

## Where do I go for help with teaching chemistry? Finding what you need at ACS

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### **Abstract**

What is the American Chemical Society (ACS) doing for chemical education and is it doing the right things? These are important questions that we hope you will join us in discussing. Education features prominently in the charter of the American Chemical Society. The objects of incorporation emphasize “the improvement of the qualifications and usefulness of chemists through high standards of professional ethics, education, and attainments” and promote “scientific interests and inquiry, thereby fostering public welfare and education...” The education products and services of the ACS Division of Chemical Education (DivCHED) and Education Division foster “public welfare and education” by focusing on high-quality chemical education for members and non-members alike. Extensive programming by DivCHED at ACS national and regional meetings and at the Biennial Conference on Chemical Education facilitates the exchange of the latest information on the teaching and learning of chemistry. Innovative textbooks integrate new content and pedagogy. The activities of the Student Affiliates Program, Project SEED, the Chemistry Olympiad, Kids & Chemistry, and High School Chemistry Clubs engage young people in a myriad of opportunities for professional and personal growth, and the Journal of Chemical Education and the Examinations Institute provide important resources for instructors. This paper will highlight the extensive resources offered by ACS to enhance chemical education and will describe how an instructor can navigate these different options to get needed help or information.

Teaching chemistry is not the easiest task and through the American Chemical Society a variety of resources are available to support the teaching of chemistry at all levels. Unfortunately, many instructors are not aware of these resources. Therefore, in this paper, we invite you to explore these various options and join us in a discussion of them.

The American Chemical Society, through its [Division of Chemical Education](#) and its [Education Division](#), offers extensive resources designed to enhance chemical education. Understandably, the similar nomenclature between the Division of

Chemical Education and the Education Division causes confusion. In an attempt to try to clear up this confusion, the following distinction is offered:

- The Education Division is the staff operating unit within ACS that has primary responsibility for education initiatives. The Division provides programs, products, and services from kindergarten through graduate school, from *Apples, Bubbles, and Crystals* to Preparing for Life After Graduate School. The offerings of the Education Division are summarized in the *Science Teaching Resources Catalog 2006-07*, as well as online through the Division's Web site and the [ACS online store](#).
- The Division of Chemical Education is one of 33 technical divisions of the American Chemical Society (ACS). It is a volunteer organization of ACS members; its major activities are programming at national meetings and the *Biennial Conference on Chemical Education*, the [Journal of Chemical Education](#), and the [ACS Exams Institute](#).

In this paper these two organizations and their missions will be distinguished.

## 1. THE ACS EDUCATION DIVISION

The activities of the Education Division are overseen by two governance bodies, the [Society Committee on Education](#) (SOCED) and the [Committee on Professional Training](#) (CPT). The Office of Professional Training (OPT) within the Education Division provides support to the work of CPT, whose major responsibility is guiding and administering the ACS approval process for baccalaureate programs. OPT also produces the [Directory of Graduate Research](#), an online, comprehensive source of information on chemical research and researchers in the U.S. and Canada.

The following sections highlight the major resources available to students, teachers, parents and grandparents through the Education Division. A complete list of all products, services, and programs may be found in the *Science Teaching Resources 2006-07* catalog.

### K-8

Online resources for children in grades K-8 are accessible at [chemistry.org/kids](http://chemistry.org/kids). The Education Division also produces two books for young children, *Apples, Bubbles, and*

*Crystals and Sunlight, Skyscrapers, and Soda Pop.* Members find these colorful books useful when introducing their children and grandchildren to science.

The focus at the upper elementary and middle school level is on teacher preparation, enabling teachers to be more effective in the classroom. [Chemistry through Inquiry](#), offered through the Jason Academy, is a five-week online course that emphasizes chemistry-based physical science topics. Inquiry Matters is an onsite workshop targeted toward 3<sup>rd</sup> to 8<sup>th</sup> grade teachers. Both the course and workshop utilize the book [Inquiry in Action](#), which is based on the National Science Education Standards.

[Kids & Chemistry](#) workshops train volunteers to conduct hands-on activities with students in grades 4-6 and are offered at ACS National Meetings, as well as a number of local venues. The *Kids & Chemistry Activity Resource Manual* provides detailed instructions on these hands-on experiments.

## High School

Students are first introduced to chemistry as a stand-alone science in high school, and ACS provides a variety of opportunities to enhance this all-important experience. A new initiative at the high school level is the Chem Clubs Program, which launched during the 2005-2006 academic year. Thirty-five high schools participated during the inaugural year, with additional schools being added during the current academic year.

Long-standing activities at the high-school level include [ChemMatters](#), the quarterly magazine that has been demystifying everyday chemistry since 1983. [Chemistry in the Community \(ChemCom\)](#), now in its fifth edition, has served as the high school text for over two million students in the United States. More than 8,000 students have participated in [Project SEED](#) over the past 38 years. This program provides summer research opportunities for students from economically disadvantaged backgrounds. And the [Chemistry Olympiad](#) engages the top U.S. chemistry students in international competition each summer. The U.S. team earned three silver and one bronze medal at the 2006 International Chemistry Olympiad.

## Undergraduate

The majority of activities in the Education Division are focused on undergraduate education. Many students and faculty members are familiar with the [Student Affiliates](#) program, which engages approximately 10,000 students in developing the skills needed to succeed as a professional chemist; raising awareness of and appreciation for chemistry on their campuses and within their local communities; and organizing community service projects. Students learn of research, internship, and study abroad opportunities through the [Experiential Programs in Chemistry \(EPiC\)](#) program.

A total of 639 colleges and universities offer ACS-approved baccalaureate programs. Schools engage in a rigorous evaluation process, conducted by the Committee on Professional Training, in order to receive and retain approval. CPT is currently [revising the existing guidelines](#) to encourage innovation, simplify the guidelines and procedures, allow flexibility in degree tracks, and continue to support excellent chemistry programs through faculty and infrastructure requirements.

A separate approval process for chemical technology programs is administered by the [Chemical Technology Program Approval Service](#). [Technician education](#) at ACS has received significant support from the National Science Foundation and the U.S. Department of Education, resulting in the development of a set of skill standards.

Two ACS textbooks meet the needs of undergraduate students. [Chemistry in Context](#), designed for non-science majors, presents chemistry on a need-to-know basis in the context of environmental, social, and ethical issues. [Chemistry](#) is designed for a two-semester general chemistry course, engaging students in an activity-centered approach to the study of chemistry.

## **Graduate Education**

The [Office of Graduate Education](#) was established five years ago to better meet the needs of graduate students in chemistry. Several new initiatives have come out of this office, including the Academic Employment Initiative, which offers a venue at ACS National Meetings for graduate students and post-docs seeking academic positions to informally meet with academic recruiters. The Preparing for Life After Graduate School workshop is presented on university campuses to graduate students who are beginning to consider career options. The workshop focuses on industrial careers, presenting modules on interviewing, resume writing, and intellectual property, among others.

## **2. THE ACS DIVISION OF CHEMICAL EDUCATION**

The organization and mission of the award-winning Division of Chemical Education (DivCHED) was admirably defined in [The View from the CHED Chair](#), a paper presented by Morton Hoffman in the 2005 conference series. With 5423 members as of September, 2006, DivCHED is one of the largest of the 33 ACS member divisions. As a member organization, the division is run primarily by volunteers. Although DivCHED does maintain a division office with a part-time secretary and provides some funds for the production of the newsletter and partial travel funds for officers to attend meetings, most individuals receive no compensation for their work. They contribute their time for the improvement of chemical education nationally.

It is important to realize that an ACS division is people. Its nature and character are a function of those who join and become active in the division. In DivCHED we have been blessed with a wealth of dedicated individuals. As a result, a number of resources have been generated for the enhancement of chemical education. Some DivCHED resources are intended for all levels of education, primarily *The Journal of Chemical Education*, the Biennial Conference on Chemical Education, the ConfChem conferences, and an outreach program.

**The [Journal of Chemical Education](#) (JCE)**, edited by John Moore, is more than a print journal. On its website you will also find a comprehensive set of resources for teaching. Some are available for purchase through the [JCE Online Store](#): books, videos, software, and a scoring system for the online question bank. Others are available to chemical educators at no cost:

- The [JCE Digital Library](#) , which is part of the National Science Digital Library, contains a wide variety of useful online resources, including question banks, demonstrations, featured molecules, living textbooks, and other resources.
- [JCE Discussion Forums](#) allow chemical educators to share ideas and build collaborations with others having similar interests.
- The [Chemical Education Resource Shelf](#), managed by Hal Harris, provides up-to-date information on current books, software, and modeling kits, with links to publisher websites.

**The [ACS Examinations Institute](#)** produces and distributes examinations at all levels of chemistry from high school through graduate levels. See Tom Holme's paper in this conference for more details and an update on Exams Institute activities.

**The [Biennial Conferences on Chemical Education](#) (BCCE)**, described in 2005 by George Kriz, bring together 1000-2000 chemical educators every even-numbered year for a week-long series of sessions, workshops, demonstrations, and social events. The BCCE is one of the largest conferences on chemical education in the world, with as many as 17 concurrent sessions.

The [DivCHED Outreach Office](#) can provide chemical educators with materials for a wide variety of events focusing on chemical education, whether it be a workshop, outreach program, short course, regional meeting, award night, teacher conference, or seminar. The Outreach Office will send you sample journal issues, classroom activities, and many other useful materials.

DivCHED also offers a variety of specific resources for different levels of instruction:

**Graduate education.** DivCHED is the home for the Graduate Student Symposium Planning Committee (GSSPC). This group has a constantly changing membership consisting of graduate students who plan symposia for ACS National Meetings. According to the GSSPC, their goal is to promote ongoing and active participation of graduate students in American Chemical Society (ACS) National Meeting programming, promote ACS graduate student membership, promote networking between current graduate students and ACS governing bodies, and enhance the education of graduate students in areas outside of our individual areas of scientific research. The DivCHED Program Committee has been working with the ACS Education Division Office of Graduate Education to make sure that the programming runs smoothly and well. A new task force headed by Wayne Jones, Binghamton University, will be overseeing the structuring of this effort.

**Undergraduate education.** Much of the programming at national and regional meetings and at the Biennial Conference on Chemical Education (BCCE) focuses on the undergraduate level. The [ACS Examinations Institute](#) exams are frequently used as placement exams, final exams, and qualifying exams for graduate programs in chemistry. The [College Chemistry Consultant Service](#), C3S, provides important consulting services to college-level chemistry departments. The consultants provide helpful information on issues such as ACS accreditation, the design of safe laboratories, and writing proposals for external funding.

**High School teachers.** The Chemistry Teacher Connection offers high school teachers affiliate membership in the Division of Chemical Education along with a subscription to [HS-Clic](#), the online version of the Journal of Chemical Education that is specially tailored to the needs and interests of high school teachers. Please also see Claire Baker's paper in this conference for a discussion of the role the Division can play in the lives of high school chemistry teachers. The Division also sponsors the [Teaching Excellence Endowment](#), which will provide a monetary award to an exemplary science teacher in each of the ACS regions beginning in 2007. The awards will be presented at the ACS Regional Meetings.

**K-8.** DivCHED offers some programming for elementary teachers, but not very much and not consistently. We believe that chemistry in elementary and middle school needs attention, but are not sure what most needs to be done. Is there something we need to be doing? Let us know your thoughts.

**Professional status of chemical educators.** As a member organization, the division can act as an advocate for chemical educators. For example, a task force led by Barbara Sawrey, University of California at San Diego, organized and presented a symposium on Hiring and Promotion in Chemical Education at the San Francisco ACS meeting in September, 2006. They are currently examining the status of chemical education professionals in chemistry departments and are preparing a set of hiring and promotion guidelines. We would like your thoughts about what should be included in these guidelines.

**We invite you to join.** If you are not a member of DivCHED, you may be interested to learn that anyone can join. You do not need to be a member of ACS or live in the United States and you do not need to be a chemist. You need only to care about the teaching and learning of chemistry. You can join by clicking on the Membership button on the DivCHED web page: <http://www.divched.org/>. Affiliate members are Division members who are not members of the ACS. They have the same rights and privileges as regular members except that they serve as a Division councilor and cannot vote for councilors in Division elections.

**Who are we?** It is not simple to find out at what type of institution members work, as we have a work address for only about 60% of our members. Of those members, 11% list a high school, 28% a two- or four-year college, and 38% a university. Other members may be from industry, nonprofit institutions, or governmental research laboratories. Everyone is welcome and we find that a diversity of perspectives enriches all discussions.

**What are the benefits of joining The ACS Division of Chemical Education?** The tangible benefits may seem few, although they contain many opportunities for personal growth: you receive a copy of the division newsletter three times a year and you can participate on committees, organize symposia, write examinations, and run for office. However, the intangible benefits are phenomenal. DivCHED has over 5000 members and constitutes the largest organization in North America devoted solely to chemical education. Through Division activities, both those described above and many others, you have the opportunity to make a difference in how chemistry is taught and learned across the nation. You also become part of a wonderful community of people who care about the teaching and learning of chemistry and have a lot of fun working together to support these goals. We need your ideas and your willingness to help.

- If you are not a member: please think about becoming a Division member.
- If you are a member: we salute you and thank you for your efforts.
- If you are a member and want to become more involved: there is a form in the DivCHED newsletter on which you can indicate your interests. Please fill out the form and send it to us.

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**CONFCEM** on-line conferences are organized by the ACS Division of Chemical Education's Committee on Computers in Chemical Education ([CCCE](#)).

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