



Chemical Information Basics A Very Brief Overview

Do you think that all you need to do research is Google and Wikipedia? Think again. All academic disciplines have a formal literature and special tools for finding relevant information within that discipline. Chemistry has one of the largest and most complex literatures of all, and chemists spend a lifetime learning to navigate it. The earlier you begin to get a sense of the landscape, the sooner you can begin avoiding costly mistakes and ill-advised shortcuts, and the sooner you'll gain confidence in doing real research.

The Chemistry Library serves as a starting point for doing research. Its web pages provide links to and descriptions of many important tools and resources.

- <http://www.lib.utexas.edu/chem/> Home page, with links to the most important tools.
- <http://www.lib.utexas.edu/chem/info/> -- Here you'll find pathfinders for printed reference sources in specific fields of chemistry.
- <http://www.lib.utexas.edu/chem/internet.html> -- links to all kinds of useful chemical information resources on the Web.

These are the major components of the chemical literature that you're likely to encounter as a student.

Encyclopedias

Encyclopedias are good places to start learning about an unfamiliar topic. Examples from the Chemistry Library's reference section:

- *Kirk-Othmer encyclopedia of chemical technology*. TP 9 K54 2004 and on the Web.
- *Encyclopedia of inorganic chemistry*. QD 148 E53 2005
- *Ullmann's encyclopedia of industrial chemistry*. TP 9 U57 2003
- *Encyclopedia of physical sciences and technology*. Q 123 E497 2002

Avoid relying on free web encyclopedias like Wikipedia: they may be inaccurate. Do not cite them in any formal paper.

Books

Books in the sciences, also known as monographs, are part of the secondary literature because they do not report new research results. They are typically written at a fairly advanced level. Many are collections of chapters by different authors. If you're looking for an in-depth introduction to a subject, books are the best place to start.

- **Formats:** Most books are print only, but some electronic books are also available.
- **Where to find them:** Search the **Library Catalog** (<http://catalog.lib.utexas.edu/>) by keyword, author, title, etc. Note the **call number** (example: QD 151.2 C68 1999) then retrieve it from the shelf in the location indicated. If a book is checked out, you can request it for yourself.
- **Checking them out:** Bring the book and your UT ID card to the circulation desk.

Textbooks

Textbooks are intended for students and are easier to comprehend than advanced monographs.

- **Where to find them:** For textbooks currently used in chemistry courses, just ask at the Reserves Desk in the Chemistry Library. It helps if you know the author and title. Older editions of textbooks are often available for longer checkout in the library's book stacks. Search for them in the Library Catalog, or browse the shelves by call number:
 - QD 31-33: General/inorganic chemistry
 - QD 151: Inorganic chemistry
 - QD 251-261: Organic chemistry
 - QD 453: Physical chemistry

Journals

Journals are the core of the **primary literature** of all the physical and natural sciences. This is where new research is first reported. Journals are usually **peer-reviewed**, meaning that articles are reviewed by other researchers for accuracy and relevance before being accepted for publication. Many thousands of journals are currently published across the sciences around the world. Around 80% of articles are now written in English regardless of country of origin.

- **Formats:** Historically printed, but increasingly electronic. Most current journals routinely consulted by scientists are now in electronic format and available on the Web via institutional (library) subscription. Publishers are digitizing older years, but many journals prior to the mid-1990s still exist only in print and must be consulted and photocopied in the library.
- **Where to find them:**
 - Print journals: search the Library Catalog by journal title (not abbreviations, not article titles). Journals in the Chemistry Library are shelved alphabetically by title.
 - Electronic journals: search the Find a Journal database (<http://www.lib.utexas.edu/journals/>). Remember to look for a print version if you do not find an electronic version of what you need!

Articles

Articles form the content of journals. They come in all shapes and sizes:

- Full articles – peer reviewed results of research completed.
- Letters – peer reviewed brief communications of research in progress.
- Reviews – summary and synthesis of recent research on a specific topic; do not contain new research.
- News and editorials – front matter in journals and magazines (not peer reviewed)
- Abstracts – brief (one paragraph) summaries of an article or conference paper. They appear at the beginning of most articles and are also compiled into large databases for searching and browsing the literature, such as Chemical Abstracts.

How to find articles:

Use an appropriate index database. (It's better NOT to use Google.) For undergraduate chemistry students, the best place to start is **Chemical Abstracts Student Edition** (link from Chemistry Library home page). CA-SE is a subset of the full Chemical Abstracts database, covering about 300 core journals back to 1967. Almost all of these journals are available at UT-Austin, most electronically. You can search by keyword, author, CAS Registry Number of specific compounds, etc. Articles cover extremely narrow topics, and you can't do the same kind of broad searches (e.g. "NMR spectroscopy") like you would for books. Records contain an abstract, which can tell you if the article is worth retrieving for your needs. There is also a button to locate full text of the article on the Web, if available:



Look for this button in many different indexes available to you.

If you're ambitious, you can search the entire Chemical Abstracts (CA) database via **SciFinder Scholar** (information at <http://www.lib.utexas.edu/chem/sfs1.html>). SciFinder is not a Web-based tool and requires special client software on your computer, or you can use it in one of the libraries. Chemical Abstracts began in 1907 and contains nearly 30 million records for documents in chemistry and many related disciplines, in over 50 languages. In addition to journal articles, you'll find worldwide patents, conference papers, technical reports, and more. CA's comprehensiveness can be intimidating for the novice, and much of the literature abstracted is not immediately available to you. SciFinder also links to available full text of journal articles and patents.

Many other indexes across all subjects are listed at <http://www.lib.utexas.edu/indexes/>.

If you're new to searching articles, you can consult a basic tutorial called "Finding Articles 101" on the Chemistry Library's web site.

<http://www.lib.utexas.edu/chem/tutorials/articles/>

There is more to the chemical literature than just journals and books, however. Chemistry offers a wealth of special tools and databases that can provide specific, reliable information needed in the laboratory without your having to search the literature for it.

Chemical Properties and Data

Chemists frequently need ready data on chemical substances' names, structures, and properties. This data can sometimes be hard to find, and there is a bewildering variety of tools to consult. It is important to use authoritative sources of data and not rely on unattributable web sites. A few of the most important online tools are:

- *CRC Handbook of Chemistry and Physics* – This should be your first stop for any chemical data need. Also available in print in the Chemistry Library.
- *NIST Chemistry WebBook* – Reliable source of thermochemical, kinetic, and spectral properties of thousands of important compounds.
- *Combined Chemical Dictionary* – Structures, names, properties, and brief bibliographies for over 500,000 compounds including organic, inorganic and organometallic.

Links to these and others are found on the Chemistry Library's home page and on relevant subsidiary pages.

Chemical Spectra

Comparing spectra of unknowns to known reference spectra is done both with digital spectral libraries associated with instruments and with spectral reference sources in the library. Most of the latter exist only in printed format and they're located in the Spectra Section in the Chemistry Library. A large number of them is listed on the Spectra and Spectral Data pathfinder:

<http://www.lib.utexas.edu/chem/info/spectra.html>

Safety and Hazard Information

Information on safe handling and disposal of chemicals in the lab is found in Materials Safety Data Sheets (MSDS) provided by chemical suppliers. A list of MSDS sites can be found here:

<http://www.utexas.edu/safety/ehs/msds/>

Citing Your Sources

It is critical that when writing for a class or for publication you cite your sources and give credit where credit is due. The *ACS Style Guide* (on reserve in the Chemistry Library) is the principal guide to writing and preparing papers for publication in the chemical sciences. It includes a chapter on citation formats for various types of publications.

When you're lost, ask for help!

No one is pretending that finding scientific information is easy. There are so many tools and sources that even experts get confused. Be sure to ask for assistance in the library when you get stuck.