

# Sloan Career Cornerstone Center

## Chemistry Overview

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### The Field

Chemistry is the central science. It is the science about substances, their composition, structure, properties, and interactions. Chemistry helps explain the physical world and its workings, and plays an important role in our lives. Chemists have contributed a great deal to technical advances of society and have made many important contributions to modern life. Everything is made from one or more chemical elements that occur in nature. Chemists use different kinds of chemical processes to make the elements more useful, and they create countless products that make our lives healthier, easier, and more enjoyable.



Chemistry is a powerful springboard to launch you into a fascinating career. Chemistry courses combine general education with preparation for immediate employment. A person with a bachelor's level education in chemistry is prepared to assume a wide variety of positions in industry, government, and academia. The more obvious positions for which a background in chemistry is important are those in the chemical industry or in chemical education. Those with a significant knowledge of chemistry are also employed in a wide variety of related professions such as molecular biology and biotechnology, material science, forensic science, hazardous waste management, textile science, and information management. There are as many specialties as there are areas of application of chemical principles. An undergraduate chemistry degree may be combined with advanced studies in other fields and lead to work in areas such as law or higher management.

Chemists are challenged, excited, and satisfied with their profession. Though chemists may change employers several times during their careers, the majority in the field stay in it their entire careers. The career information in this resource has been assembled to help students majoring in chemistry and related sciences prepare for careers in the chemical sciences by describing a wide variety of chemistry careers and illustrating options available to those who obtain degrees in the chemical sciences.



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## Preparation

Your college education is your first step toward your future chemistry career. It is a critical first step. Because chemistry offers so many different career opportunities and can be your entree into a whole spectrum of careers, scientific and nonscientific, you should consider your options; choose as your goals the fields that interest you most, and plan your education with your goals in mind. Your degree offers vital proof of your mastery of basic principles and how well you prepared for specific career options.

The variety of degrees in chemistry and related fields include: Associate in Applied Science (AAS), Bachelor of Arts (B.A.) or Bachelor of Science (B.S.) degree in chemistry; Master of Science (M.S.) degree and the Master of Arts (M.A.) degree; Doctor of Philosophy (Ph.D.) degree; and Doctor of Arts (D.A.) degree. Some receive additional training in post-doctoral positions. Since the chemical industry has become globalized, you may want to include the study of a foreign language if you are considering a career in industry. How much education is enough? The answer to this question depends on your interests, abilities, and career goals.

### AAS / BA / BS

The Associate in Applied Science (AAS) is offered to those wishing to complete programs in chemical technology. Many chemical technicians begin their career by earning this degree. After earning this degree, some graduates continue their studies to earn a bachelor's degree in chemistry or a related field. The Bachelor of Arts (BA) or Bachelor of Science (BS) degree in chemistry. The designation of these four year BA or BS degrees varies from one institution to another. The BS degree typically includes more chemistry, other science, and math courses. The BA degree typically includes more courses outside of science, engineering, and math.

### MS / MA

The Master of Science (MS) and the Master of Arts (MA) degrees in chemistry and related fields are typically earned after two years of study after the bachelor's degree. Earning a bachelor's degree in chemistry and a master's degree in a related field (or vice versa) can be very useful to students planning an interdisciplinary career. A master's degree is essential in order to teach in a community college. It is also helpful to have a master's for a high school teaching career. A master's degree can also serve to deepen or broaden your chemistry knowledge and better prepare you for industrial careers. Some students use the master's degree to help them determine their career interests and aptitudes before making the longer commitment to a Doctor of Philosophy (PhD) chemistry program. This approach can be particularly useful to students who were not able to participate in an undergraduate research program. For them, the master's degree is their first real exposure to chemical research.

### PhD / DA

The Doctor of Philosophy (Ph.D.) degree in chemistry is preferred for many research positions in industry and government. Colleges and universities usually require Ph.D. degrees when they hire new faculty members. Earning a Ph.D. degree demonstrates a long-term commitment to chemistry as a career. It provides the chemist with a depth of chemical information and the knowledge of how to do productive research.

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## Post-doc

Many research universities and some colleges prefer that employment candidates also complete some postdoctoral (post-doc) research in addition to earning their Ph.D. In post-doctoral research, Ph.D. chemists work with a professor or chemical professional in industry on a research project but do so more independently than they did as graduate students. Usually, they leave the institution where they earned their Ph.D. to work in another university, industrial, or government laboratory. Industrial post-docs are becoming more common as are post-docs before beginning a research career in industry, particularly the pharmaceutical industry. Post-doctoral positions typically last two years. They offer chemists two opportunities. The first is to work in the same field as they did when earning their Ph.D. This provides a depth of knowledge and specialization that can be very useful if there are plentiful job opportunities in their field of specialization. The second is to work in a different field than the one in which they earned their Ph.D. This will allow them broaden their knowledge and experience, thus qualifying them for a broader range of job opportunities and demonstrating their versatility to employers

## Graduate School Considerations

Before deciding whether to apply to graduate school, determine the kind of career you want. Consider both your interests and abilities when making this determination. One of the reasons so many chemists enjoy their careers is that they are a good match for their interests and abilities. Graduate school is intended to develop independent researchers and is usually the best option for those who want to spend a major portion of their career doing research and development work. However, be prepared to revise your plans as your interests change. For example, after working in research, some industrial chemists develop an interest in guiding research and determining what research areas are explored at their company.

A major component of many master's degree and nearly all Ph.D. programs is research and writing a thesis. This is an intense experience. Working on an undergraduate research project will help you decide if you find research rewarding and thus would enjoy graduate school. So will working in an industrial research lab after graduation or as part of a co-op program. Of course, you'll also learn if your abilities will enable you to be a good researcher.

In deciding whether to continue your education past the bachelor's degree, assess your abilities as objectively as possible. Consult your faculty advisor and other faculty members who know you well. Consult graduate students. If you know some chemists who have completed graduate school and know you, consult them as well. If they do not know you well, they can still advise you on what they think are the most important qualities you need to do well in graduate school.

Success in your undergraduate studies is not a definite predictor of graduate school success. Graduate school is unique, far more than an extension of your undergraduate study. In short, graduate school requires more work, a stronger commitment, and concentrated effort as well as creativity in research and analysis. The course work is more intense. You will have to be self-motivated and work independently to succeed at your research. This requires maturity and motivation. Writing your thesis is a major effort that both demonstrates your research accomplishments and indicates whether you can organize and effectively communicate complicated technical information to others.

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Your decision to attend graduate school is not final; it does not have to be made prior to receiving your undergraduate degree. Some students receive their undergraduate degree and work as chemists or in other fields before deciding to attend graduate school. A break of a year or more can offer you a chance to gain practical experience before choosing a specialty.

Some are concerned that delaying graduate school to gain work experience or earn an income may ultimately lead to not returning to school to do graduate work as they get used to developing their careers and earning a salary. However, many employers encourage their employees to attend graduate school while continuing to work and often offer financial assistance to do so. Once you've decided you have the abilities and commitment to succeed in graduate school, you will have to decide on which schools to apply, complete application materials, gain admission, and decide how to finance your graduate education.

Selecting a Graduate School - Graduate schools differ greatly in their degree programs. Carefully review graduate school catalogs and the research interests of the faculty members. Many universities now have web sites. By consulting them, you can get at least an introduction to various graduate programs. The ACS "Directory of Graduate Research" provides detailed information on chemistry departments' faculty size, the research interests of their faculty members, and recent faculty publications. Another ACS publication, Graduate Programs in Chemistry, provides information about the nature and scope of chemistry graduate school programs. Discuss your graduate school plans with your faculty advisor, other professors at your undergraduate school, alumni of graduate schools, and campus recruiters. Also discuss your interests and options with acquaintances already in graduate schools. Don't feel bound to enroll in the graduate program at your undergraduate institution. (Some schools will not permit students to do graduate work in the same program at their undergraduate institution.) A change of schools will expose you to people with different attitudes about chemistry and research and widen your circle of academic contacts. Changing schools will enable you to experience different educational approaches and provide the stimulus of a new and different environment.

Admission - After developing your final list of graduate schools, contact the department chairs of these schools and ask them for their admission requirements and application forms. Do this no later than the beginning of your senior year. You can write or contact the departments through their web sites. You should complete and submit your applications by the start of the second semester of your senior year. The time between semesters is an excellent opportunity to complete and submit your applications if you haven't done so already. Many schools have early admissions programs that can reduce the stress and concern you feel while waiting to hear if you have been admitted. Take advantage of these by submitting your application materials early. However, don't rush these out. Treat them like job applications and resumes. They should be letter perfect. Cover letters and long responses to questions should be examples of your best writing.

Financial Aid - While your choice of a graduate school should not depend only on financial considerations, money concerns are important. Most chemistry graduate students obtain full or partial tuition scholarships. Teaching assistantships and research fellowships are part of the work component that pays for tuition and provides for some living expenses. In addition to university funding and research assistantship funding from your thesis advisor's research grant money, competitive fellowships are offered by the National Science Foundation, the National

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Institutes of Health, other government agencies, and some companies. The department chair or administrator can help you collect information on these funding opportunities. Education loans, often guaranteed by the government and repayable over long periods of time, are another financing option.

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## Co-ops / Internships / Summer Work

Experiential opportunities such as co-ops, internships, and summer work are effective strategies that add value to your education and career development. These work-integrated learning programs can provide opportunities for you to apply classroom theory, advance your technical skills, learn about diverse work cultures, explore career options, and gain self-knowledge. Some schools offer undergraduate and graduate cooperative chemistry programs that combine industrial work experience with the academic program. Co-op programs can help students learn about what industrial work is like while they are still in school.

A co-op program or summer internship can help you learn about various chemistry careers and give you an opportunity to test and analyze your capabilities. If you find a career or specialty that really excites you, you can tailor the remainder of your curriculum to prepare you for this career. You can also gain useful contacts in industry who can serve as references and otherwise help you in your job hunting efforts.

The ACS Office of College Chemistry publishes a directory of schools offering co-op programs. The periodically updated searchable version may be found at [www.acs.org/edugen2/educareer/epic/expichem.htm](http://www.acs.org/edugen2/educareer/epic/expichem.htm).

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## Career Options

The employment outlook for chemists varies with the state of the economy, the prosperity of particular industries, the needs of specific employers, and the amount of government spending on science programs. Specifics of your own situation will also affect how many employment opportunities you find in the job market. These specifics include:

1. Your education level
2. Your technical specialty
3. Previous job and practical experience. (In addition to previous job and research experience, this can include professional society activities, college extracurricular activities, and volunteer work.)
4. Skills and traits such as communications skills, business sense, leadership skills, initiative, teamwork, and versatility
5. Geographic restrictions on relocation

Chemistry career options include those in industry, government, and academia. Career opportunities also available in areas outside of the traditional laboratory or academic setting (nontraditional careers for chemists).

The Profiles section highlights various careers of chemical professionals in industry, government, and academia, and includes both traditional and nontraditional careers in the chemical sciences. The profiles give a summary of the jobs performed by the chemical professionals profiled.

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## General Discussion

Common career options for chemists with bachelor's degrees include chemical sales, working as a plant chemist, working in a quality control laboratory, working as a laboratory technician. Careful choice of a minor or a sequence of elective courses can be critical. The right choices can aid a B.A. or B.S. chemist in becoming a high school science teacher, working in chemical sales, or beginning a career in chemical marketing. Helpful electives include various engineering fields, other sciences such as biology and biotechnology, patent law, business, marketing, computer science, chemical information, public speaking, and writing. Minors and electives can be most helpful if you have a particular career in mind. If this is the case, determine the educational requirements by talking with people currently in these careers. You can sometimes find these individuals through your college alumni office or through your local ACS section.

Chemists with advanced chemistry degrees usually begin their careers with more specialized responsibilities than bachelor's degree chemists. They usually work in research or as college or university faculty members. Many of these positions are only open to M.S. and Ph.D. chemists.

## Industry

Private industry employs about two-thirds of all chemists. Private industry offers excellent salaries and benefits and many different career paths for chemists. Most industrial chemists work in research and development (R&D), R&D management, sales, or marketing. Entry-level bachelor's degree chemists may work in research or plant labs analyzing and testing products. They may also work with senior researchers in R&D laboratories. As they gain experience, they work more independently and can advance to supervisory positions or change career tracks to work in chemical sales or other business functions. Continuing education greatly aids changing career tracks. Taking a minor in business or marketing can aid bachelor degree chemists in beginning their careers with a sales or marketing job.

## Government

Federal, state, and local government units employ many chemists. About 10% of all chemists are employed by the government. Government salaries often are lower than in private industry, particularly starting salaries. However, the gap has narrowed in recent years. Despite government cutbacks, jobs remain more secure in government than in private industry.

Chemists are the largest group of scientists working for the federal government. Many work for large research laboratories such as the National Institutes of Health and the Naval Research Laboratory. Others work for Federal government departments such as Energy, Defense, Interior, Agriculture, Commerce, Health and Human Services, and Justice. There they may do basic or applied research. Much of this work is aimed at developing the scientific basis for government regulations. Chemists also perform testing work needed to enforce government regulations and monitor their effectiveness. Chemists are also responsible for administering government funding to universities and research institutes. Other chemists work as program administrators within government. Chemists also work writing and editing government regulations and other documents.

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## Academia

Academia includes primary and secondary schools, community colleges, four-year colleges, and universities. Teaching in academia often involves teaching other sciences besides chemistry. Teaching in primary and junior high school often involves teaching young people the scientific method and the role of science in health and the environment.

Thinking back on your own pre-college education, you'll realize that, in addition to teaching a subject such as science, teachers also counsel and discipline students. They prepare examinations, meet with and advise parents, and work with other teachers and administrators to keep the school running smoothly. It is to fulfill these responsibilities that states require teacher certification.

Due to a shortage of science teachers, many school districts are hiring B.S. or B.A. chemists to teach provided they take the necessary courses required to obtain a teaching certificate. These courses usually can be taken in the evening, weekends, or the summers. Each department of education in each state specifies the courses needed for certification. These are uniform for all the school districts in a given state. However, the courses required vary from state to state. Contact your local school district to find out what courses you would need to complete to be certified as a teacher in your state. Remember, requirements vary from state to state. So if you plan to move after graduation, determine the certification requirements in your new state.

**Secondary School Teaching** - Chemistry teachers in secondary (high) schools often teach other science courses such as general science, physics, math, and biology. These teachers often enjoy the satisfaction of having students choose careers in science and engineering as a result of their experiences in secondary school science courses.

To teach in public school, one must take the necessary education courses to obtain a teaching certificate in addition to courses in your major discipline. Many private/parochial schools do not require a teaching certificate; however, they frequently pay less than public schools. After you begin your teaching career, you will find that additional courses, often culminating in a master's degree, will improve your promotion prospects, job security, marketability. This is particularly true for secondary school teachers. Depending on your career goals, the courses you take may be primarily chemistry courses or education courses. You may also find it advantageous to broaden your skills beyond that of science taking the courses necessary to become certified in other field.

**College and University Teaching** - Chemistry faculty members teach chemistry courses, prepare and grade exams, counsel students (often providing career advice), and participate in chemistry department and college governance. At four-year institutions and universities with graduate schools (research universities), research plays a major role. In addition to the responsibilities listed previously, chemistry faculty members must design and execute a creative research program. To do this, they must obtain research funding by writing grant proposals, persuade students to work with them as bench researchers, and supervise and guide these students in their research while allowing them sufficient independence to develop as creative chemists in their own right. Writing successful grant proposals is critical to career success for faculty members at research universities and some four-year institutions. Successful graduate school and post-doctoral research is helpful. So is one's previous

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success in independent research. This success is usually measured by both the number and quality of one's publications in chemistry journals. However, the ability to organize your thoughts and write clearly and well is also critical in preparing successful grant proposals. The ability to present oral research papers at conferences and seminars at other universities is also important in developing a good professional reputation that may influence grant proposal reviewers in your favor.

**Community College Teaching** - At two-year colleges, the primary emphasis is on teaching, not research. Faculty members may hold either Ph.D. or MS degrees. The fraction of faculty members holding Ph.D. degrees is increasing as the academic job market becomes ever more competitive. Tenure is offered at most, but not all, two-year colleges. Normally it is awarded after two to five years of probationary employment. While any research the faculty member accomplishes will be a positive factor in tenure evaluations, the primary emphasis is on teaching. Usually the facilities for doing research are very limited in four-year colleges. However, summer National Science Foundation programs and other opportunities exist give community college faculty members access to first-rate research facilities. Many two-year colleges offer part-time positions teaching courses during the day as well as the evening. Although the pay is often low and part-time employees do not receive fringe benefit, these adjunct positions are very useful in gaining the experience needed for obtaining full-time, tenure track positions in 2-year and 4-year colleges and provide opportunities for chemists to combine teaching with another job, education, or personal commitments such as raising a family.

**Research** - Success in research, measured by research funding obtained for creative projects and publication of interesting results in chemistry journals, is necessary for career success at research universities. This is the major factor in deciding whether to award an assistant professor tenure. Without tenure, chemistry department faculty members are employed under a series of one- to six-year contracts. At one or more times during an assistant professor's first six years at a research university, he or she will be considered for tenure. If the assistant professor does not obtain tenure, a seventh year allows him or her time to obtain another position. Some people in this position, particularly those who are outstanding teachers, obtain positions in four-year institutions or community colleges where research is not emphasized. Others enter industry or obtain non-faculty research staff positions. Research opportunities for chemistry faculty members at community colleges and some four year institutions are more limited. Many who prefer teaching to supervising research find teaching at community colleges more rewarding. These faculty members often teach more courses than their counterparts at research universities.

### **Nontraditional Careers**

Chemistry is the springboard for many careers in areas other than the more traditional research laboratory or academic positions. A growing number of chemical scientists at all degree levels are pursuing careers at chemistry interfaces. Professionals use their training in chemistry to launch careers in, for example, law, business management, journalism, and computer science. They make broad use of scientific knowledge in these career areas.

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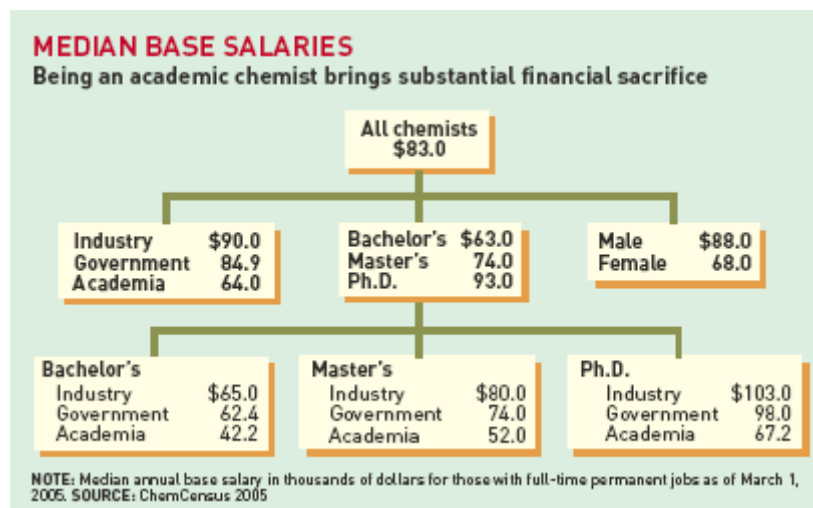
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## Earnings

New chemistry graduates starting salaries' vary depending on a number of factors and one of the most important is where they work. According to the ACS 2004 Starting Salary Survey, the median annual salary of inexperienced bachelor's chemistry graduates working full time for the class of 2004 was \$33,000. For inexperienced master's graduates employed in industry, the median salary was \$44,500, and for inexperienced Ph.D.s, the median annual salary was \$72,500. (Inexperienced is defined as having less than one year of technical work experience prior to graduation.)

Starting salaries for new and inexperienced graduates employed full-time in an academic setting were noticeably lower. For the new bachelor's chemists in this sector the median salary in 2004 was \$30,100. For inexperienced master's graduates employed in academia, the median salary was \$40,500, and for inexperienced Ph.D.s, the median annual salary was \$43,260.

In addition, the 2005 census of all ACS members in the workforce reveals lower unemployment and shifts in the chemical profession. The gain for bachelor's chemists this year was from \$61,000 to \$64,000 or 4.9%; for master's, from \$71,000 to \$75,000, or 5.6%; and for Ph.D.s, from \$90,000 to \$93,800, or 4.2%. The salary gain for chemists as a whole was, as would be expected, more modest. Salaries rose from the median of \$82,000 for all 2004 survey respondents to \$83,000 for this year's respondents. The full report may be viewed at [www.careercornerstone.org/chemistry/2005salary.pdf](http://www.careercornerstone.org/chemistry/2005salary.pdf).



Findings from the class of 2004 are summarized in Chemical and Engineering News. A full report of the Starting Salary Survey is available from the American Chemical Society at [www.chemistry.org/careers](http://www.chemistry.org/careers) or by calling ACS's Office of Society Services at 1-800-227-5558.

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## Job Hunting Advice

Your career as a professional chemist begins with your first job. You should begin your job hunt about a year before graduation by assembling a list of companies you would like to work for and people at each company to contact. The summer before your final year is a good time to start. Plan to visit a local library to obtain information on potential employers. Also read at least one good book on job hunting techniques. The ACS publishes several brochures tailored for chemists and engineers to help you write your resume and cover letter and interview more effectively. These are listed in the final section of this brochure.

To obtain advice in your job hunt, consult with people at your campus placement center. Most placement centers arrange on-campus interviews with corporate recruiters visiting your school. They can also provide guidance in writing your resume, and cover letter. In addition, they can provide counseling and moral support. Also discuss your job hunting and career concerns with professors, particularly faculty advisors.

Finding a job is seldom easy. Disappointment is common in job hunting. Competition is stiff and so you should not become discouraged if you do not succeed in getting a particular position. You must expect to apply for many positions to win a few interviews. Not every interview will result in getting a job offer.

### Leads

Begin looking for job leads after you have decided what type (or types) of job you want, what type of working environment you prefer, and what your geographic limitations (if any) are. You can identify job leads by:

- Checking with your campus placement office to determine what corporate recruiters will be visiting campuses and when. Your placement office will have publications such as "The Job Choices Annual" which provides information on many companies, what types of job openings they have, and the personnel manager's name and address.
- Consulting with family, friends, and faculty members for the names and telephone numbers of professionals in the field of chemistry you are interested in or working for companies you might want to work for. Don't neglect recent chemistry graduates from your school. In addition to job leads, they can provide helpful, up-to-date job-hunting tips.
- Checking newspapers, telephone "Yellow Pages," and chambers of commerce listings for possible job leads.
- Checking the Internet. There are many job sites listed on the World Wide Web. You can locate many of these sites by typing a keyword such as "employment" on your search engine. Don't neglect the home pages of companies you would like to work for. These provide useful information on the company and its products. Many company home pages also list job openings. Job opening information is also available on the home pages of professional organizations such as the ACS. Some publications such as the "National Business Employment Weekly" have helpful articles on job-hunting topics on their websites.
- Visiting your library and reviewing publications such as "Peterson's Guide," "Dun and Bradstreet," "The Thomas Register," and "Moody's Industries" for general descriptions of various corporations. Also, consult books on writing resumes and cover letters and employment interviewing while you are in the library.
- Using ACS services, particularly those of the ACS Employment Aids Office. This office maintains the Employment Clearing House -- a collection of resumes that employers can

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access through ACS. This service is free to ACS members and student affiliates. Contact the Employment Aids Office to have your resume included.

- Accessing the ACS website. The employment advertisements and the Younger Chemists Committee web page are particularly useful to job hunters.
- Registering for the Employment Clearing House at ACS national and regional meetings. Through the clearing house, you can arrange interviews during the meeting with prospective employers. This service is free to those registered at the meeting.
- Participating in other job-hunting related activities at ACS meetings. These include mock interviews, resume consultations with ACS experts, and workshops and symposia on job-hunting topics.
- Taking out an advertisement in the "Situations Wanted" section of Chemical & Engineering News. ACS offers reduced rates to members and student affiliates.
- Consult your college or university Web page to find job banks, resume writing, interviewing, and networking assistance.

## Resumes

It is best to prepare your resume during the summer before your senior year. You'll have more leisure to consider what types of jobs you would like and to assemble the information on your qualifications and accomplishments. You can also request permission of the individuals you would like to list as references. Your resume is the first example prospective employers have of your communications skills. So it should be well-organized and well-written. Your resume should outline your experience, interests, abilities, and goals and should emphasize your accomplishments. Limit your resume to one page but make it as comprehensive as possible. You can list publications and references on a second page. Reference books at your library or placement office can provide models of resume content and format. Your format should contribute to the clarity and readability of your resume.

If you are uncertain about your career goals, prepare a separate resume tailored for each career goal. For example, you might prepare one version for the petrochemical industry and one for the pharmaceutical industry. The resume you target to pharmaceutical industry could emphasize your interest in biochemistry and the biochemistry courses you took. Your second resume could emphasize courses more relevant to the petrochemical industry such as physical chemistry and catalysis chemistry courses.

Your cover letter should be more than just a note saying, "Here is my resume." Also it shouldn't be just a restatement of what is in your resume. Your resume tells what you are: a graduating chemistry student with certain experience, abilities, and accomplishments. Your cover letter should tell employers who you are through both its content and tone. It should demonstrate that you are a productive, accomplishment-oriented individual with good written communications skills. Like your resume, it should be one page long.

## Interviews

Your resume and cover letter will get you an employment interview; they won't get you a job offer. The critical step in getting a job offer is the employment interview. Expect some nervousness and anxiety as you approach this critical step in your job hunt. Preparation and practice can reduce your concerns. Begin preparing by reviewing your resume thoroughly so you will not need to refer to it during your interview.

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## References

Any successful job search entails an extensive examination of self, employer, and the market. Job candidates should always research information about prospective companies before any interview. Recruiters are most impressed with candidates who have some prior knowledge of the company. Ironically, this research is most commonly ignored or omitted by candidates when preparing for an interview.

Do not allow the resources found in the data file below to limit you. It is not an exhaustive list of all resources available. However, it is a list widely used by chemists, chemical engineers, and counselors to seek out information on career-related topics.

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## Overcoming Challenges

Everyone will face challenges as they transition from high school to college to the work place. Women and minorities may face additional challenges. Organizations and publications offer support and resources to these chemistry students.

### Minorities

Minorities are the fastest growing part of the U.S. population, and in the next century, they will become the majority possessing both the clout and talent to contribute significantly to the nation's future. Minorities are underrepresented in the sciences. The ACS, the world's largest scientific society, has committed to reach out and invite underserved minorities to participate in the excitement and opportunities that literacy in the sciences offer and execute this commitment through its Minority Affairs Program.

The mission of the minority affairs program is to conceive, develop, coordinate, and implement programs that are designed to encourage and support minority involvement in the chemical sciences.

### People with Disabilities

Misconceptions have an unfortunate effect in deterring young people with physical and learning disabilities from careers in science. Well-meaning but uninformed parents, teachers, college admissions personnel, and others imply or state that science is unsuitable as a career for a person with a disability. They encourage bright, enthusiastic high school students to avoid chemistry labs out of concern that mobility aids-- or speech, hearing, or visual impairments - will represent undue safety risks or interfere with traditional teaching methods. An extensive report by Anne Swanson and Norman Steere, published in the *Journal of Chemical Education* in 1981, found no basis for this concern. It indicated that people with disabilities pose no greater safety hazard in the classroom, laboratory, or workplace than their able-bodied peers. Few require any special pedagogical techniques. A 1995 study by the American Council on Education (ACE) indicated that college freshmen with disabilities have just as great an interest in a science major as other students. The American Chemical Society and its Committee on Chemists with Disabilities published *Working Chemists with Disabilities: Expanding Opportunities in Science* to address these misconceptions and increase opportunities for people with disabilities in chemistry and other fields of science. Assistive technologies and legislation already have eliminated many real barriers. Some of the most serious remaining impediments are not physical, but attitudinal.

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## Professional Organizations

Professional organizations and associations provide a wide range of resources for planning and navigating a career in Chemistry. These groups can play a key role in your development and keep you abreast of what is happening in your area of specialization. Most maintain a website and many of the associations have special pages for high school and/or college students with questions about careers in the field. Associations promote the interests of their members and provide a network of contacts that can help you find jobs and move your career forward. They can offer a variety of services including job referral services, continuing education courses, insurance, travel benefits, periodicals, and meeting and conference opportunities. Some of these organizations have special interest in issues related to women or underrepresented minority groups.

The following is a partial list of professional associations serving the field of chemistry. A broader list of professional associations, including those specifically serving women and minority groups is also available by clicking here including the Association for Women in Science, the American Indian Science and Engineering Society, and the Vietnamese Association for Computing, Engineering Technology, and Science.

### **American Chemical Society ([www.acs.org](http://www.acs.org))**

The American Chemical Society is a self-governed individual membership organization that consists of more than 158,000 members at all degree levels and in all fields of chemistry. The organization provides a broad range of opportunities for peer interaction and career development, regardless of professional or scientific interests. The programs and activities conducted by ACS today are the products of a tradition of excellence in meeting member needs that dates from the Society's founding in 1876.

### **American Chemistry Council ([www.americanchemistry.com](http://www.americanchemistry.com))**

Represents the American chemical industry. Information about the Responsible Care initiative, news articles, press releases, research and testing, and public health.

### **International Council of Chemical Associations ([www.icca-chem.org](http://www.icca-chem.org))**

International Council of Chemical Associations (ICCA) is the world-wide voice of the chemical industry, representing chemical manufacturers and producers all over the world. It accounts for more than 75 per cent of chemical manufacturing operations with a production exceeding USD 1,6 trillion annually. Almost 30 percent of this production is traded internationally. ICCA promotes and co-ordinates Responsible Care and other voluntary chemical industry initiatives.

### **European Federation of Chemical Engineering ([www.dechema.de/efce.htm](http://www.dechema.de/efce.htm))**

Since 1953 the European Federation of Chemical Engineering has promoted scientific collaboration and supported the work of engineers and scientists in 28 European countries. Moreover, from the very beginning Eastern and Central European countries were included. Today the EFCE represents more than 100,000 chemical engineers in Europe. With its 22 Working Parties and 3 Sections it covers all areas of Chemical Engineering.

### **Institution of Chemical Engineers ([www.icheme.org](http://www.icheme.org))**

The Institution of Chemical Engineers (IChemE) is the professional body for chemical and process engineers. Originally founded in 1922, IChemE has grown continuously to its current status as a leading engineering organization with an international membership across more than 80 countries approaching 25,000.

#### **"Chemistry Overview"**

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