

Chemical Information Skills

A student who intends to become a practicing chemist, or who will use chemistry in allied fields of science and medicine, should know how to use the chemical literature effectively and efficiently. Access to the chemical literature has traditionally used print resources extensively; these days however instruction in chemical information skills is likely to rely heavily on on-line resources and access and instruction in those resources is critical to the training of any chemist.

There are a variety of specific skills of importance in the successful use of the chemical literature. For example, students should be able to

- Efficiently locate chemical and physical properties of substances, including spectra.
- Efficiently locate references for the detection, characterization, or reactions, including syntheses, of desired compounds or classes of compounds.
- Be able to obtain information on a substance through a variety of searching strategies, including structure searching, and searching by molecular formula and name.
- Identify key references and use citation searching of articles to locate more current articles on the topic of interest.
- Complete a comprehensive subject search.
- Compile a complete bibliography of an author's publications.
- Locate recent review articles on a subject.
- Know the importance of patents and be able to search for patents on a subject.
- Use a bibliographic program to organize information and prepare a scientific paper.

Instruction should also be provided in data management and archiving, record keeping (electronic and otherwise), and managing citations and related information. This includes notebooks, data storage, and information management and formatting.

Assessment of the quality of information obtained and the ability of the student to obtain and use that information.

Students need to develop the ability to determine the quality of the information obtained. Students should especially learn how to evaluate the validity of on-line sources. Their instruction should include familiarity with the primary literature as well as experience with secondary sources and databases. Students must have proficiency with technical databases and other resources that enable development of skills in searching the literature, including structure-based searching.

Faculty should consider their role in the assessment of these skills. As described below, these skills can be developed through coursework, instructional laboratories and participation in a research project. Chemical information skills should be developed throughout the curriculum, with consideration given to the assessment of student proficiency.

Methods for developing chemical information skills

The incorporation of exercises that require students to develop familiarity with the chemical literature should be integrated throughout the chemistry curriculum in both class and laboratory activities. Students may be required to

obtain literature data such as melting points or spectra for compounds synthesized in the organic chemistry lab. In an in-depth course, students might be expected to write a paper on a particular technique or chemical process. Faculty should consider the development of chemical information skills as an on-going process, beginning with finding specific information and maturing to an ability to critically assess the quality and utility of information. The preparation of a written report at the culmination of a research project is a superb way for students to demonstrate a mastery of chemical information skills. A research report should demonstrate that the student obtained appropriate primary literature through effective searching and read, understood, and incorporated that primary literature into the project. A separate supplement (available on the CPT website) provides guidelines for preparing a research report.

References and resources:

1. More detailed information on the development of chemical information literacy can be found at the Division of Chemical Information of the American Chemical Society, <http://www.acscinf.org/>
2. ACS Style guide: Effective Communication of Scientific Information. Anne M. Coghill and Lorrin R. Garson, Eds. American Chemical Society, Washington, D.C, 3rd ed. 2006
3. Chemical Information Sources. http://en.wikibooks.org/wiki/Chemical_Information_Sources
4. The Journal of Chemical Education has a number of articles which describe chemical information resources as well as specific exercises and course descriptions for curricula focused on chemical information retrieval.

Some examples:

- Ridley, D. D. J. Chem. Educ., 2001, 78, 559.
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