

**Indus University**

**IISHLS**

**Department of Chemistry**

**M.Sc. Chemistry**

**Semester: 3**

**Subject Code: MCH0308**

**Name of Subject: Research**

**Methodology**

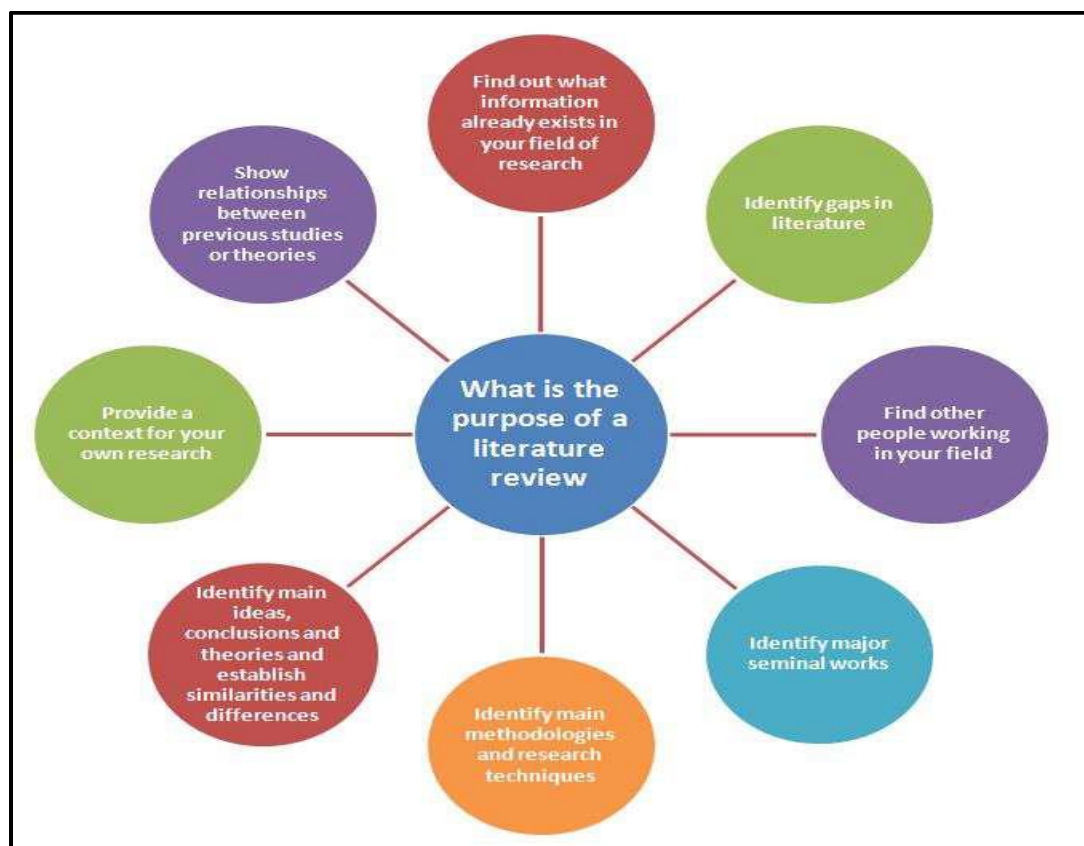
**Unit: I - Literature Survey**

## ❖ What is Literature Review?

- Before taking up the work on a research problem one has to know **whether any work was reported on the same problem.**
- If so he should know the extent to which the work was carried out.
- He should also know the work on the related field.
- **Unless one knows the details regarding the work done in the earlier years in the same or related problem it is not possible to carry out the work.**
- The total body of chemical/physics knowledge called the literature is located on the combined shelves of all the chemical and physics libraries in the world.
- **The process of extracting the information about a research problem or a compound or a method etc., from the literature is called the literature survey.**
- Literature survey is not difficult and nowadays the literature search has become very simple.
- **Definition:**  
**A literature review is a “Critical analysis of a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles”**
- **Key points of a literature review**
  - Tell me what the research says (**Theory**)
  - Tell me how the research was carried out (**Methodology**)
  - Tell me what is missing or the gap that research intends to fill. (**Research gap**)

## → Why do a literature review?

- To identify gaps in the literature
- To avoid reinventing the wheel (at the very least this will save time and it can stop you from making the same mistakes as others)
- To carry on from where others have already reached (reviewing the field allows you to build on the platform of existing knowledge and ideas)
- To identify other people working in the same fields (a researcher network is a valuable resource)
- To increase your breadth of knowledge of your subject area
- To identify seminal works in your area
- To provide the intellectual context for your own work, enabling you to position your project relative to other work



*Purpose of Literature review*

→ The literature can be divided into two broad categories as

- **Primary sources**
- **Secondary sources**

### ❖ **Primary sources:**

→ A primary source publishes the original results of laboratory investigations.

→ There are two kinds of primary sources:

→ **Journals**

→ **Patents**

→ **Journals:**

→ All new work such as new

➤ **Preparation method**

➤ **New compound**

➤ **New technique will be published first in journals.**

→ There are thousands of journals that publish chemical and physics research papers in many countries and in many languages.

→ They are published by monthly, quarterly and semiannually.

→ Some journal cover all fields of science

→ Examples: **Science,**

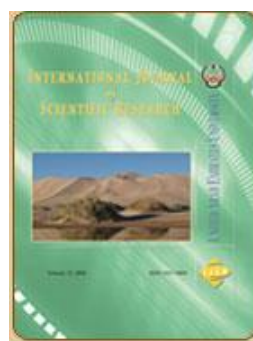
**Nature,**

**Journal of Scientific and Industrial Research,**

**Current Science,**

**International Journal of Scientific Research,**

## Research Insights.



## •Some journals are restricted to Chemistry

Examples: Journal of Chemical Sciences  
 Langmuir  
 Journal of Chemical Research  
 Indian Journal of Chemical Technology  
 Journal of Organic Chemistry  
 Progress in Chemistry



→ Journals publish three types of publications:

- **Papers**
- **Note**
- **Communications**
- **Patent**

→ **Papers**: If the work is substantial and if it gives complete details with sufficient data it is published as a paper.

→ **Example** : See all the following images .....



## ***In silico* characterization of antifreeze proteins using computational tools and servers**

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**Abstract.** In this paper, seventeen different fish Antifreeze Proteins (AFPs) retrieved from Swiss-Prot database are analysed and characterized using *In silico* tools. Primary structure analysis shows that most of the AFPs are hydrophobic in nature due to the high content of non-polar residues. The presence of 11 cysteines in the rainbow smelt fish and sea raven fish AFPs infer that these proteins may form disulphide (SS) bonds, which are regarded as a positive factor for stability. The aliphatic index computed by Ex-Pasy's ProtParam infers that AFPs may be stable for a wide range of temperature. Secondary structure analysis shows that most of the fish AFPs have predominant  $\alpha$ -helical structures and rest of the AFPs

visualized and analysed using helical wheel plots generated by EMBOSS pepwheel tool. The presence of disulphide (SS) bonds in the AFPs Q01758 and P05140 are predicted by CYS\_REC tool and also identified from the three-dimensional structure using Rasmol tool. The disulphide bonds identified from the three-dimensional structure using the Rasmol tool might be correct as the evaluation parameters are within the acceptable limits for the modelled 3D structures.

**Keywords.** Antifreeze proteins; computational analysis; disulphide bridges; homology modelling; proteomics tools

### **1. Introduction**

Computational packages and online servers are the current tools used in the protein sequence analysis and characterization.<sup>1</sup> The physicochemical and the structural properties of the proteins are well understood with the use of computational tools. Today, number of computational tools has been developed for making predictions regarding the identification and

sequence provides most of the information required for determining and characterizing the molecule's function, physical and chemical properties. Sequence analysis and physicochemical characterization of proteins using biocomputation tools have been done by many researches and reported.<sup>2–8</sup> Antifreeze Proteins (AFPs) were first identified in fishes. Antifreeze proteins resist ice crystal growth and prevent cellular damage in the organisms due to freezing. AFP mole-

## **2. Materials and methods**

### *2.1 Antifreeze protein sequences*

Antifreeze protein sequences were retrieved from the manually curated public protein database Swiss-Prot.<sup>19</sup> Swiss-Prot is scanned for the key word antifreeze. The search result yielded 39 antifreeze protein

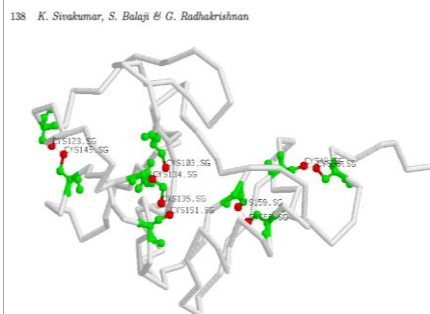


Fig. 5. RasMol (backbone) representation of the homology-modeled 3D structure of antifreeze protein Q01758 (using PDB template 2AFP-1). Cysteines are shown as ball and stick models (green). The sulphur atoms present in cysteines and the SS bonds (dotted lines) are shown in red color.

**Table 6.** Disulphide (SS) bond pattern of pairs predicted, by CYS\_REC (using primary structure) and identified by RasMol (using 3D structure modelled).

Accession number	CYS_REC	RasMol
Q01758	Cys38-Cys49	Cys38-Cys49
	Cys66-Cys135	Cys66-Cys159
	Cys103-Cys145	Cys135-Cys151
	Cys123-Cys134	Cys103-Cys134
	Cys151-Cys159	Cys123-Cys145
P05140	Cys41-Cys52	Cys41-Cys52

### 3. Results and discussion

The results of primary structure analysis show that most of the AFPs are hydrophobic in nature due to the presence of high non-polar residues (containing 2 and 3). The presence of 11 Cys residues in Q01758 (6.29% of Cys) (rainbow smelt) and P05140 (6.75% of Cys) (sea raven fish) indicate the presence of disulphide bridges (SS bonds) in these AFPs. Moreover, the primary structure and

acceptable limits for the 3D structures modelled using the PDB template 2AFP\_A for both of the (target) proteins. Criteria for a good 3D structure is given in table 9. The cysteines and the SS bonds identified using the three-dimensional structures of AFPs Q01758 and P05140 are shown in figures 3 and 4 respectively. In the case of AFP Q01758 the four SS bond positions Cys66-Cys135, Cys103-Cys145, Cys123-Cys134 and Cys151-Cys159 predicted by CYS\_REC are not correlating with the SS bond positions Cys66-Cys159, Cys135-Cys151, Cys103-Cys134 and Cys123-Cys145 identified using RasMol tool. We speculate that the SS bonds predicted from the primary structure (protein sequence) using CYS\_REC tool might not be correct and the SS bonds identified from the three-dimensional structure (3D coordinates) using the RasMol tool might be correct. The ten cysteines and five SS bonds present in the AFPs Q01758 and P05140 are shown in figures 3 and 4. The one unpaired cysteine in both the proteins is not shown in the figures.

### 4. Conclusions

Seventeen fish antifreeze proteins have been chosen mainly to study their physico-chemical properties,

### References

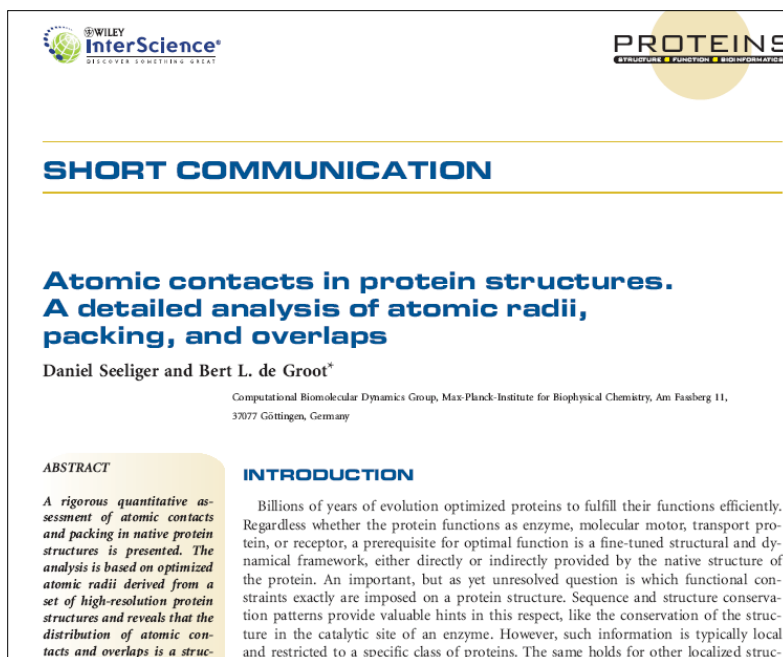
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### → Notes:

- A note is a brief paper published without a summary and abstract.
- **It is more or less similar to paper in other aspects.**
- It may be of small scope.
- **Most journals no longer publish notes.**

→ **Communications:** Communications are brief but significant. Communications differ from paper and notes in three respects.





→ **Communications differ from paper and notes in three aspects.**

- 1. They are brief, not because the work is of small scope, but because they are condensed. Usually they include only the most important experimental details or none at all.**
- 2. They are of immediate significance. Journals that publish communications make every to have them appear as soon as possible after they are received. Some papers and notes are of great importance, and some are of lesser importance, but all communications are supposed to be of high importance.**
- 3. Communications are preliminary reports, and the material in them may be republished as papers at a later date, in contrast to the material in papers and notes, which cannot be republished.**

→ Most of the journals publish articles in English language. Some journals publish articles in Russian, German, French and Chinese.

→ They publish summaries in English. The second most important language in journals is Russian. For other language journals especially for Russian journals; English version is also available.

→ All journals have abbreviations and these abbreviations are used when they are quoted as references.

→ **Examples:**

<b>Journal</b>	<b>Abbreviation</b>
→ Indian Journal of Biochemistry	Indian J Biochem
→ Indian Journal of Biochemistry & Biophysics	Indian J Biochem Bio
→ Indian Journal of Biotechnology	Indian J Biotechnol
→ Indian Journal of Chemical Technology	Indian J Chem Techn
→ Indian Journal of Chemistry	Indian J Chem
→ Indian Journal of Chemistry Section A	Indian J Chem A
→ Indian Journal of Chemistry Section B	Indian J Chem B

- **Patents:**

A patent is for a

- **New technique**
  - **New equipment**
  - **New compound**
  - **New method for making a known compound.**
- The patents are very useful for the researchers / laboratory chemists and no literature search is complete that neglects the relevant patents.
  - Chemical patents are part of chemical literature and both United States and foreign patents are regularly abstracted by Chemical Abstracts.
  - Bound volumes of US patents are kept in a number of large libraries.
  - Chemical Abstracts lists, in the introduction to the first issue of each volume, instructions for obtaining patents from 26 countries.
  - **The patents are not as reliable as papers due to the following two reasons;**
  - It is in the interest of the inventor to claim as much as possible.

- **Reason-1:** Therefore he or she may, for example, actually have carried out a reaction with ethanol and with 1-propanol, but will claim all primary alcohols, and perhaps even secondary and tertiary alcohols, glycols and phenols. An investigator repeating the reaction on an alcohol that the inventor did not use may find that the reaction gives no yield at all. In general, it is safest to duplicate the actual examples given, of which most chemical patents contain one or more.
- **Reason-2:** Although legally a patent gives an inventor a monopoly, any alleged infringements must be protected in court, and this may cost a good deal of money. Therefore, some patents are written so that certain essential details are concealed or entirely omitted. Generally, chemical patents make full disclosure and claim only what was actually done.

### ❖ Secondary Sources

**Secondary sources:** (indexes, abstracts, review articles, handbooks, catalogues etc)

- In the literature search, the original articles related to our problem cannot be directly referred as it is so vast.
- If there were no indexes, abstracts, review articles, handbooks, catalogues etc., the literature would be unusable.
- The above sources which are used to refer the primary sources are called as secondary sources.
- In Physics, Chemistry and Computer science excellent secondary sources are available, Various kinds of secondary sources are discussed.

#### ➤ Title Publications

- These publications list the title of current papers and this is useful for the chemists to read only the paper relevant to his work.
- There are two 'title' publications covering whole of chemistry.

➤ **Current contents Physical, Chemical & Earth Sciences:**

- Began in 1967 and appear **weekly**, contains the contents pages of all issues of about 800 journals in chemistry, physics, earth sciences, mathematics, and allied sciences.
- Each issue contains **an index of important words taken from the titles of the papers listed in that issue**, and an author index, which, however, lists only the first-named author of each paper.
- The **author's address is also given, so that one may write for reprints.**
- Current Contents is also available on computer discs, with “keywords”- words taken from the title and the interior of the paper.
- The **discs can be searched for the keywords, allowing the user to find papers** containing specific topics of interest.

➤ **Chemical Titles, published by chemical Abstracts Service**

- **Biweekly** publication, begun in 1961, lists, in English, all titles from more than 700 journals, all in the field of chemistry. The most useful aspect of this publication is the way the titles are given.
- They are listed in alphabetical order of every word in the title, except for such words as “the”, “of”, “investigation”, “synthesis”, etc. **The indexed words are also called “keywords”.** (each issue contains a list of words prevented from indexing).
- Furthermore, at each listing are given the words that immediately precede and follow the keyword.
- In the second section of each issue (called the **Bibliography**) the complete titles and the authors are given.
- Incidentally, this Bibliography duplicates, for the journals they both cover, the listings in Current Contents, Physical, Chemical, & Earth Sciences, since the complete contents of journals are given in order of page number.
- Each issue of Chemical Titles has an author index, covering all authors.


- Author's addresses are not given.

➤ **Abstracts**

- Listing of title will not tell what is in the paper.
- Abstracts of the paper give the summary of the paper with other details and so they are very useful.

There are two publications covering the whole field of chemistry.

1. Referativnyi Zhurnal, Khimiya which began in 1953 is published in Russian language.
2. Chemical Abstracts.



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Spectrochimica Acta Part A 62 (2005) 991–999

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PART A

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## Dual fluorescence of diphenyl carbazide and benzanilide: Effect of solvents and pH on electronic spectra

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**Abstract**

The absorption and fluorescence spectra of benzanilide (BA) and diphenyl carbazide (DPC) in solvents of different polarities and pH have been analysed. The spectral characteristics of DPC and BA are compared with diphenyl amine molecule. In water and methanol, a dual fluorescence is observed for both DPC and BA molecules. The normal stokes shifted emission originates from a locally excited  $\pi^*$  electronic state and the large stokes shifted band is due to emission from a twisted intramolecular charge transfer (TICT) state. pH studies show that both monocations and monoanions are non-fluorescent. The excited state acidity constants determined by fluorimetric titration and Förster cycle methods, have been reported and discussed.

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*Keywords:* Solvent effects; pH effects; TICT; Diphenyl carbazide; Benzanilide

- The Chemical Abstracts is published **weekly** by the **American Chemical Society**.
- It covers about 18000 journals.

- It gives the abstracts in English of every paper that contains **chemical information regardless of original language.**
- Chemical Abstracts is most useful because of its excellent indexes.
- **Abstracts appear about 3-6 months after the appearance of original paper in journals.** It also publishes chemical patents from 18 countries.
- The abstracts are grouped into 80 sections of which sections 21-34 pertains to organic chemistry.
- Each abstract contains,
  - **Abstract number**
  - **Title of the paper**
  - **Author's names as given in paper**
  - **Abbreviated name of journal.**
  - **The year, volume, issue and page numbers**
  - **Language of the paper**
  - **A concise summary of the information in the paper**

#### ➤ **Reviews**

- A review article is an **intensive survey of a specific field.**
- A good review article is of enormous value, because it is a thorough survey of all the work done in the field under discussion.
- For example one wants to collect the literature on a particular field upto 2002. If he gets a review on that field in the year 1995 then that review will cover all the work done on that field till 1994.
- There is no need for him to do literature survey in that field before 1994. It is enough if he goes through the work done on that field after 1994.
- If he is able to get recent review then it saves so much time for the research worker.



Tutorial Review

## Green Fluorescent Proteins: Invisible to Visible

K. Sivakumar

**Introduction**

The Royal Swedish Academy of Sciences has awarded the Nobel Prize in Chemistry for 2008 jointly to Osamu Shimomura, of Marine Biological Laboratory, and Boston University Biological Laboratory, and Boston University Medical School along with Martin Chalfie, Columbia University, New York and Roger Y. Tsien, University of California, San Diego "for the discovery and development of the Green Fluorescent Protein (GFP)".




Osamu Shimomura, Martin Chalfie and Roger Y. Tsien with their Nobel Prize

### Review Article

#### ➤ Monographs and Treatise on Specific Areas

- Organic chemistry is blessed with a large number of books devoted to a thorough coverage of a specific area.
- Many of these are essentially very long review articles, differing from ordinary review articles only in size and scope.
- Some of the books are by a single author, and others have chapters by different authors but all are carefully planned to cover a specific area.
- Many of these books have been referred to in footnotes in appropriate places.
- There have been several series of monographs, one of which is worth special mention: **Monographs and Treatise on Specific Areas**
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- Many of these books have been referred to in footnotes in appropriate places.
- There have been several series of monographs, one of which is worth special mention: “The Chemistry of Functional Groups”, under the general editorship of Patai, published by Wiley, New York.

### ➤ Text Books

- There are many excellent textbooks in the field of Physics and chemistry.
- Examples: Introduction to Condensed Matter

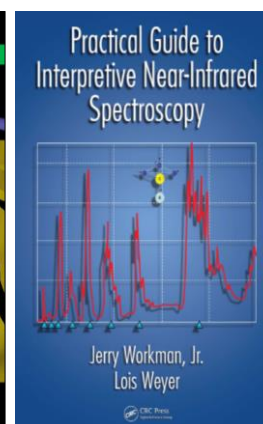
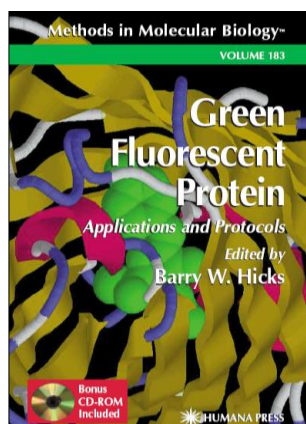
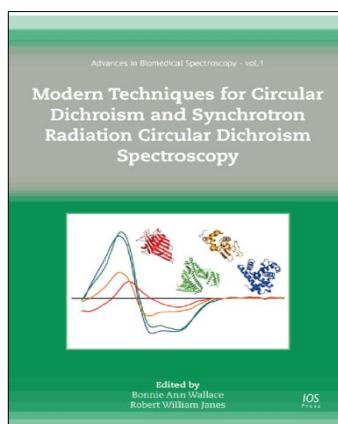
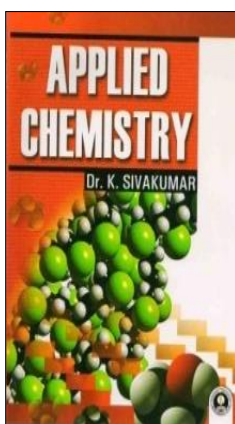
Equilibrium Statistical Physics

The Physics of Solar Cells

Modern techniques for circular Dichroism

Green Fluorescent Proteins

Practical Guide to Interpretive Near IR spectroscopy



### Text Books

### ➤ Beilstein

- Handbook for organic chemistry is commonly known as Beilstein after its first editor.
- The Beilstein database is the largest database in the field of organic chemistry, in which compounds are uniquely identified by their Beilstein Registry Number.

- **It is a multivolume handbook that lists all known organic compounds.**
- It gives the important **historical notes, occurrence, formation, preparation, properties (physical and chemical, physiological), technical application of a compound.**
- It also gives the analysis details like addition compounds and salts conversion products of unknown structure.
- The space devoted to any one compound varies from one line to several pages according to the available information and to its importance.
- It consists of a main series and four supplementary series (27 volumes)
- Main series antiquity – 1900 (i.e., upto 1909)
  - First supplement – 1910 -1919
  - Second supplement – 1920 - 1929
  - Third supplement – 1930 – 1949 (in complete)
  - Fourth supplement – 1950 – 1959 // (incomplete)
- The compounds are grouped into three major divisions.
  - *Acyclic compounds 1-4*
  - *Carbocyclic compounds 5-16*
  - *Heterocyclic compounds 17-27*
- There is a fourth minor division of carbohydrates, rubber like compounds and carotenoids contained in volumes 30 and 31.
- Each volume contains compounds with certain functional groups like alcohols, ketones etc.
- Every conceivable compound has been assigned a system number whether or not the compound has been reported in the literature.
- System number is the same for a particular compound in all the series.
- So once the system number is located in the main series, it is easy to refer the details of the compound in other series.

- The procedure used by Beilstein staff to assign the system number for a compound is sufficiently involved and it is difficult to find out the system number.
- **General subject index**
- It is used to search for topics such as oxidation, kinetics, fluorescence etc.
- If we are interested to find out the work done in the field of kinetics during the period 1972-1976 we can refer to the decennial subject index from 1972-1976 and we can see all the work on kinetics alphabetically.
- **Author Index**
- If we are interested to find out the work done by a particular author for a period we can refer to author index.
- **Formula Index**
- If we are interested to find out the carcinogenic activity of “Benzanilide” during the period from 1977-1981, we can refer to the decennial formula index of that period. The work done in this area will be listed.
- For each formula there may be a number of compounds (a number of isomers).
- **Chemical Substance Index**
- **This is more specific than formula index.**
- We can refer by using the name of the compound.
- This is very useful to **know the work done on a particular compound during a certain period.**
- All the indices give only **volume number and abstract number like 97, 489352.**
- 97 is the volume number. 489352 is the abstract number.
- We can get the abstract with other details in volume 97.
- If we want complete information we may have to consult the original article published in the referred journal.
- **Chemical Abstracts does not always use IUPAC nomenclature.**
- All compounds are listed as derivatives of a parent compound.

- For example: 4-hydroxybiphenyl is referred as Biphenyl-4-ol.
- Index guide, published every **18 months**, give the nomenclature system used in chemical abstract.
- **If the name is not clearly known, it is better to use formula index.**

## Digital

- Technological revolution in academic libraries have changed the ways in which libraries use and find information today. Developments in electronic technologies, computers and communication technologies have drastically affected the role of librarians.
- To overcome the limitations of physical ownership, libraries supplement their collections through Inter-Library Loan (ILL) and document supply services (DDS).
- Unfortunately, academic libraries in India have not yet shown interest in DDS and ILL, though there are few agencies that are involved in initiating and implementing ILL.
- In the past, it has been observed that libraries are moving slowly from Print to Electronic media. Libraries, faced with declining budgets and high cost of journals are not able to purchase all publications and materials that their users would generally expect to have.
- The escalating price of the rapidly growing numbers of electronic journals and databases has forced the librarians to think alternative options to subscribe to E-resources.

- Perhaps the formation of consortia is an answer to this problem.
- Indian Academic libraries are no exception to this fact, which also are also gradually shifting from print format to electronic format, though electronic sources have their own limitations but accessing large number of E-journals or resources globally is significant advantage. **UGC- INFONET developed by UGC in collaboration with INFLIBNET is a landmark initiative** towards sharing of E-resources the formation of consortia.
- The new release of electronic resources under the consortia in the year 2004 for fifty universities is a milestone in the history of higher education system.

### ➤ **ELECTRONIC JOURNALS**

- Electronic journals are often referred to interchangeably as “electronic publishing”, “electronic serials”, “online journals” and “electronic periodicals”.
- While some authors simply take an electronic journal as a publication whose primary means of delivery to subscribers is through a computer file, others define it strictly to be “a full text electronic publication, which may include images, and is intended to be published indefinitely”
- The only thing that can be said definitively is that e-journals are serial publications available in digital format. Some are distributed on CD-ROMs, some over the Internet. Electronic Journals are counterpart of print journals which are browsed, viewed, searched and save using network computers.

### ➤ **E-JOURNALS ACCESSIBILITY TO UNIVERSITIES**

- Access to electronic resources requires good IT infrastructure, availability of satisfactory number of PCs in network environment and good speed of INTERNET connectivity. If any of these is not available, these facilities remain unutilized.



- Other factor, which is also responsible for usage is awareness among users. Statistics reveal that most of the universities in the region are not making desired use of E-journals due to some or the other reasons. But despite the best efforts of INFLIBNET, universities in the region are yet to catch up with mainstream.
- Access to E-journals in the north east is given to five universities in the year 2004.
- These universities are North Eastern Hill University, Tezpur University, University of North Bengal , Guwhati University, Manipur University. These universities were given more than 1700 full text journals from different publishers. These resources are:

No.	Name of Publisher	No. of Journals / databases	Access from
1	American Chemical Society	31	Vol.1 issue 1
2	Royal Society of Chemistry	24 + 6 Databases	1997
3	Institute of Physics	36	Vol.1 issue 1
4	Cambridge University Press	72	1997
5	AIP/APS	27	1997
6	Project Muse	222	1999 onwards
7	JSTOR	517	Vol.1 issue 1
8	Kluwer Academic	647	1995 onwards
9	Springer Link	533	1995 onwards
10	Annual Reviews	29	1994 onwards
11	Emerald	28	1995
12	Nature	1	1997
13	Science Online	1	1997
14	Encyclopedia Britannica	1 Database	complete collection
15	Elsevier Science - Life Sciences	34	1995 onwards
16	Biological Abstracts	1 Database	1969 onwards
17	Chemical Abstracts	1 Database	1907 onwards
18	Chemical Abstracts	1 Database through STN	1907 onwards
19	J-Gate Portal	1 Product	2000 onwards
20	Ingenta Portal	1 Product	1997 onwards, some back access as well

### ➤ Journal Table of Contents (TOC) Alerts.

- Most scholarly journals publish a "feed" that contains the Table of Contents (TOC) for the most recent issue of the journal.
- TOC alerts update the feed each time a new issue of a journal is published. TOC alerts provide a convenient way to stay informed about current developments in your field.
- Below are instructions for setting up and using the Journal TOCs service, (a free service) which allows you to select a set of journal titles, view the latest TOCs, export your TOC feeds to popular RSS feed readers, and to set up email alerts.
- Many publishers offer a table of contents alerting service
- Sign up to receive an email when a new issue is published
- Look out for a link on the home page of your favourite journals
- TOCs are also available for our subscription journals e.g. OVID
- Link : <http://www.journaltoocs.ac.uk/>
- Free service
- Provides tables of contents and RSS feeds for new content, for over 24,000 journals
- Sign up to the service to receive alerts for up to 30 articles

### ➤ Concept of Citations Index

- Citations symbolize the conceptual association of scientific ideas as recognized by publishing research authors .
- By the references they cite in their papers, authors make explicit **linkages** between their current research and prior work in the archive of scientific literature.

- Introduced by **Dr. Eugene Garfield** of Institute of Scientific Information (Web of Science) in 1950s.
- **Citation indexing makes links between books and articles that were written in the past and articles that make reference to ("cite") these older publications.**
- **In other words, it is a technique that allows us to trace the use of an idea (an earlier document) forward to others who have used ("cited") it.**
- The citation indexes were originally designed primarily for information retrieval. Helps for identifying the relevant research papers independent of language, title words, or author keywords.
- ISI Web of Science Databases:
  - 1. Science Citation Index Expanded (SCI)*
  - 2. Social Science Citation Index (SSCI)*
  - 3. Arts and Humanities Citation Index (A&HCI)*
- **Advantages of Citation Indexing**
  - ✓ **SCI, SSCI and A&HCI are multidisciplinary in nature..**
  - ✓ **The citation-based associations and connections within the literature are made by authors themselves.**
  - ✓ **Helps for identifying the core periodicals in a subject.**
  - ✓ **Helps for quantifying or measuring the research productivity of an institution or individual or country or region.**
- **Indian Citation Index(ICI)**
  - ✓ **Link: <http://www.indiancitationindex.com>**

The screenshot shows the Indian Citation Index (ICI) website. The main search area includes three input fields: 'Title', 'Author', and 'Publication Name', each with a dropdown menu. Below these fields are 'Search' and 'Clear' buttons. The page also features a navigation menu at the top with links like 'Home', 'About Us', 'Product', etc. A sidebar on the right lists 'ICI Other Products' such as Indian Science Citation Index (ISCI), Indian Health Science Citation Index (IHSCI), Indian Agriculture Citation Index (IACI), Indian Social Science & Humanities Citation Index (ISSHCI), Indian Journals Citation Report (DCR), Indian Science & Technology Abstracts (ISTA), and Directory of Indian R&D Journals (DoI).

## Coverage of Web of Science

Citation Index	No of Journals
Science Citation Index	3772
Social Science Citation Index	2995
Arts & Humanities Citation Index	1656

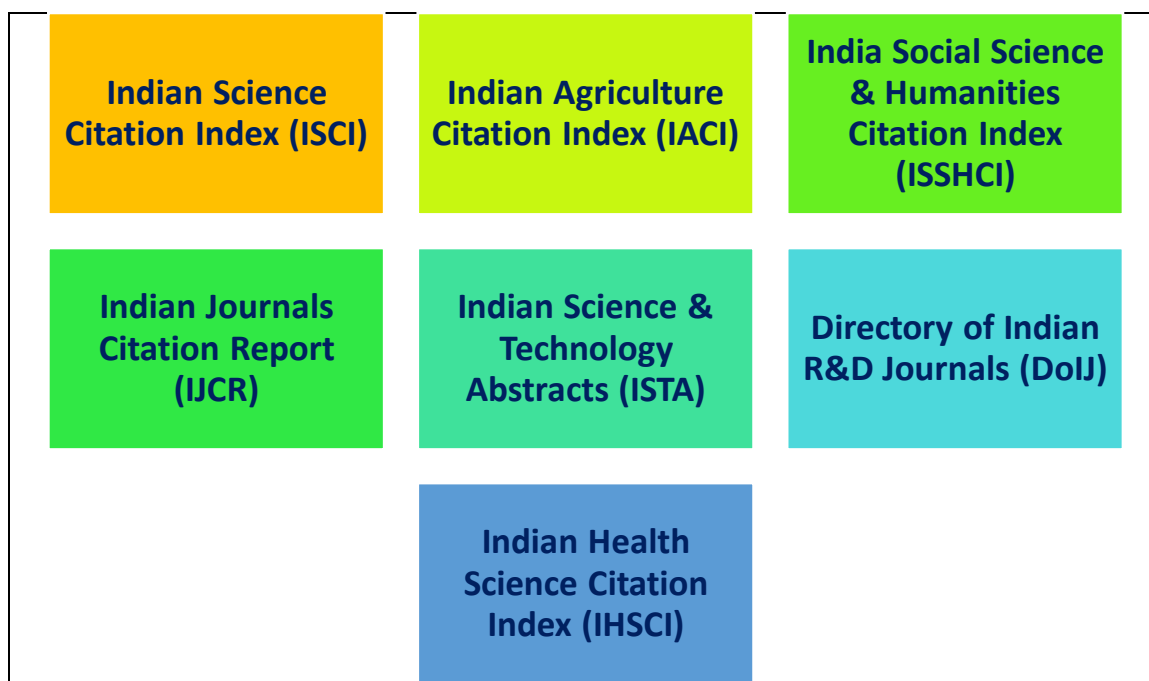
Total = 8423 Journal  
 30.30 of the World Publications  
 24000 Peer Reviewed Journals (Sale, 2007)  
 Only 268 Indian Journals are indexed in WoS

- **Benefits of ICI**

- ✓ **A comprehensive research & evaluation tool for Indian literature**
- ✓ **Facilitates comprehensive sciento-metric and bibliometric studies on Indian literature**
- ✓ **Helps to measure & analyze individual, institutional, regional, and national R&D output for strategic planning**

- ✓ **An authentic tool to generate complete and comprehensive analytic reports on the health of Indian R&D**
- ✓ **ICI can generate national R&D indicators like, Indian Journals Citation Reports, etc.**
- ✓ **Catalyze the image & visibility of Indian knowledge contents and publications**
- ✓ **Helps decision makers to arrive at some conclusive point to decide the superiority of competitor (s), for some awards, fellowships, recruitments etc.**
- ✓ **Provides a boost to Indian publishing industry at global level**

- **Products of ICI**



## ➤ Impact Factor

- The impact factor is a measure of the frequency with which the average article in a journal has been cited in a particular year or period.
- JCR (Journal Citation Report) of Web of Search has been major tool for measuring the Impact factor of journals.
- The JCR provides quantitative tools for ranking, evaluating, categorizing, and comparing journals (Thomson Reuters, 2011).
- JCR impact factor is a ratio between citations and recent citable items published.
- Thus, the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years

### Calculation for journal impact factor

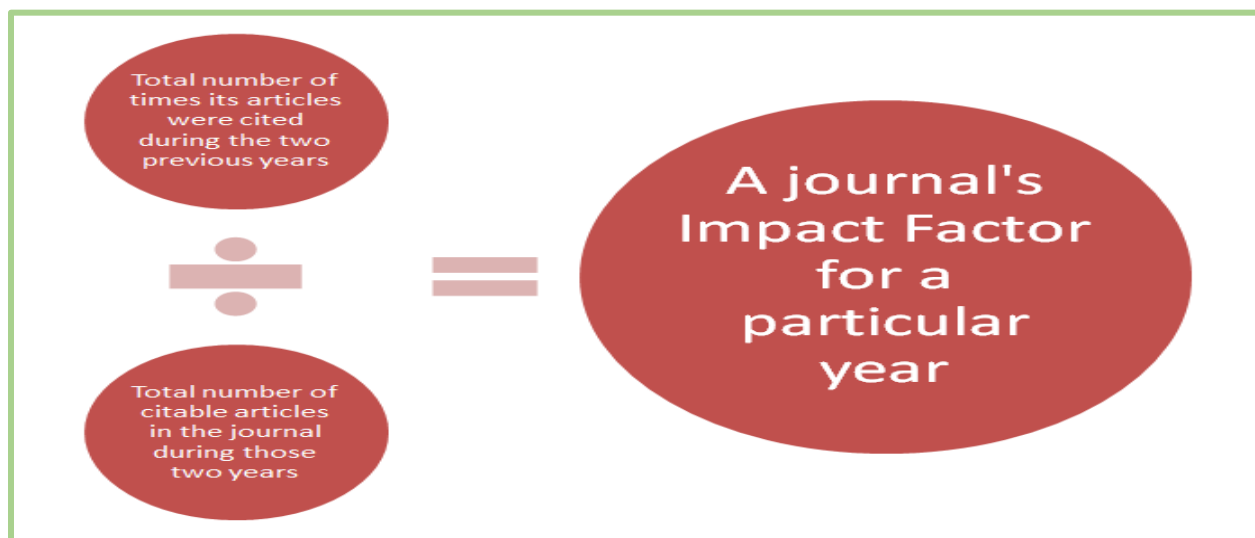
A= 2010 cites to articles published in 2008 and 2009

B= Number of articles published in 2008 and 2009

C=  $A/B$  = 2010 Impact factor

	A	B	C
	Cites in 2010 to 2008-2009 articles	Number of articles Published in 2008 and 2009	Impact Factor (A/B)
Journal of Library and Information Science	150	80	1.875





Title	Impact Factor 2019	Impact Factor 2018
Advanced Materials	27.398	25.809
Advanced Energy Materials	25.245	24.884
Advanced Functional Materials	16.836	15.621
Small Methods	12.130	-
Small	11.459	10.856
ChemCatChem	4.853	4.495
ChemElectroChem	4.154	3.975
ChemPhysChem	3.144	3.077
Particle & Particle Systems Characterization	3.099	4.194
ChemPhotoChem	2.838	-
Electroanalysis	2.544	2.691
Magnetic Resonance in Chemistry	2.035	1.731
Fuel Cells	1.876	2.330
International Journal of Quantum Chemistry	1.747	2.263
Surface and Interface Analysis	1.665	1.319
Journal of Surfactants and Detergents	1.654	1.672
Journal of Physical Organic Chemistry	1.536	1.530
International Journal of Chemical Kinetics	1.531	1.417
Concepts In Magnetic Resonance Part B - Magnetic Resonance Engineering	0.690	0.941

## ➤ H-Index

- The h index was proposed by **J.E. Hirsch** in 2005 and published in the Proceedings of the National Academy of Sciences of the United States of America.
- **The h index is a quantitative metric based on analysis of publication data using publications and citations to provide “an estimate of the importance, significance, and broad impact of a scientist’s cumulative research contributions.”**
- According to Hirsch, the h index is defined as: **“A scientist has index h if h of his or her  $N_p$  papers have at least h citations each and the other  $(N_p - h)$  papers have  $\leq h$  citations each.”**
- **As an example, an h index of 10 means that among all publications by one author, 10 of these publications have received at least 10 citations each.**
- **Strengths of the h index**
  - ✓ The h index is a metric for evaluating the cumulative impact of an author’s scholarly output and performance; measures quantity with quality by comparing publications to citations.
  - ✓ The h index corrects for the disproportionate weight of highly cited publications or publications that have not yet been cited.
  - ✓ Several resources automatically calculate the h index as part of citation reports for authors.

- **h index of 20 after 20 years of scientific activity, characterizes a successful scientist**
- **h index of 40 after 20 years of scientific activity, characterizes outstanding scientists, likely to be found only at the top universities or major research laboratories.**
- **h index of 60 after 20 years, or 90 after 30 years, characterizes truly unique individuals.**
- **h index of 15-20, fellowship in the National Physical Society.**
- **h index of 45 or higher, membership in the National Academy of Sciences.**

### ❖ **E-Consortium**

- Consortium is cooperative arrangement of groups with a policy of sharing resources among members.” It is a strategic alliance of institutions having common interest.
- According to the Oxford English Dictionary, ‘Consortia’ means a **“temporary cooperation of a number of powers, companies, etc., for a common purpose.** It is an association of similar types of organizations/ institutions who are engaged for producing and servicing common things for providing services for a specific purpose of its users.

#### → **Salient features of Library Consortia .**

- To eliminate problems faced by libraries to provide various services to users;
- To meet the thrust of information of people due to rapid growth of population all over the world;
- To cope up with newly generated knowledge published in different forms, such as printed and non-printed documents, electronics media on various disciplines, multi-disciplinary and new generated subject areas;

- To collect all documents published at the national and international level, because of the library financial crunch; and
- To overcome language barriers.

→ **Purpose**

- **Library Perspectives:** The general perception among libraries is that a consortium should enable libraries to purchase and provide access to more resources than they currently have, with lesser spending than what they currently spend and gain net savings in current spending.
- **Publisher Perspectives:** Publishers look at consortia as an instant mass-market opportunity to expand their market base in many times both in terms of client base and revenues.
- **True Perspectives:** Consortia models are still in an evolving phase, constantly affected by technological changes. Hence, consortia development requires an open dialogue between the two parties- libraries and publishers/vendors, in a spirit of partnership to help their common beneficiary, the end user, whose needs and usage alone can justify the sustenance of whatever new consortia models that publishers can offer and libraries can adopt.

<b>Allowed in E- Consortium</b>	<b>Not Allowed in E- Consortium</b>
<ul style="list-style-type: none"> <li>• Viewing, downloading, copying, printing and saving a copy of search results</li> <li>• Viewing, downloading, copying, printing and saving individual articles</li> <li>• Using e-resources for scholarly, educational or scientific research, teaching, private study and clinical purposes</li> <li>• Sending a copy of an article to another authorized user (i.e. current faculty, students or staff)</li> <li>• Posting the URL to the publisher's version of the article on a class website (publisher links will allow only authorized users access)</li> </ul>	<ul style="list-style-type: none"> <li>• Use of robots or intelligent agents to do systematic, bulk or automatic downloading</li> <li>• Systematic downloading or printing of entire journal issues or volumes, or large portions of other e-resources</li> <li>• Using e-resources for commercial gain (i.e. reselling, redistributing or republishing of content)</li> <li>• Transmitting, disseminating or otherwise making online content available to unauthorized users</li> <li>• Posting the publisher's version or PDF of an article to an open class website is not permitted</li> </ul>

## ● **Full-text Resources**

- **ABI / INFORM Complete**
- **ACM Digital Library**
- **ASCE Journals**
- **ASME Journals**
- **ASTM Journals & Standards**
- **Capitaline**
- **CRIS INFAC Ind. Information**
- **EBSCO's Business Source Premier**
- **Emerald Insight**
- **Euromonitor (GMID)**
- **IEL Online**
- **Indian Standards.**
- **INSIGHT**
- **Nature**
- **Proquest Science**
- **Science Direct**
- **Springer's Link**

## ❖ **UGC INFONET**

- It is an ambitious project launched by UGC in collaboration with INFLIBNET which facilitates access to large number of E-journals to academic community in India.
- There are two aspects, one deals with the network connectivity to universities, which is known as UGC- INFONET and other addresses the issues, related to E-journals. UGC has formed various committees to address these issues.
- The objective behind the consortium is to facilitate access a large number of electronic resources to the academic community of the country. Both the projects are being executed and implemented by INFLIBNET in collaboration with UGC

and ERNET India. In order to provide access to E- resources, UGC has spent huge sum of amount in terms of both recurring and Non-recurring grants.

- This is the largest consortium with a vision and plans to reach out more than 150 + universities and several thousand colleges affiliated to these universities, over a period of time.
- The consortium can take credit for investing significant time for making considerable evaluation of resources for selection and obtaining the various pricing terms and models from the vendors.
- The consortium is a trend-setter in thoughtfully adopted e-only model without any links to the current print holdings by its member universities.
- It is subscribing to large number of electronic journals which includes full text and Indexing and abstracting databases for the benefit of millions of users in India. It offers high quality collection of 4600+ full text electronic resources from 25 different publishers to academic community, comprising of faculty, staff, researchers and students.

### ❖ **Internet discussion groups and communities**

- A discussion group is a group of individuals, typically who share a similar interest, who gather either formally or informally to discuss ideas, solve problems, or make comments. Common methods of conversing including meeting in person, conducting conference calls, using text messaging, or using a website such as an Internet forum.
- People respond, add comments, and make posts on such forums, as well as on established mailing lists, in news groups
- Other group members could choose to respond by posting text or image.



- There are many types of discussion group and communities are available like Blogs, preprint servers, Search engines, Scirus, Google Scholar, ChemIndustry, Wiki-Databases, ChemSpider, Science Direct, SciFinder, Scopus.
- **Blog:** It is a discussion or informational website published on the World Wide Web consisting of discrete, often informal diary-style text entries (posts).
- Posts are typically displayed in reverse chronological order, so that the most recent post appears first, at the top of the web page.
- Until 2009, blogs were usually the work of a single individual, occasionally of a small group, and often covered a single subject or topic. In the 2010s, "multi-author blogs" (MABs) emerged, featuring the writing of multiple authors and sometimes professionally edited.
- Different types of Blogs are available in online platform like personal Blog, Corporate Blog, Personal service Blog, Affiliate Blog, Artists Blog, etc..
- **Scirus:** Scirus was a comprehensive science-specific search engine, first launched in 2001. like CiteSeerX and Google Scholar,
- It was focused on scientific information. Unlike CiteSeerX, Scirus was not only for computer sciences and IT and not all of the results included full text.
- It also sent its scientific search results to Scopus, an abstract and citation database covering scientific research output globally.
- Scirus was owned and operated by Elsevier. In 2013 an announcement appeared, on the Scirus homepage, announcing the site's retirement in 2014:
- **Google Scholar:** Google Scholar is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines. Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: articles, theses, books, abstracts and court

opinions, from academic publishers, professional societies, online repositories, universities and other web sites. Google Scholar helps you find relevant work across the world of scholarly research.

### → Features of Google Scholar

- Search all scholarly literature from one convenient place
- Explore related works, citations, authors, and publications
- Locate the complete document through your library or on the web
- Keep up with recent developments in any area of research
- Check who's citing your publications, create a public author profile

❖ **Wiki –Data base** : A **database** is an organized collection of data, generally stored and accessed electronically from a computer system. Where databases are more complex they are often developed using formal design and modeling techniques.

→ Formally, a "database" refers to a set of related data and the way it is organized. Access to this data is usually provided by a "database management system" (DBMS) consisting of an integrated set of computer software that allows users to interact with one or more databases and provides access to all of the data contained in the database (although restrictions may exist that limit access to particular data).

→ The DBMS provides various functions that allow entry, storage and retrieval of large quantities of information and provides ways to manage how that information is organized.

→ Existing DBMSs provide various functions that allow management of a database and its data which can be classified into four main functional groups:

- **Data definition** – Creation, modification and removal of definitions that define the organization of the data.
- **Update** – Insertion, modification, and deletion of the actual data.
- **Retrieval** – Providing information in a form directly usable or for further processing by other applications. The retrieved data may be made available in

a form basically the same as it is stored in the database or in a new form obtained by altering or combining existing data from the database.

- **Administration** – Registering and monitoring users, enforcing data security, monitoring performance, maintaining data integrity, dealing with concurrency control, and recovering information that has been corrupted by some event such as an unexpected system failure.

❖ **ChemSpider** : It is a free chemical structure database providing fast text and structure search access to over 67 million structures from hundreds of data sources.

→ ChemSpider is a service of the Royal Society of Chemistry. It is a database of data about chemicals. It generates a unique identifier for each molecule, and these are used in Wikidata and in Wikipedia's {{Chembox}} template.

→ ChemSpider is a free, online chemical database offering access to physical and chemical properties, molecular structure, spectral data, synthetic methods, safety information, and nomenclature for almost 25 million unique chemical compounds sourced and linked to almost 400 separate data sources on the Web. ChemSpider is quickly becoming the primary chemistry Internet portal and it can be very useful for both chemical teaching and research.

→ ChemSpider is not just a search engine layered on terabytes of chemistry data; it is also a crowdsourcing community for chemists who contribute their data, skills, and knowledge to the enhancement and curation of the database. ChemSpider, therefore, resembles Wikipedia by encouraging participation and contributions from the community.

→ Link: <http://www.chemspider.com/>

→ **Search by chemical names**

- Systematic names
- Synonyms
- Trade names
- Database identifiers

→ **Search by chemical structure**

- Create structure-based queries
- Draw structures in the web page
- Use structure files from your computer

❖ **Science Direct:** It is a website which provides subscription-based access to a large database of scientific and medical research. It hosts over 12 million pieces of content from 3,500 academic journals and 34,000 e-books.

→ Link : <https://www.sciencedirect.com/>

→ From foundational science to new and novel research, discover our large collection of Physical Sciences and Engineering publications, covering a range of disciplines, from the theoretical to the applied.

→ The journals are grouped into four main sections: Physical Sciences and Engineering, Life Sciences, Health Sciences, and Social Sciences and Humanities. Article abstracts are freely available, but access to their full texts (in PDF and, for newer publications, also HTML) generally requires a subscription or pay-per-view purchase.

❖ **Scopus:** Scopus is Elsevier's abstract and citation database launched in 2004. Scopus covers nearly 36,377 titles from approximately 11,678 publishers, of which 34,346 are peer-reviewed journals in top-level subject fields: life sciences, social sciences, physical sciences and health sciences.

→ Link : <https://www.scopus.com/home.uri>

→ It covers three types of sources: book series, journals, and trade journals. All journals covered in the Scopus database, regardless of who they are published under, are reviewed each year to ensure high quality standards are maintained. Searches in Scopus also incorporate searches of patent databases.

→ Scopus also offers author profiles which cover affiliations, number of publications and their bibliographic data, references, and details on the number

of citations each published document has received. It has alerting features that allows registered users to track changes to a profile and a facility to calculate authors' h-index. In 2016, a free website, Scopus Cite Score, was introduced. It provides citation data for all 25,000+ active titles such as journals, conference proceedings and books in Scopus and provides an alternative to the impact factor.

❖ **SciFinder** : It is produced by Chemical Abstracts Service (CAS), is the most comprehensive database for the chemical literature, searchable by topic, author, substances by name or CAS Registry Number, OR use the editor to draw chemical structures, substructures, or reactions.

→ **Link:** <https://sso.cas.org>

→ It's a core research tool for chemistry, biochemistry, chemical engineering, materials science, nanotechnology, physics, environmental science and other science and engineering disciplines. Depending on your research, SciFinder is complementary to other databases

#### ❖ **Information technology and Library Resources**

→ The application of information technology in library and Information centers has developed in the western countries since the 1940's.

→ In the 1960's the use of information technology has been started in the developing countries and that too is in different stages.

→ The rapid development of Information and communication technology has made a special impact on the method of information acquisition, Processing, Storing & dissemination of information.

→ The invention of the Internet has brought a major change in the scenario of library and information services. Due to this impact of information technology, it has created challenges and opportunities for the information professional around the world.

**→ Advantages:**

- Collaboration & creation of Library network
- Avoids time-consuming effort done by the librarian
- Increases the range of services offered
- Less time consuming
- Efficiency can be increased
- Easy & speedy access to information
- Improves the quality of library service
- Increases in the knowledge & experience
- Integration within the organization
- Improvement in the status of libraries
- Improvement in the communication facilities
- Remote access by users
- 24x 7 service can be offered
- Access to unlimited information from different sources
- More up to date information
- The flexibility of Information to the users
- Workload reduce of library staff
- Combining data from different sources

**THE END**