemicals Pvt. Ltd	Pune	Plot No. 1/16, 1st floor, Supreme Industrial Estate, Pune Satara Road-411009	020-3954437 8	S	N	N
228	Vet Bio Chem Pvt Ltd	Pune	No.301, CTS No. 981, Plot No. 128, Shivaji Nagar, Pune-411005	8373902 429	S	N	N
229	Vibgyor Chemicals Pvt.Ltd.	Aurungabad	B-1, MIDC Industrial Area, Station Road, Aurungabad-431001	0240-228208	S	N	N
230	Vishal Chemicals	Nashik	7/2, Saubhagya Society, nashik Road, Asha Nagar, Nashik-422101	0253-2464616	S	N	N
231	Volga Organics Pvt. Ltd	Mumbai	5, Sheela Smruti, Tejpal scheme road#3, Vile parle- 400057	9821559 846	S	N	N
232	Wanbury Ltd.	Mumbai	Wanbury Limited BSEL Techpark,'B' Wing, 10th Floor,Sector 30-A,Opp. Vashi Railway Station,Vashi, Navi Mumbai - 400705	022-6794 2222 Fax No. : 022-6794 2111/333	M	N	N
233	Watson Pharma Ltd (Sekshnia Chemical Ltd)	Mumbai	N- 15, Additional Ambarnath M. I. D. C., Ambarnath East, Thane - 421501, Maharashtra, India	0251-2626074 0251-2626045	S	N	N
234	Wokhardt	Mumbai	Wockhardt Limited Wockhardt Towers, Bandra Kurla Complex, Bandra (East), Mumbai	022-2653 4444	L	N	N

			400051 Maharashtra, India				
235	Worlee-Chemie GMBH	Mumbai	Flat No. 101, Plot No. 22, Sector-8 A, CBD-Belapur, Navi Mumbai-400614	022-27563352	M	N	N
236	Yuvraj Chemicals Pvt. Ltd	Pune	Survey No. 2165, Sadashiv Peth, Pune-411030	020-24338472/24333349	S	N	N
237	Zuari Industries Limited	Pune	B-2, tilak Road, Sadashiv Peth, Pune-411030	020-24327269	M	N	N

Appendix – B

List of Chemical Industries in Mumbai & Pune

Sr. No.	Name	Place	Address	Contact No.	Large/ Medium/ Small	R & D	Library
1	Adity Birla	Mumbai	Plot No. 1 & 1- A/1, MIDC, Tal. Dist. 410208,, Panvel,Navi Mumbai, Maharashtra 410208	9967018634	L	Y	Y
2	Anupam Colour & Chemicals	Mumbai	101-102, Kaveri Complex,Next To Hotel Holiday Inn,Jagannath Mandir Road,Sakinaka Junction, Mumbai – 400 072	022-2850 6532, 022-2850 6586 Fax No : 022-2852 5954	S	N	N
3	Apte Amelgamates	Mumbai	14A - The Club Near Mangal Anand Hospital, Swastik Park, Chembur,Mumbai - 400071	022-2527 7504, 022-2851 5606 / 44	S	N	N
4	Asian Paints	Mumbai	Head Office Asian Paints Limited,Asian Paints House 6A, Shantinagar, Santacruz (E),Mumbai - 400 055,	022-3981 8000 Fax: 022 - 3981 8888	L	Y	Y
5	B.M. Thakkar	Mumbai	Quarry Road, Malad (E) Mumbai	8355251,8835 252	M	N	N
6	BASF India Limited	Mumbai	BASF India Limited Plot 37, Chandivali Farm Road, Chandivali, Andheri (East), Mumbai - 400 072,	022-2858 0200	L	Y	Y

			Maharashtra				
7	Bharat Serums & Vaccines Limited	Mumbai	Hoechst House, Nariman Point, Mumbai-400021	022-6656 0900	M	Y	N
8	Blue Circle corporation	Mumbai	34, Ist Floor, Empire Building, 146, Dr Dadabhai Naoroji Road, Dr Dadabhai Naoroji Road, Mumbai, Maharashtra 400001	022-2207 1691	M	N	N
9	Bombay Drug house	Mumbai	Nair Baug Akuli Road, Kandivli (East),Mumbai - 400101 (Maharashtra) India	022 -8891370 /8890082 Fax : 022-8890856	S	N	N
10	Century Rayon	Mumbai	Century Bhavan, Dr. Annie Besant Road, Worli, Mumbai-25, Maharashtra	022-22027570	L	N	N
11	Chemishield Systems	Mumbai	W-12, MIDC Indus. Area, Kulgaon, Badlapur, Dist- Thane	0251-2693401	S	N	N
12	CHROMATIC INDIA LTD.	Mumbai	207,Vardhan Complex Lbs Marg Vikhroli (W) Mumbai:-400083,	022-25793367	S	N	N
13	Cipla Ltd	Mumbai	Cipla Ltd.Mumbai Central,Mumbai – 400 008	022-23082891 022-23095521	L	Y	Y
14	Clariant Colour Chem Pvt. Ltd.	Mumbai	Reliable Tech Park Behind Reliable Plaza Thane-Belapur Road, Airoli Navi Mumbai - 400 708	022-71251000	M	Y	Y
15	Colgate (I) Palmolive	Mumbai	Colgate Research Centre Main Street, Hiranandani Gardens Powai, Mumbai 400 076	022 - 67095050 Fax: 25705088	L	Y	Y

16	Coromandal Fertilizers Ltd. (Pary Ltd. Earlier)	Mumbai	Thane Belapur Road, Mahape	022-27781261	L	N	N
17	Deepak Fertilizers and Petrochem Corporation Ltd.	Mumbai	Jail Road, Opp. Golf Course, Shastri Nagar. Yerawada, Pune-411006	020-6645 8000	L	N	N
18	Dow Agro Sciences	Mumbai	1St Floor, Block B, Gate 02, Godrej It Park, Godrej Business District, Pirojshanagar, L.B. S. Marg, Vikhroli (West) Mumbai-400079	02356-272034-40	L	Y	Y
19	EPIC - Enzymes Pharmaceuticals and Industrial Chemicals Ltd.	Mumbai	Plot No. 102, Sector - 12, Vashi Ho:New Mumbai , Maharashtra - India Pincode :400703	022-27895042,27892405	S	N	N
20	FDC Ltd.	Mumbai	Fdc Limited 142-48, S. V. Road Jogeshwari (West) Mumbai - 400 102	022 - 26780652 / 26782653 Fax: 022 - 26788123	L	Y	N
21	Frost & Sullivan	Mumbai	4Th Floor, Tower-Vi, Solitaire Corporate Park, Chakala, Andheri E, Mumbai- 400093	228324705	S	N	N
22	Garware Plastics	Mumbai	Garware Polyester Ltd., 50-A, Swami Nityanand Marg, Western Express Highway, Vile Parle (East), Mumbai 400 057, India Email: Ho@Garwarepoly.Com	022-66988000 Fax: 022-28248155, 022-28248199	L	Y	Y

23	Gharda Chemicals Ltd	Mumbai	Gharda Chemicals Ltd. B-27, Phase-1 MIDC. Dombivili (East) District: Thane Maharashtra. India. Email Ghardadom@Gharda.Com	0251-2803380 – 86 Fax 91-0251-2430581	L	Y	Y
24	Glenmark Pharmaceuticals	Mumbai	Glenmark Pharmaceuticals Limited Glenmark House, B D S Marg, Chakala, Off Western Express Highway Andheri (E), Mumbai - 400099	022-4018 9999 Fax : +91 22 4018 9990	L	Y	Y
25	Godrej Agrovet Ltd	Mumbai	Godrej Agrovet Pirojshanagar, Eastern Express Highway Vikhroli (E), Mumbai – 400079, India	022-25188010 Fax: 022-25188485	L	N	N
26	Godrej Hi-Care	Mumbai	Hicare Services Pvt. Ltd. 1303/1304, 13Th Floor, Jaswanti Landmark, Mehra Industrial Estate, Vikhroli (W), Mumbai- 400 079.	022-2519 7072	L	N	N
27	Goodwill Chemical Industries	Mumbai	Chadha Building, Wadala, Plot No 95 Ne T To Lijjat Papad Depot, Wadala, Mumbai, Maharashtra 400031	022-2414 6465	L	N	N
28	Grauer & Well (India) Ltd	Mumbai	Akruli Road, Kandivli E- Mumbai-400 101	9819776674	M	N	N
29	H.K. Industries	Mumbai	H K Industries 15,Swastik Industrial Estate 178,Vidyanagari Marg,Kalina Mumbai-400098 India	022-26526736 022-26526686	S	N	N
30	HAB Pharma	Mumbai	18/1 Dewan & Shah Industrial Complex, Waliv Phata Vasai, Vasai East, Vasai East, Mumbai, Maharashtra 401208	022-2494 1933	S	N	N

31	Hema Chemical Co.	Mumbai	B-9, Garibdas Soc, Juhu, Mumbai - 400049	022-26718115, 28668110	S	N	N
32	Hindustan Organic Chemicals Ltd.	Mumbai	Rasayani, District. Raigad, Maharashtra	02192-50041-46	L	Y	Y
33	Hiran Orgochem Ltd	Mumbai	908, Ijmima Complex, Off Link Road, Malad (West), Mumbai - 400 064. India.	022-40144127	S	N	N
34	Indofil Industries Ltd.	Mumbai	Kalpataru Square, 4Th Floor Kondivita Road, Opposite Andheri Kurla Road, Andheri East, Mumbai 4000059	022-66637373	M	N	N
35	Indo-Nippon Chemical Co Ltd	Mumbai	Maker Bhavan No.2, 18, New Marine Lines, Mumbai 400 020, INDIA	22-2205 1723 / 2205 1897 / 2205 1612 / 2205 1821	M	Y	N
36	Innovasynth Technologies (IOCL)	Mumbai	Old Mumbai-Pune Road, Khopoli, Dist. Raigad, Pin - 410203 Maharashtra (India)	02192 - 260100 Fax :02192-263628	M	Y	N
37	Innovative Organics	Mumbai	A-19 MIDC Ph Ii, Dombivli Industrial Area-Dombivli East, Thane - 421203	0251-2438479	M	N	N
38	Invert Pharma Pvt. Ltd.	Mumbai	Gala No.2, P.V.K. Compound, Laxmi Narayan Mandir Marg, Kherani Road, Sakinaka, Mumbai - 400 072, Maharashtra, India.	022-28521608 / 28594877 / 28592878 FAX : 28521608	S	N	N
39	IOCL	Mumbai	Indian Oil Corporation Ltd., Indianoil Bhawan, Plot No.33, G Block, Bandra Kurla Complex,	022-26722701	L	Y	Y

			Bandra (E) Mumbai - 400051				
40	Ion Exchange India Ltd	Mumbai	Ion House, Dr. E. Moses Road, Mahalaxmi, Mumbai-400 011, India R-14, TTC, MIDC, Thane-Belapur Road, Rabale, Maharashtra, Navi Mumbai - 400 701, India	022-3989 0909 / 3047 2042	L	Y	N
41	IPCA Laboratories	Mumbai	123-Ab, Kandivli Industrial Estate, Kandivli (West) Mumbai 400 067, Maharashtra	022-6647 4755 / 6647 4757	L	Y	N
42	Isagro (Asia) Agrochemicals Pvt. Ltd.	Mumbai	Unit No.1 Ground, 2Nd& 3Rd Floor, Brady Gladys Plaza, 1/447, Senapati Bapat Marg, Lower Parel, Mumbai-400013	022-56955656	M	Y	N
43	Ivax India Pvt. Ltd.	Mumbai	76, Makwana Rd, Andheri East, Mumbai - 400059 Landmark: Marol Naka	022-, 66762510 Fax: 022-66762500	S	N	N
44	J B Chemicals & Pharmaceutical	Mumbai	Neelam Centre, B Wing, 4Th Floor Hind Cycle Road, Worli Mumbai 400030 India	022-2482 2222 / 2493 0918 Fax: 022-2493 0534 / 2493 9633	L	N	N
45	Jame Robinson India Pvt. Ltd.	Mumbai	110, Bhaveshwar Complex,Kirol Address2: Village,Vidyavihar West City : Mumbai State : Pin:400086	022-25145357/25144402	S	N	N

46	Jay Chemicals	Mumbai	504, Damji Shyamji Trade Centre, Station Road, Vidhya Vihar West, Mumbai, Maharashtra 400086	022-2511 9081	L	Y	N
47	Key Biotech Ltd	Mumbai	8-B, Piccadilly Flats, Ground Floor, 57, Clare Road, Byculla, Mumbai - 400008, Maharashtra, India	022-26731244/ 66989283/230 76869	S	N	N
48	Kopran Ltd	Mumbai	Parijat House, 1076, Dr. E. Moses Road,Worli, Mumbai - 400 018, Maharashtra (India).	022-43661111	L	Y	N
49	Kores (I) Ltd	Mumbai	301/302 Ashford Chambers Lady Jamshedji Road,Mahim West, Mumbai - 400016 Email: Response@Kores-India.Com	022-24476800 Fax No: 91-22-24476999	L	N	N
50	Kubo Combustion Efficiency Pvt. Ltd	Mumbai	401, Amit Industrial Estate, 61, Dr. S. S. Rao Road, Parel, Mumbai - 400 010, India	022-2416 7589	M	Y	N
51	Lanz Labs	Mumbai	Lanz Labs Pvt. Ltd. 4, Vivekanand Villa, 139, Sv Road, Andheri (W), Mumbai - 58 India.	022-26205525 / 56750780. Telefax: 91 22 6201515	M	N	N
52	Laxmi Organic Industries Ltd.	Mumbai	Chandermukhi, Third Floor, Nariman Point, Mumbai 400021	022-49104444	M	Y	N
53	Lona Industries	Mumbai	Gharkul, 82, Dr. M. B. Raut Road, Shivaji Park, Dadar West, Mumbai - 400028, Factory : Ladivali, New Rasayani Taluka: Panvel, Dist. Raigad Pin- 410 207.	022-24442791 022-24451007	M	N	N

54	Lona Industries Ltd.	Mumbai	Alta Bhavan, 532, Senapati, Bapat Marg,P.O Box No.17006, Dadar, Mumbai-400028	022-24307441/693	M	Y	N
55	Lubrizol India	Mumbai	2Nd Floor, V I P Building , Plot No 88 C, Old Prabhadevi Road, Prabhadevi, Mumbai - 400025	022 - 67759000, 24300672, 66255100	L	N	N
56	Lupin Ltd	Mumbai	Laxmi Towers B Wing, 5Th Floor, Bandra Kurla Complex, Mumbai- 400051	022-6640 2222	L	Y	Y
57	Macleods Pharma Ltd	Mumbai	Atlanta Arcade, Marol Church Road, Andheri (East), Mumbai - 400059, India.	022-6676-2800 Fax : 022-2925-6599	M	Y	Y
58	Mehta Pharmaceutical India	Mumbai	313 - 314, Janki Centre 29, Shah Industrial Estate, Off Veera Desai Road, Andheri (W),Mumbai - 400 053	022 - 9320404150	M	N	N
59	Mercantile Essentia oil	Mumbai	44, Mint Road, Fort, Mumbai - 400001 View Map	022-2611357, 2616351, 2617272	M	N	N
60	Merck Development Center Pvt. Ltd.	Mumbai	Plot 1A/2, MIDC Industrual Estate Taloja, Panvel 410208 Raigad	022-27402900	L	N	N
61	Merind Ltd.	Mumbai	Okad Enterprises, Mulund Goregaon Link Road, Bhandup, Bhandup, Mumbai, Maharashtra 400078	022-2564 2583	L	Y	N
62	Metropolition Eximchem Ltd.	Mumbai	5/283, Meghdoot, Flank Road, Sion East, Sion East, Mumbai, Maharashtra 400022	022-2408 1528	M	N	N

63	Monarch Catalyst (P) Ltd	Mumbai	Plot No. F-1/1, F-1/2, A-94, MIDC, Phase-I, Dombivli (E), Dombivli East, Dombivli, Maharashtra 421203	0251 243 1013	M	N	N
64	Murlikrishna Pharma Pvt. Ltd.	Mumbai	101, 1St Floor, Ganesh Bhuvan Co-Op, Housing Society, Opp, Palmacres Soc, Mahatma Phule Road, Mulund (East), Mumbai 400 081	022 - 25631595 / 25631594 / 25637534	M	N	N
65	Naiknavare Chemicals	Mumbai	1 Vidyabhuvan Society (Thakur Hospital Bldg), Above Gypsy Restaurant Shivaji Park, 121 Keluskar Road, Dadar West, Mumbai - 400028	09769200353, 9820150477	M	N	N
66	Naprod Life (Neon Antibiotics Pvt. Ltd.)	Mumbai	304, 3Rd Floor, Town Centre, Near Mittal Industrial Estate, Andheri Kurla Road, Andheri East, Mumbai - 400059	022-40939000	M	N	N
67	Navrang Chemical Industries	Mumbai	Andheri-Kurla Road, Marol,Marol & Sakinaka, Andheri E-400069	022-26361548	S	N	N
68	Neelikon Food Dyes & Chemicals Ltd.	Mumbai	D-8, Everest, 5Th Floor, Pandit M.M. Malaviya Marg,Tardeo , Mumbai - 400 034	022-23525257,6661415	M	N	N
69	Neon Laboratories	Mumbai	Damji Shamji Industrial Complex, Andheri West, Maharashtra	022 -687 5366	L	Y	N
70	Nicholas Pirmal India	Mumbai	Piramal Enterprises Piramal Tower, Ganpatrao Kadam Marg, Lower Parel – West Mumbai – 400 013.	022-30466666	L	Y	Y

71	Nitson Laboratories	Mumbai	409-410, 4H Floor, Lotus House, 33-A, New Marine Lines, New Marine Lines, Mumbai, 400020	022-2206 5303	S	N	N
72	NOCIL	Mumbai	Nocil Limited C-37, T.T.C. Industrial Area, Off Thane-Belapur Road, Pawne Village, Post Turbhe, Navi Mumbai - 400 705	022-66730551 Fax: 022-27671862	L	Y	N
73	OM Pharmaceutical Industries	Mumbai	B - 006, Jayraj Nagar C. H. S. Ltd. Opp. Manav Mandir Complex, Ambadi Road, Vasai (W). Dist - Thane - India Pin Code - 401202	0250 - 2338315 0250 - 2344639 Fax : 0250 - 2338315	M	N	N
74	Pacific Chemical	Mumbai	W-111, MIDC Kharvai, Badlapur East, Thane, Maharashtra 421503	094 22 679057	S	N	N
75	Panchasheel Organic Ltd	Mumbai	1St Kapadia Chamber, 1St Cinema Lane, Near Metro Cinema, Mumbai – 400 020.	022-4345 4200, 4345 4214 / 4216,	M	N	N
76	Paras Organics Pvt. Ltd	Mumbai	D-119, TTC Indl. Area, MIDC, P.O. Nerul, Navi Mumbai - 400 706.	022-2768 5275 / 6511 4912	M	Y	N
77	Perstorp Chemicals India Private. Ltd.	Mumbai	501, 5Th Floor, Kesar Solitaire, Plot No.5, Sector-19, Sanpada, Navi Mumbai-400705	022-27818000	S	N	N
78	Pharma Chem Consultec (I) Pvt. Ltd.	Mumbai	1, Ratnamanjusha, Ravi Industries Compound, Panchpakhadi, Thane (W), Mumbai - 400602	022-5415259 / 5436790 Fax : 022-5436790	S	N	N
79	Pharmaceutical Product India Ltd (PPIL)	Mumbai	Swastik Chamber, V N Purav Marg, Chembur, V N Purav Marg Mumbai, Maharashtra	022 2523 3053	L	N	N

80	Pidilite	Mumbai	Corporate Head Office Ramkrishna Mandir Road Off Sir Mathuradas Vasanji Road, Andheri (East) Mumbai - 400059	022-3308 7000 Fax: +91 22 2835 7700	L	Y	Y
81	Piramal Healthcare	Mumbai	Piramal Enterprises 247 Business Park A-Wing, 6Th Floor Lbs Marg, Vikhroli (West) Mumbai – 400 083.	022-3095 6666	L	Y	Y
82	Polyolefins Industries Ltd	Mumbai	Mafatlal Chent, Nariman Point, Mumbai - 400021	022-22024226, 25392912	M	N	N
83	Pratap Organics	Mumbai	Plot No. C - 481 /4, 481/5, 481/6, M.I.D.C. Land, TTC, Pawana Village,Thane Belapur Road, Navi Mumbai - 400 701	022-27670445, 27633555 Fax : 022 27670445	M	N	N
84	Pratichem	Mumbai	Plot No 51, Sector 2, Vasai Taluka Co-Op Industrial Estate, Vasai East, Thane - 401207, Goraipada, Vasai E	9970206789	S	N	N
85	Precise Chemiphar m Pvt. Ltd	Mumbai	Address: No. 108, Malwa Patanwala Industrial. Estate, L. B. S Marg, Ghatkopar West, Mumbai - 400086	022-2500 0416	M	N	N
86	PSA chemicals & Pharmacutic als Ltd	Mumbai	605, Arneja Corner, Sector-17, Vashi	022-2789 0164	S	Y	N
87	R L Chemical Industries Pvt. Ltd	Mumbai	M-7, Abhishek Building, 303, Samuel St, Vadgadi, Masjid Bandar West, Masjid Bandar, Mumbai, Maharashtra 400003	022 2342 3229	S	N	N
88	Rajput Organixs Pvt Ltd	Mumbai	D-206, MIDC Estate Turbhe, Behind Pfizer Ltd, H.P.Road Navi Mumbai - 400 703	022-2768428	S	N	N

89	Rallis India Ltd.	Mumbai	156/157, Nariman Bhavan, 15Th Floor, 227 Nariman Point, Mumbai-400021	02356-272618,	L	Y	Y
90	Rashtriya Chemicals & Fertilizers	Mumbai	Priyadarshini Building, Eastern Express Highway Sion,Mumbai-400 022	022-25548300	L	Y	Y
91	Ratiopharm India Pvt Ltd	Mumbai	601 Omega, Hiranandani Business Park, Powai, Mumbai - 400076	022-66412100/ 66412132	S	N	N
92	Research Support Internationa l Ltd	Mumbai	Dil Complex, Ghodhbunder Road, Majiwada Thane, West, Maharashtra, 400610	022 6798 0888 022 6798 0800	S	N	N
93	Resource Rasayan Pvt. Ltd.	Mumbai	Plot No. F-1/27, Makaveli, MIDC Industrial Estate, Badlapur - 421509, Maharashtra, India	09833399219	M	N	N
94	Rex-Tone Dye Ltd	Mumbai	309, Laxmi Plaza La Mi Industrial Estate, New Link Road, Andheri West, Andheri West, Mumbai, Maharashtra 400053	022-2840 8193	S	N	N
95	Reliance Industries Limited	Mumbai	Reliance Industries Limited Makers Chambers - IV, Nariman Point,Mumbai 400 021.	022-2278 5000	L	Y	Y
96	RIL Life sciences Pvt. Ltd	Mumbai	Dhirubhai Ambani Life Sciences Center,R-282, TTC Industrial Area Of MIDC,Thane-Belapur Road, Rabale,Navi Mumbai 400 701	022-6767 8000	L	Y	Y
97	Rotam India Ltd.	Mumbai	Floral Deck Plaza,C-512Wing Road, No.23MIDC Central Road Andheri(East)Mumbai 400 093.	022-28312122 28302296/282 46081	M	N	N

98	Row2 technologies Pvt. Ltd	Mumbai	Raheja Point One Pt. J. Nehru Road, Vakola, Santacruz (East), Mumbai 400 055, India	022-66931400 Fax: +91 22 66910510	M	N	N
99	RPG Lide Sciences Ltd	Mumbai	463, 4 Th Floor, Rpg House, Dr. Annie Besant Road, Worli, Mumbai – 400 030. Maharashtra	022-2498 1650 / 51/ 6660 6375 / 76 / 7	L	Y	Y
100	S A Pharmachem Pvt. Ltd.	Mumbai	220, Udyog Bhavan,Sonawala Road,Goregaon (East), Mumbai - 400 063 Maharashtra India	022-2681 9999 Fax:022-2686 2742	M	Y	N
101	S H Kelkar & Co. Pvt. Ltd.	Mumbai	Near Patalganga, Dist. - Raigad, Maharashtra - 410 220	02164 9163-69	S	Y	N
102	Sadhana Nitro Chem. Ltd.	Mumbai	207, Kakad Chambers , Second Floor, 132, Dr, Annie Besant Road, Worli, Mumbai-400018	022-6660 4881-5	S	Y	N
103	Sagar Chemicals	Mumbai	A-48, New Empire Industrial Estate Kondivita Road Andheri E Mumbai - 400 059. Maharashtra. India.	022-28202847 / 28379608	M	N	N
104	Sailife	Mumbai	Building 1, Plot 2, Chrysalis Enclave, International Biotech Park, Phase Ii, Hinjewadi, Pune - 411057, Maharashtra, India	020-66743600	S	N	N
105	Sandoz Pvt. Ltd (NOVARTIS)	Mumbai	Plot No 8/A/2 8/B, TTC Industrial Area, Village Digha Kalwe Block, Thane Belapur Road, Airoli, Navi Mumbai	022-27690001, 27639000	L	Y	N
106	Sanofi India Limited	Mumbai	54/A, Sir Mathuradas Vasanji Road, Andheri East, Mumbai 400 093	022-28278000	S	N	N

107	Serum Biotec Ltd	Mumbai	502, Citi Centre, 39/2, Erandwane, Karve Road Pune, 411 004, Maharashtra, India	020-25458481, 25459619	M	N	N
108	Shamrock Internationa l Ltd.	Mumbai	1008, MAKER CHAMBERS, NO. V, 221, NARIMAN POINT, Mumbai - 400021, Maharashtra, India	022-22840346	M	N	N
109	Shaper Chemicals	Mumbai	203/206 Shrikant Chambers S T Road Chamber, Chembur, Chembur, Mumbai, Maharashtra 400071	022-2745 5712	M	N	N
110	SI Group – India Limited	Mumbai	(Formerly Schenectady Herdillia Limited)Thane-Belapur Road, Navi Mumbai-400705	022-30782039, 30782000	L	Y	N
111	Somaiya Organo Chems Ltd	Mumbai	Fazalbhoy Building 45-47, Mahatma Gandhi Road, Post Box No.384, Fort,Mumbai	022-22858430, 22858440/50	M	N	N
112	Sonal Palsrub Industries P Ltd	Mumbai	3, Girikunj, M G X Road 4, Kandivali(W), B/H Patel Nagar, Kandivali(W), Mumbai, Maharashtra 400067	022-2806 4278	M	N	N
113	Span Chemicals	Mumbai	Plot No. D- 284, TTC Industrial Area, MIDC, Turbhe, Navi Mumbai, Maharashtra 400705	022-2768 3544	M	N	N
114	Spectrum Ethers Ltd.	Mumbai	No 5, 1st Floor, Daulat Sagar Apartment, Nehru Road, Santacruz East, Santacruz East, Mumbai, Maharashtra 400055	022-2619 5399	M	Y	N
115	Sudarshan Chemical Industries Ltd.	Mumbai	Jolly Maker Chamber, Nariman Point, Nariman Point, Mumbai, Maharashtra 400021	022-2202 0912	L	Y	N

116	Sun Pharma Industries Ltd	Mumbai	AC ME Plaza, Andheri Kurla Road, Mumbai-400059	022-66455645	L	Y	Y
117	Tata Chemicals Ltd.	Mumbai	Bomay House, 24 Homi Mody Street, Fort,Mumbai-400001 Maharashtra	02892-665264	L	Y	Y
118	Technova Imaging System Ltd	Mumbai	TechNova Imaging Systems (P) Limited Plot No. E1/2/3, M. I. D. C. Taloja 410 208, District Raigad,	022-2741 2463	M	N	N
119	Thermax	Mumbai	2nd Floor, Dhanraj Mahal, Near Gateway Of India, Chhatrapati Shivaji Road, Fort, Mumbai, Maharashtra 400001	022-6754 2255	L	N	N
120	Thirumalai Chemical Limited	Mumbai	Plot No 101 S. No. 6, Road No.29, SION-Matunga Estate, Mumbai-400022	022-2401 7834	M	Y	N
121	Trichem Life Sciences Ltd	Mumbai	Address: 209, C-5, Abhishek Bldg, Dalia Industrial Estate,, Off New Link Rd, Andheri (W), Mumbai, Maharashtra 400053	022 -6668 8142	M	N	N
122	U Vitamins Ltd	Mumbai	Arvind Vithal Gandhi Chowk, BSD Marg, Station Road, Govandi East,Mumbai - 400 088.	022-2556-4048 & 022-6786-1111	L	Y	N
123	Ultra-Tech Speciality Chemicals Pvt. Ltd	Mumbai	113 JK Chambers, Sector-17, Navi Mumbai-400705	022-27891443	M	N	N
124	Unichem Labas Ltd	Mumbai	Address: Unichem Bhavan, Prabhat Estate, Off S.V.Road, Jogeshwari (West), Mumbai, Maharashtra 400102	022-66888333	L	Y	N

125	United Phosporous Ltd	Mumbai	Readymoney Terrace 167, Dr Annie Besant Rd, New Ambalal Chawl, Bhim Nagar, Mahalakshmi Nagar, Mumbai	9819547749/022- 2493 0681	L	Y	Y
126	V V Pharma Industries	Mumbai	Plot No. 48, Additional M.I.D.C, Ambernath East, Thane, Maharashtra 421506	0251 262 1891	M	N	N
127	Vamshi Chemiclas Pvt. Ltd	Mumbai	B-48, Baria Apt., Marwadi Chawl, S. V. Road, Malad (W), Mumbai, Maharashtra 400064	022-2417 5215	M	N	N
128	Volga Organics Pvt. Ltd	Mumbai	5, Sheela Smruti, Tejpal scheme road#3, Vile parle- 400057	9821559846	S	N	N
129	Wanbury Ltd.	Mumbai	Wanbury Limited BSEL Techpark,'B' Wing, 10th Floor,Sector 30-A,Opp. Vashi Railway Station,Vashi, Navi Mumbai - 400705	022-6794 2222	M	N	N
130	Watson Pharma Ltd (Sekshnia Chemical Ltd)	Mumbai	N- 15, Additional Ambarnath M. I. D. C., Ambarnath East, Thane - 421501, Maharashtra, India	0251-2626074 0251-2626045	S	N	N
131	Wokhardt	Mumbai	Wockhardt Limited Wockhardt Towers, Bandra Kurla Complex, Bandra (East), Mumbai 400051 Maharashtra, India	022-2653 4444	L	N	N
132	Worlee-Chemie GMBH	Mumbai	Flat No. 101, Plot No. 22, Sector-8 A, CBD-Belapur, Navi Mumbai-400614	022-27563352	M	N	N
Pune							
Sr. No.	**Name**	**Place**	**Address**	**Contact No.**	**Large/ M**	**R & D**	**Library**

					edium/Small		
1	Aarushi Speciality Chemicals Pvt. Ltd.	Pune	Shreeprasad, Plot No.4, Sadashiv Shyamsundar Society, Pune-411030	020-24331381	S	N	N
2	Akzo Nobel Chemicals India Ltd	Pune	501/502, San Mahu Complex, 5Th Floor, Bandh Garden Raod, Opp Puna Club, Pune-411001	020-25560384	L	Y	N
3	Alkyl Amines Chemicals Ltd	Pune	20/06 Hadapsar Industrial Estate, Hadapsar Pune-411013	020-26874981	L	Y	Y
4	Aquapharma Chemical Company Pvt. Ltd	Pune	2A, 3Rd Floor, Atur Chamber, Malodina Road, Camp Pune-411001	020-66090033/66090000	M	Y	N
5	Aquarius Chemicals	Pune	3 Umed Bhavan, Station Road, Pimpri, Pune-411018	9823208315	S	N	N
6	Atlas Chemicals	Pune	156/1B, 1St Floor Akshay Building, Barne Road, Mangalwar Peth, Parag Chowk, Pune-411011,	020-26127700	S	N	N
7	B K Chemicals	Pune	B 2 Shrusti Apartments, 1St Floor, Century Enka Colony 2, Pune Nasik Highway, Bhosari, Pune-411039	8447569063	S	N	N
8	BASF India Limited	Pune	94/3/1 Paud Road, Pune-411038	020-25280114	L	N	N
9	Bhawani Chemicals	Pune	365/14, Ghorpade Peth, Swargate, Pune-411042	020-24267316	S	N	N
10	Cadmosil chemicals Pvt. Ltd	Pune	12 Mrutyunjay Colony, Kothrud Pune- 411029	020-25456670	S	N	N

11	Campex Chemicals Pvt. Ltd	Pune	Survey No. 224, New Nana Peth Road, Pune-411002	020-26351200, 26355048	S	N	N
12	Centak Chemicals Ltd	Pune	Office No. 401, 4Th Floor Century Arcade, Narangi Baug Road, Pune Station, Pune-411001	020-2612 2136	S	N	N
13	Dai-Ichi Karkaria Ltd	Pune	105 Mile Stone, Pune Mumbai Road, Kasarwadi, Pune-411034	020-66308800/66308811	L	Y	N
14	DBS Chemicals	Pune	Yashodeep Building A, Block-2, Rambaugh Colony Sadashiv Peth, Pune-411030	020-2446 0717	S	N	N
15	Deccan Dyes & Chemical Industries	Pune	Shardha Center Off Pune Road, Pune	020-25466390	L	Y	N
16	Deccan Mechanical and Chemical Industries	Pune	78, Bhosari MIDC, Pune	020-2712 0020	L	Y	N
17	Deepak Nitrate Ltd	Pune	Deepak Complex, National Games Road, Yerwada, Pune-411006	020-66458000/66458080/66090200	L	Y	Y
18	Demech Chemical Products Pvt. Ltd	Pune	T-77, Bhosari Industrial Estate, Pune	020-40775500	L	Y	N
19	Diamond Chemical	Pune	Plot No. 66, S Block, Bhosari Industrial Estate, Pune-411026	020-27122247	S	N	N
20	Elkay Chemicals pvt. Ltd	Pune	J-152/3, MIDC Bhosari Pune	020-30624166	L	Y	N
21	Emcure Pharma	Pune	Emcure House, T 184, MIDC, Bhosari, Pune-411026	020-30610000	L	Y	Y
22	Gauri Fine Chemicals	Pune	T-140, Industrial Estate, Bhosari Pune	020-66114273/4271	M	Y	N

23	Gayatree Chemical Industries	Pune	37/2 Ashatavinayak Industries Estates, Narhe Dhayari Rooad, Narhe Goan, Pune-411041	020-24690792	S	N	N
24	Globe Chemie	Pune	Chandraneel Apartment, Near Dsk Ranwara, Bhawdan, Pune	20-32309500 / 64730705	S	N	N
25	Halides Chemicals Pvt. Ltd	Pune	3, Nilashree, Plot No.16, Prashant Chs, Paund Road, Pune	020-39545566	L	Y	N
26	Hankel Adhesives technologies	Pune	234/235/245 Phase-1, Hinjewadi, Pune-411057	020-39803100	L	Y	N
27	Headway Chemicals India Pvt. Ltd	Pune	6, Bagheshree Art, Kalyani Nagar, Pune-411014	9890245986	S	N	N
28	Hikal Limited	Pune	Plot No. 3A, Hinjewadi, 2Nd Phase, International Biotech Park,Pune-411057	020-4200411	L	Y	N
29	Indian Oxides and Chemicals Limited	Pune	F2 Block, Plot No. 11, MIDC, Pimpri, Pune	020-6635 9377	S	N	N
30	Indica Chemical Industries Pvt. Ltd	Pune	Gat No. 153, Pune Nagar Road, Lonikand, Pune-412216	02137-253799	S	N	N
31	Indofil Chemicals Company	Pune	105 Bldg No. C2, Bramha Estate, Kondhwa Road, Kondhwa Khurd, Pune-411048	020-26831849	M	N	N
32	J P Fine Chemicals	Pune	Block S, 113/5, MIDC Bhosari, Pune	020-2114 2008	M	Y	N
33	Jain Chemical Industries	Pune	153/152, Dhayari Village, Ganesh Nagar, Pmc-Pune-411051	020-2437 3046	S	N	N
34	Jaybee Chemicals	Pune	Shop No. A-4 Kunal Park, Municipal School, Chinchwadgoan Pune-411033	020-27610396	S	N	N

35	Kamdhenu Chemical & Fertilizers Industries Limited	Pune	A-25, Pune Satara Road, Balaji Nagar, Pmc Area, Pune-411042	020-24371831	M	Y	N
36	Kangaru Polymers Pvt. Ltd	Pune	Somnath Apts, Revenue Colony, Shivajinagar Pune-411005	020-25513367	S	N	N
37	Kirti Chemicals	Pune	Bhosari Gaonthan, Near Sathayae MIDC, Pune-411039	020-27121821	S	N	N
38	Kulkarni organics Pvt. Ltd	Pune	172, Trambekeshwar Chs, Shanivar Peth, Pune	020-2425 0672	S	N	N
39	Kumbha Chemicals Pvt. Ltd	Pune	C-11, Green Park, A, Munthwa Road, Magarpatha Hadapsar, Pune	020-26890775	S	N	N
40	Lupin Ltd	Pune	1St Floor, Go Square, S.No. 249/250 Wakad Rd, Kaspate Wasti, Wakad, Pimpri-Chinchwad, Maharashtra	020- 6791 7400	L	Y	Y
41	Mak Glit Chem India Pvt Ltd	Pune	Gat No.126/127, Plot No.1, Pirangut Pune-412111	020-64730233	S	N	N
42	Melzer Chemicals Pvt. Ltd	Pune	S132/Z, Plot No.22, Gulmohar Park, Itt Road, Aundh, Pune-411007	020-4100 4800	S	N	N
43	Mohnish Chemicals Pvt. Ltd	Pune	S No. 29/3, P No. 99 & 20, Off Pune Nagar Road, Khardi Pune-411014	020-64101990	S	N	N
44	Nagarjun Fertilizers & Chemicals	Pune	Survey No 126, Vishal Enterprises, Pune Saswad Road, Phersuji Pune-412308	020-26982566	M	N	N
45	NAV Gases & Chemicals	Pune	50 A, Hadapsar Industrial Estate, Near Viaduwadi Police Chowky, Hadapsar Pune-411013	020-26818911	S	N	N

46	New Star Chemicals	Pune	Plot No. A 27 H Block, Mohawadi Road, Pimpri, Pune-411018	020-27472868	S	N	N
47	New White Excel Super Chemical Company	Pune	Survey No. 679/2A/6, 2Nd Floor, Off No.4, Bhosari Colony, Landewadi, Pune-411039	8880784339	S	N	N
48	Nutun Chemicals	Pune	J 37, MIDC Bhosari Industrial Estate Pune-411026	020-27120295	S	N	N
49	Oswal Chemical Industries	Pune	S R No. 37, Pisoli Road, Pune	020-26931253	S	N	N
50	Parag Gases & Chemicals Pvt. Ltd	Pune	S No. 224 A319 Kalpataru Plaza, Bhawani Peth, Ramoshi Gate Police Chowki, Pune-411042	020-26387676	S	N	N
51	Paras Chemical Industries	Pune	497/1, Shabbir Lane, Near Old Motor Stand, Bhavani Peth, Pune	020-2645000	M	Y	N
52	Polygram Industries	Pune	Gat No.768, Sheetal Chowk, Pawarvasti, Kudalvadi, Chikli, Pune	098903 24751	S	N	N
53	Poona Acid & Chemical Co.	Pune	Plot No. 2, Gat No. 189, Talawade Pune-412114	020-27690570	S	N	N
54	Praj Industries Limited	Pune	Praj House Bhawdan, Pune	020-71802000	L	Y	Y
55	Prasanna Industries	Pune	21,Hadapsar Industrial Estate, Pune-411013	020-2447 0592	S	N	N
56	Promtech Chemicals Pvt. Ltd	Pune	314/2, Vijayshree, Chinchwadgaon, Pune-411033	020-27455750	S	N	N
57	Renuka Chemiclas	Pune	S No.528/9, Block No.7, 3Rd Floor, Yogeshwar Complex, Dandekar Bridge, Pune-411030	020-24331993	S	N	N
58	RSB Chemicals Industries	Pune	T-136, MIDC Bhosari, Pune-411026	020-2712 0805	S	N	N

59	Shivam Fine Chemicals Limited	Pune	77/2, S Block MIDC Bhosari, Pune	020-2711 1328	S	N	N
60	Shourya Chemicals	Pune	1278, panyeshwar Road, Kasba peth,Pune-411011	020-39614085	S	N	N
61	Shree Balaji Bio Chem Industries	Pune	S No. 106, Talewade, Jyotiba Nagar, Pune-412114	020-64104920	S	N	N
62	Sigma Aldrich Chemicals Pvt. Ltd	Pune	203, Suyog Fusion, B S Dhole Patil Road, Pune-411001	020-41464700	M	N	N
63	Somani Petrochemicals Co.	Pune	664/A, Near Garware Bridge, deccan Gymkhana, Pune-411004	098903 24751	S	N	N
64	STS Chemicals Ltd	Pune	Unit Excel Phosphochem MA Ltd Compound, Pimpri, Pune-411018	020-27425648	S	N	N
65	Subhash Chemical Industries Pvt. Ltd	Pune	Plot No.3, S Block, MIDC Bhosari, Pimpri Chinchwad Pune	094220 28064	S	N	N
66	Sudarshan Chemical Industries	Pune	162, Wesley Road, Near Sangam Bridge, Pune- 411001	020-2605888	L	Y	N
67	Sujalam Chemiclas	Pune	D-1 Pragati Park, Hadapsar, Gadital Near Sanjivani hospital, Pune-411028	9422560788	S	N	N
68	Sujanil Chemo Industries	Pune	S No. 158/159 Mukund Nagar, Pune- 411037	020-24270228/24270248	S	N	N
69	Sunrise Fine Chemical Industries	Pune	28, Kondwa Satara Road, Dhankawadi, Kondwa Pune	020-24268665	S	N	N
70	Sunshine Fine Chemical India Pvt. Ltd	Pune	N 8 State Bank Nagar, CHS, Bibvewadi, Pune-411037	9011050347	M	Y	N

71	Supranil Chemical Industries	Pune	Gavane Estate, Padmavati, Near Landewadi, Pune-411039	020-24221591	M	Y	N
72	Surekha Chemical Industries	Pune	916,Opp Jeevn Medicines, Baristar Gadgil street, Sadashiv Peth, Pune-411030	020-2447 3586	S	N	N
73	Surtec Chemicals India Pvt. Ltd	Pune	Gat No. 318, Pune Nagar Road, Lonikand, T1, Havel, Dist. Pune	020-66785801	S	N	N
74	Tata Chemicals Ltd	Pune	Survey No. 1139/1, Urawde Road, Mulsi Pune-412108	020-66549700/ 9223056289	L	Y	Y
75	The Dharamsi Morarji Chemical Co Ltd	Pune	211 Morta Heights, Nityanand Hsg. Scty, Dhankawadi, Behind Rajashri Shahu Bank, Pune-411043	020-24368923	L	N	N
76	Thermax Limited	Pune	97 E, General Block, MIDC, Telco Road, Bhosari, Pune-411026	020-66051200	L	Y	Y
77	Trigon Chemie	Pune	722/AB/15, Nirmal Laxmi Park colony, Navi peth, Pune	020-24530071	S	N	N
78	United Chemicals	Pune	S No. 22, E Street Hadapsar, Pune-411028	9372888874	S	N	N
79	Usha Chemical Company	Pune	C-9, Morya Gosavi Raj Park, Chinchwad Pune	020 2027 0207	S	N	N
80	Vardhman Fertilizers Seed Pvt. Ltd	Pune	Pratibha Tower 3rd Floor, 18A/2B, Wakdevadi, Pune Mumbai Road	020-4141 2204	S	N	N
81	Varusak Plastic Paints and Chemicals Pvt. Ltd	Pune	Plot No. 1/16, 1st floor, Supreme Industrial Estate, Pune Satara Road-411009	020-39544378	S	N	N
82	Vet Bio Chem Pvt Ltd	Pune	No.301, CTS No. 981, Plot No. 128, Shivaji Nagar, Pune-411005	8373902429	S	N	N

83	Yuvraj Chemicals Pvt. Ltd	Pune	Survey No. 2165, Sadashiv Peth, Pune-411030	020-24338472/24333349	S	N	N
84	Zuari Industries Limited	Pune	B-2, tilak Road, Sadashiv Peth, Pune-411030	020-24327269	M	N	N

Appendix – C

List of Chemical Industries Having R & D Center and No Library

Sr. No.	Name	Place	Address	Contact No.	Large / Medium /Small	R & D	Library
1	Akzo Nobel Chemicals India Ltd	Pune	501/502, San Mahu Complex, 5Th Floor, Bandh Garden Raod, Opp Puna Club, Pune-411001	020-25560384	L	Y	N
2	Aquapharma Chemical Company Pvt. Ltd	Pune	2A, 3Rd Floor, Atur Chamber, Malodina Road, Camp Pune-411001	020-66090033/ 66090000	M	Y	N
3	Bharat Serums & Vaccines Limited	Mumbai	Hoechst House, Nariman Point, Mumbai-400021	022-6656 0900	M	Y	N
4	Dai-Ichi Karkaria Ltd	Pune	105 Mile Stone, Pune Mumbai Road, Kasarwadi, Pune-411034	020-66308800/ 66308811	L	Y	N
5	Deccan Dyes & Chemical Industries	Pune	Shardha Center Off Pune Road, Pune	020-25466390	L	Y	N
6	Deccan Mechanical and Chemical Industries	Pune	78, Bhosari MIDC, Pune	020-2712 0020	L	Y	N
7	Demech Chemical	Pune	T-77, Bhosari Industrial Estate, Pune	020-40775500	L	Y	N

	Products Pvt. Ltd						
8	Elkay Chemicals pvt. Ltd	Pune	J-152/3, MIDC Bhosari Pune	020-30624166	L	Y	N
9	FDC Ltd.	Mumbai	Fdc Limited 142-48, S. V. Road Jogeshwari (West) Mumbai - 400 102	022 - 26780652 / 26782653 Fax: 022 - 26788123	L	Y	N
10	Fem care Pharma Ltd	Nashik	Plo No. D-55, Ambad, Addi MIDC, Nashik-422010	0253-2383146	L	Y	N
11	Gauri Fine Chemicals	Pune	T-140, Industrial Estate, Bhosari Pune	020-66114273/4271	M	Y	N
12	Halides Chemicals Pvt. Ltd	Pune	3, Nilashree, Plot No.16, Prashant Chs, Paund Road, Pune	020-39545566	L	Y	N
13	Hankel Adhesives technologies	Pune	234/235/245 Phase-1, Hinjewadi, Pune-411057	020-39803100	L	Y	N
14	Hikal Limited	Pune	Plot No. 3A, Hinjewadi, 2Nd Phase, International Biotech Park,Pune-411057	020-4200411	L	Y	N
15	Indo-Nippon Chemical Co Ltd	Mumbai	Maker Bhavan No.2, 18, New Marine Lines, Mumbai 400 020, INDIA	22-2205 1723 / 2205 1897 / 2205 1612 / 2205 1821	M	Y	N
16	Innovasynth Technologies (IOCL)	Mumbai	Old Mumbai-Pune Road, Khopoli, Dist. Raigad, Pin - 410203 Maharashtra (India) Email:- Itil@Innovassynth.Com	02192 - 260100 Fax :02192-263628	M	Y	N

17	Ion Exchange India Ltd	Mumbai	Ion House, Dr. E. Moses Road, Mahalaxmi, Mumbai-400 011, India R-14, TTC, MIDC, Thane-Belapur Road, Rabale, Maharashtra, Navi Mumbai - 400 701, India	022-3989 0909 / 3047 2042	L	Y	N
18	IPCA Laboratories	Mumbai	123-Ab, Kandivli Industrial Estate, Kandivli (West) Mumbai 400 067, Maharashtra	022-6647 4755 / 6647 4757	L	Y	N
19	Isagro (Asia) Agrochemicals Pvt. Ltd.	Mumbai	Unit No.1 Ground, 2Nd& 3Rd Floor, Brady Gladys Plaza, 1/447, Senapati Bapat Marg, Lower Parel, Mumbai-400013	022-56955656	M	Y	N
20	J P Fine Chemicals	Pune	Block S, 113/5, MIDC Bhosari, Pune	020-2114 2008	M	Y	N
21	Jay Chemicals	Mumbai	504, Damji Shyamji Trade Centre, Station Road, Vidhya Vihar West, Mumbai, Maharashtra 400086	022-2511 9081	L	Y	N
22	Kamdhenu Chemical & Fertilizers Industries Limited	Pune	A-25, Pune Satara Road, Balaji Nagar, Pmc Area, Pune-411042	020-24371831	M	Y	N
23	Kopran Ltd	Mumbai	Parijat House, 1076, Dr. E. Moses Road,Worli, Mumbai - 400 018, Maharashtra (India).	022-43661111	L	Y	N

24	Kubo Combustion Efficiency Pvt. Ltd	Mumbai	401, Amit Industrial Estate, 61, Dr. S. S. Rao Road, Parel, Mumbai - 400 010, India	022-2416 7589	M	Y	N
25	Laxmi Organic Industries Ltd.	Mumbai	Chandermukhi, Third Floor, Nariman Point, Mumbai 400021	022-49104444	M	Y	N
26	Lona Industries Ltd.	Mumbai	Alta Bhavan, 532, Senapati, Bapat Marg,P.O Box No.17006, Dadar, Mumbai-400028	022-24307441/693	M	Y	N
27	Merind Ltd.	Mumbai	Okad Enterprises, Mulund Goregaon Link Road, Bhandup, Bhandup, Mumbai, Maharashtra 400078	022-2564 2583	L	Y	N
28	Neon Laboratories	Mumbai	Damji Shamji Industrial Complex, Andheri West, Maharashtra	022 -687 5366	L	Y	N
29	NOCIL	Mumbai	Nocil Limited C-37, T.T.C. Industrial Area, Off Thane-Belapur Road, Pawne Village, Post Turbhe, Navi Mumbai - 400 705	022-66730551 Fax: 022-27671862	L	Y	N
30	Paras Chemical Industries	Pune	497/1, Shabbir Lane, Near Old Motor Stand, Bhavani Peth, Pune	020-2645000	M	Y	N
31	Paras Organics Pvt. Ltd	Mumbai	D-119, TTC Indl. Area, MIDC, P.O. Nerul, Navi Mumbai - 400 706.	022-2768 5275 / 6511 4912	M	Y	N
32	PSA chemicals & Pharmaceuticals Ltd	Mumbai	605, Arneja Corner, Sector-17, Vashi	022-2789 0164	S	Y	N

33	S A Pharmachem Pvt. Ltd.	Mumbai	220, Udyog Bhavan,Sonawala Road,Goregaon (East), Mumbai - 400 063 Maharashtra India	022-2681 9999 Fax:022-2686 2742	M	Y	N
34	S H Kelkar & Co. Pvt. Ltd.	Mumbai	Vashivali, S. No. 12 - 5,6, And S. No. 30 - 34 & 36, Near Balrajeshwar Temple, Village Vashivali - Vadgaon, Mulund (West), Mumbai - 400 080 Near Patalganga, Dist. - Raigad, Maharashtra - 410 220	022-2164 9163-69	S	Y	N
35	Sadhana Nitro Chem. Ltd.	Mumbai	207, Kakad Chambers , Second Floor, 132, Dr, Annie Besant Road, Worli, Mumbai-400018	022-6660 4881-5	S	Y	N
36	Sandoz Pvt. Ltd (NOVARTIS)	Mumbai	Plot No 8/A/2 8/B, TTC Industrial Area, Village Digha Kalwe Block, Thane Belapur Road, Airoli, Navi Mumbai	022-27690001, 27639000	L	Y	N
37	SI GROUP – INDIA LIMITED	Mumbai	(Formerly Schenectady Herdillia Limited)Thane-Belapur Road, Navi Mumbai-400705	022-30782039, 30782000	L	Y	N
38	Spectrum Ethers Ltd.	Mumbai	No 5, 1st Floor, Daulat Sagar Apartment, Nehru Road, Santacruz East, Santacruz East, Mumbai, Maharashtra 400055	022-2619 5399	M	Y	N

39	Sudarshan Chemical Industries	Pune	162, Wesley Road, Near Sangam Bridge, Pune-411001	020-2605888	L	Y	N
40	Sudarshan Chemical Industries Ltd.	Mumbai	Jolly Maker Chamber, Nariman Point, Nariman Point, Mumbai, Maharashtra 400021	022-2202 0912	L	Y	N
41	Sunshine Fine Chemical India Pvt. Ltd	Pune	N 8 State Bank Nagar, CHS, Bibvewadi, Pune-411037	9011050347	M	Y	N
42	Supranil Chemical Industries	Pune	Gavane Estate, Padmavati, Near Landewadi, Pune-411039	020-24221591	M	Y	N
43	Thirumalai Chemical Limited	Mumbai	Plot No 101 S. No. 6, Road No.29, SION-Matunga Estate, Mumbai-400022	022-2401 7834	M	Y	N
44	U Vitamins Ltd	Mumbai	Arvind Vithal Gandhi Chowk, BSD Marg, Station Road, Govandi East,Mumbai - 400 088.	022-2556-4048 & 022-6786-1111	L	Y	N
45	Unichem Labas Ltd	Mumbai	Address: Unichem Bhavan, Prabhat Estate, Off S.V.Road, Jogeshwari (West), Mumbai, Maharashtra 400102	022-66888333	L	Y	N

Appendix – D

List of Chemical Industries having R&D and Library

Sr. No.	Name	Place	Address	Contact No.	Large/ Medium/ Small	R & D	Library
1	Adity Birla	Mumbai	Plot No. 1 & 1-A/1, MIDC, Tal. Dist. 410208,, Panvel, Navi Mumbai, Maharashtra 410208	9967018634	L	Y	Y
2	Alkyl Amines Chemicals Ltd	Pune	20/06 Hadapsar Industrial Estate, hadapsar Pune-411013	020-26874981	L	Y	Y
3	Asian Paints	Mumbai	Asian Paints Limited,Asian Paints House 6A, Shantinagar, Santacruz (E), Mumbai - 400 055, India.	Tel: 022 - 3981 8000 Fax: 022 - 3981 8888	L	Y	Y
4	BASF India Ltd	Mumbai	BASF India Limited Plot 37, Chandivali Farm Road, Chandivali, Andheri (East), Mumbai - 400 072, Maharashtra BASF India Limited Thane-Belapur Road, Turbhe, Plot No. 12, TTC Area, Navi Mumbai - 400 705, Maharashtra,	+91 22 2858 0200 Fax: +91 22 2858 0398 +91 22 6712 7600 Fax: +91 22 6712 7628	L	Y	Y
5	Cipla Ltd	Mumbai	Cipla Ltd. Mumbai Central, Mumbai – 400 008	+91 22 23082891 +91 22 23095521	L	Y	Y

6	Clariant Colour Chem Pvt. Ltd.	Mumbai	Reliable Tech Park Behind Reliable Plaza Thane-Belapur Road, Airoli Navi Mumbai - 400 708		M	Y	Y
7	Colgate (I) Palmolive	Mumbai	Colgate Research Centre Main Street, Hiranandani Gardens Powai, Mumbai 400 076	022 - 67095050 Fax: 25705088	L	Y	Y
8	Deepak Nitrate Ltd	Pune	Deepak Complex, National Games road, Yerwada, Pune-411006	020-66458000/66458080/66090200	L	Y	Y
9	Dow Agro Sciences	Mumbai	1st Floor, Block B, Gate 02, Godrej IT Park, Godrej Business District, Pirojshanagar, L.B. S. Marg, Vikhroli (West) Mumbai-400079	Ph:02356-272034-40	L	Y	Y
10	Emcure Pharma	Pune	Emcure House, T 184, MIDC, Bhosari, Pune-411026	020-30610000	L	Y	Y
11	Garware Plastics	Mumbai	Garware Polyester Ltd., 50-A, Swami Nityanand Marg, Western Express Highway, Vile Parle (East), Mumbai 400 057, INDIA Email: ho@garwarepoly.com	+-91-22-66988000 Fax: +91-22-28248155, +91-22-28248199	L	Y	Y
12	Gharda Chemicals Ltd	Mumbai	Gharda Chemicals Ltd. B-27, Phase-1 MIDC. Dombivili (East) District: Thane Maharashtra. India.	91-0251-2803380 – 86 Fax 91-0251-2430581 / 2446363	L	Y	Y

			Email ghardadom@ghardа.com				
13	Glenmark Pharmacuticals	Mumbai	Glenmark Pharmaceuticals Limited Glenmark House, B D S Marg, Chakala, Off Western Express Highway Andheri (E), Mumbai - 400099	+91 22 4018 9999 Fax : +91 22 4018 9990	L	Y	Y
14	Hindustan Organic Chemicals Ltd.	Mumbai	Rasayani, District. Raigad, Maharashtra	Ph:02192-50041-46	L	Y	Y
15	IOCL	Mumbai	Indian Oil Corporation Ltd., IndianOil Bhawan, Plot No.33, G Block, Bandra Kurla Complex, Bandra (E) Mumbai - 400051	022-26722701	L	Y	Y
16	Lupin Ltd	Mumbai	Laxmi Towers B wing, 5th floor, Bandra Kurla Complex, Mumbai-400051	022 6640 2222	L	Y	Y
17	Lupin Ltd	Pune	1st Floor, GO Square, S.No. 249/250 Wakad Rd, Kaspate Wasti, Wakad, Pimpri-Chinchwad, Maharashtra	020- 6791 7400	L	Y	Y
18	Macleods Pharma Ltd	Mumbai	Atlanta Arcade, Marol Church Road, Andheri (East), Mumbai - 400059, INDIA. Email 1: exports@macleodspharma.com Email 2:	+91-22-6676-2800 Fax : +91-22-2925-6599	M	Y	Y

			customercare@macleodspharma.com				
19	Nicholas Pirmal India	Mumbai	Piramal Enterprises Piramal Tower, Ganpatrao Kadam Marg, Lower Parel – West Mumbai – 400 013.	022-30466666	L	Y	Y
20	Pidilite	Mumbai	Corporate Head Office Ramkrishna Mandir Road Off Sir Mathuradas Vasanji Road, Andheri (East) Mumbai - 400059 E-mail: pil@pidilite.com	+91 22 3308 7000 Fax: +91 22 2835 7700	L	Y	Y
21	Piramal Healthcare	Mumbai	Piramal Enterprises 247 Business Park A-Wing, 6th Floor LBS Marg, Vikhroli (West) Mumbai – 400 083.	022-30956666	L	Y	Y
22	Praj Industries Limited	Pune	Praj House Bhawdan, Pune	020-66750000	L	Y	Y
23	Rashtriya Chemical Fertilizers	Mumbai	Priyadarshini Building, Eastern Express Highway Sion,Mumbai-400 022	022-2554 8300	L	Y	Y
24	Rallis India Ltd.	Mumbai	156/157, Nariman Bhavan, 15th Floor, 227 Nariman Point, Mumbai-400021	Ph:02356-272618,	L	Y	Y
25	Reliance Industries Limited	Mumbai	Reliance Industries Limited Makers Chambers - IV, Nariman Point,Mumbai 400 021.	91-22-2278 5000	L	Y	Y

26	RIL Life sciences Pvt. Ltd	Mumbai	Dhirubhai Ambani Life Sciences Center,R-282, TTC Industrial Area of MIDC,Thane-Belapur Road, Rabale,Navi Mumbai 400 701	+ 91 (22) 6767 8000	L	Y	Y
27	RPG Lide Sciences Ltd	Mumbai	463, 4 th Floor, RPG HOUSE, Dr. Annie Besant Road, Worli, Mumbai – 400 030. Maharashtra	+91 22 2498 1650 / 51 +91 22 6660 6375 / 76 / 7	L	Y	Y
28	SI GROUP – INDIA LIMITED	Mumbai	(Formerly Schenectady Herdillia Limited)Thane-Belapur Road, Navi Mumbai-400705	Ph:022-30782039, 30782000	L	Y	Y
29	Sun Pharma Industries Ltd	Mumbai	AC ME Plaza, Andheri Kurla Road, Mumbai-400059	022-66455645	L	Y	Y
30	Tata Chemicals Ltd.	Mumbai	Bomay House, 24 Homi Mody Street, Fort,Mumbai-400001 Maharashtra	Ph : 02892-665264	L	Y	Y
31	Thermax Limited	Pune	97 E, General Block, MIDC, Telco Road, Bhosari, Pune-411026	020-66051200	L	Y	Y
32	United Phosporous Ltd	Mumbai	Readymoney Terrace 167, Dr Annie Besant Rd, New Ambalal Chawl, Bhim Nagar, Mahalakshmi Nagar, Mumbai	9819547749 /022- 2493 0681	L	Y	Y