

THE OCTAGON



Volume 90, No. 1, January 2007

Lehigh Valley Section of the American Chemical Society

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Meeting Announcement: 792nd LVACS Meeting: Muhlenberg College

Date: Thursday, Jan 25th

Reception: 5:15 – 6:00 pm Great Room (room 113) Seegers Union

Dinner: 6:00 pm

Meeting: 7:00 pm Trumbower lecture hall (room 130)

Talk: At the conclusion of the meeting

Menu: Lemon barbecue Flank steak, or Turkey Tetrazzini, or vegetarian

Cost: \$20, spouses, students and retirees \$10.00

Contact: Contact LuAnn Feist at 484-664-3260 or feist@muhlenberg.edu by noon on Monday Jan 22nd. Please give you name, affiliation, choice of entrée and a phone number.

Directions:

<http://www.muhlenberg.edu/muhinfo/directions.html#toBerg>

Speaker: Phil Henderson

Dr. Henderson is Manager of the Reactive Gas Applications Group in the Materials Research Center at Air Products and Chemicals (Allentown, PA). Born and raised in Los Angeles, California, he received his B. Sc. degree from the University of California at Berkeley in 1983 and his Ph. D. in fluorine chemistry in 1987 from the University of Southern California. Upon graduation he was hired by Air Products as a Senior Research Chemist. During his 19-year career at Air Products, Phil has served as principal investigator on projects within the Specialty Gas Department involving indirect fluorination with metal fluorides, Electronic Specialty Gas analysis and purification, and surface fluorination of polyolefins with F₂. In 2000, Phil transferred to the Materials Research Center where he has served as team lead for multiple projects including specialty gas separations/purifications, surface treatment and

thin film deposition using low temperature atmospheric pressure plasma, and novel delivery systems for hazardous specialty gases using ionic liquids. Phil is co-inventor on 12 patents and co-author on 16 publications. Other interests include his family, writing/performing/recording music, and playing strategy games.

Talk: Ionic Liquids: Beyond the Green

Ionic liquids are materials containing only ions with a melting point below 100°C. Although known since 1914, intensive exploration of this class of compounds began about 15 years ago with the preparation of ionic liquids resistant to hydrolysis. Although originally developed as improved electrolytes, the majority of the published literature concerning these compounds focuses on their use as “green” (or environmentally friendly) solvents. Ionic liquids have been labeled as green because of their low volatility and recyclability; however, their toxicity is generally no better or worse than conventional solvents. At Air Products, we have identified a subclass of ionic liquids that exhibit weak chemical interactions with gases allowing us to develop new applications for ionic liquids as gas storage and delivery media as well as high quality absorbents. This presentation will provide an introduction to this fascinating class of compounds and their applications beyond use as green industrial reaction chemistry solvents.

Winter-Spring 2007 Meeting Schedule

February - Cedar Crest College

**March - Desales University
HS Teacher's Night**

**April - Moravian College - Student
Awards and Poster Session**

**May - East Stroudsburg University
Pub Night Rescheduled!**

LVACS Officers - 2007

(positions were filled at Nov. meeting by acclamation)

Chair: Paul Bouis
pbmbi@rcn.com

Chair Elect: Julie Ealy
Penn State University Lehigh Valley
jbe10@psu.edu 610-285-5115

Immediate Past Chair: T. Michelle Jones-Wilson
East Stroudsburg University
East Stroudsburg, PA 18301
mjwilson@po-box.esu.edu 570-422-3703

Secretary: Chester Crane
Bangor PA
c crane9@yahoo.com 610-588-0073

Treasurer: John Freeman
East Stroudsburg University
East Stroudsburg, PA 18301
jfreeman@po-box.esu.edu 570-422-3446

Councilor: Carol Baker Libby
Moravian College, Bethlehem, PA 18018
c libby@cs.moravian.edu 610-861-1629

Councilor: Pamela D. Kistler
Cedar Crest College, Allentown, PA 18104
pdkistle@cedarcrest.edu 610-437-4471 x 3508

Alternate-Councilors: Roger Egolf & T. Michelle Jones-Wilson (see above)

introduced. A new idea is to allow members to pay multi year dues. ACS membership has increased over the past year with a record level of new members.

On February 5 on Nova (PBS – check local listings) there will be an interesting chemistry biography.

Informal science cafes have been proposed. The website is now revamped for a new exciting look. It may be moving soon, when the National Society can get the server working properly. It is still located at the ESU address: <http://www.esu.edu/lvacs/>

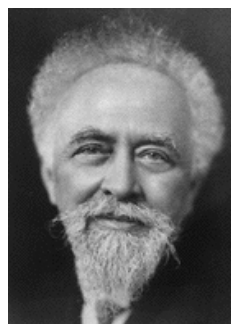
At 7:44 pm, the business meeting was adjourned.

The speaker for the evening was Professor Jack Norton of Columbia University. The title of his talk was H Transfer from Transition Metal Hydrides. Applications to Polymers and to Synthesis.

This Month in Chemical History

Harold Goldwhite, California State University, Los Angeles
hgoldwh@calstatela.edu

Prepared for SCALACS, the Journal of the Southern California, Orange County, and San Gorgonio Sections of the American Chemical Society



Jean Baptiste Perrin

The name of Jean Baptiste Perrin may not resonate strongly with most chemists, which is a pity. Perrin made contributions to science late in the 19th century and in the early decades of the 20th that were essential to understanding the fine structure of matter. The ideas that flowed from Perrin's contributions are discussed in every general chemistry course. The following

biographical sketch is drawn in part from material on the Nobel Foundation's website; Perrin won the Nobel Prize in physics in 1926.

Jean Perrin was born in Lille, France, in September 1870. He studied at the Ecole Normale Superieure in that city, was appointed to an assistantship in physics, and began studying the novel and exciting fields of cathode and X-rays. He earned his doctorate in 1897 and received a post in physical chemistry at the Sorbonne in Paris in the same year. Most of his professional career was spent at the Sorbonne where he was appointed Professor in 1910. He held that post for the next 30 years.

In 1895 in a paper in Comptes Rendus, based on the research he later presented for his doctorate, Perrin provided evidence supporting the idea that cathode rays were particulate rather than wave-like. This was a topic of intense

Meeting Minutes - September 2006

The 789th meeting of the Lehigh Valley Section of the American Chemical Society was held on September 28, 2006 at Lafayette College. Chair T. Michelle Jones-Wilson called the meeting to order at 7:37 pm.

The minutes from the previous meeting were approved as published in *The Octagon*. The next meeting will be held on October 25th at Albright College.

Treasurer's report -given by John Freeman – We have money and the budget for 2007 will be presented at the next meeting and published in the November Octagon.

Councilors' report, Pam Kistler – the entire Councilors' report will be published in the October, 2006 *Octagon*. At the most recent National meeting, a new vision statement was

interest and debate at this time. Evidence for wave-like behavior had included observations that cathode rays, like X-rays, could penetrate thin sheets of aluminum. In an elegant set of experiments Perrin collected the cathode rays in a hollow cylinder and showed that negative charge steadily accumulated on the collector. The cathode rays were also retarded by negative electric charge. In 1897 J.J. Thomson, building on these experiments of Perrin, carried out his definitive studies of cathode rays which indicated the existence of electrons in atoms.

Chemists unfamiliar with the history of their subject are usually unaware of the intense debated within the scientific community about the reality of the existence of atoms at the end of the 19th and the beginning of the 20th century. Among the most skeptical of the necessity of physical atoms was the father of physical chemistry, Wilhelm Ostwald. Perrin's work on Brownian Motion finally convinced the sceptics. Observations on colloidal suspensions, in which the colloid particles moved constantly and in apparently random directions, were interpreted by Perrin in 1909 as due to the uneven bombardment of the particles by the molecules of the liquid medium in which they were suspended. Perrin developed the theory of this motion. By observations on the rates of movement of the particles and their distribution by depth at equilibrium he was able to deduce values of Avogadro's Number that agreed with those derived from totally different lines of experiment. In effect Perrin had "observed" the discontinuous nature of matter, and this was the subject of the citation for his Nobel Prize.

Perrin wrote many articles and several influential books. The most widely read was his book on "Atoms", first published in 1913 and translated into several languages, which sold over 30,000 copies. He was awarded many honors in addition to his Nobel Prize; honorary memberships in half-a-dozen national societies; honorary doctorates from 8 universities; major scientific prizes in England, Italy, and France. He was also influential in scientific politics, creating the organization that is still at the center of French science, the Centre National de la Recherche Scientifique (CNRS); and helping to found a major science museum in Paris, the Institute of Astrophysics, and the Institute of Physico-Chemical Biology.

Perrin served his country as an officer in the Corps of Engineers in World War I and when France fell in World War II in 1940 he escaped to the United States in and died in New York in April 1942. His body was repatriated to France on the battleship Jeanne d'Arc in 1948 and was reburied in the Pantheon in Paris which is dedicated to the memory of the most outstanding citizens of France.

National Chemistry Week

2007 is the 20th anniversary of the NCW program, so planning for the celebration will begin even earlier than usual. The theme is "The Many Faces of Chemistry" and it will be celebrated October 21-27, 2007. Anyone wishing to participate in the Lehigh Valley outreach events should contact the Octagon Editor.



Each ACS local section and division has been encouraged to highlight and celebrate their own "faces" of chemistry. Please consider how this might happen within the Lehigh Valley and let a section officer know.

National Chemistry Week (NCW), a community-based outreach program, is designed to reach the public with positive messages about chemistry and to make a positive change in the public's impression of chemistry. Activities include chemical demonstrations, hands-on activities, lectures, open houses, displays, contests and games.

For more information on the NCW program visit chemistry.org/ncw.

Chemists Celebrate Earth Day (CCED)



The CCED theme for 2007 is "Recycling—Chemistry Can!" – April 22, 2007. There will be a hands-on activity newspaper

publication to assist our outreach activities and there is a K-12 grade illustrated haiku contest as well as a video contest for college students. The event that everyone across the country is encouraged to conduct is "Recycling All We Can".

CCED is an environmental awareness campaign. This program provides activities that are designed to enhance public awareness of important contributions made through chemistry in preserving our planet and improving our environment. The event is held annually on April 22. More information about CCED is available at chemistry.org/earthday.

ChemShorts for Kids: Leafy Chromatography



Since 1992 Dr. Kathleen A. Carrado, a member of the Chicago Local Section and a chemist at Argonne National Laboratory, has submitted a regular column titled

"ChemShorts" for the section's newsletter, The Chemical Bulletin. Each ChemShort describes a simple and interesting chemistry experiment that a young student (grades K-6) can do at home with adult supervision and common household items. A selected ChemShorts for Kids will be featured in future Octagon issues. Here's the first!

Kids, did you ever wonder about the chemistry of autumn leaf colors? Most plants contain several pigment molecules. If you experiment with different leaves in this activity you will see the wide range of pigments.

You will need leaves, baby food jars with lids, rubbing alcohol, coffee filters (preferably the Melitta type), hot water, and a shallow pan. Take 2-3 large leaves (or the equivalent with smaller leaves), tear them into tiny pieces, and place them into small jars with lids. Add enough alcohol to just cover the leaves. Loosely cover the jars and set them into a shallow pan containing an inch or so of hot tap water. Let the jars sit in the hot water for at least a half hour. Replace the hot water as it cools and swirl the jars from time to time. The jars are 'done' when the alcohol has picked up color from the leaves. The darker the color, the brighter the chromatogram will be. Cut a long, thin (1/2") strip of coffee filter paper for each jar. Place one strip of paper into each jar, with one end in the alcohol and the other outside of the jar. As the alcohol evaporates, it will pull the pigment up the paper, separating pigments according to their molecular size. Pigments with the largest size will move the shortest distance. After 30-90 minutes, remove the strips of paper and allow them to dry. From the information below, can you identify which pigments are present?

The color of a leaf results from the different pigments produced by the plant. The main pigment classes responsible for leaf color are porphyrins, carotenoids, and flavonoids. The color depends mostly on the amount and types of these pigments. The pigment porphyrin has a compound called chlorophyll that is green. The pigment carotenoid has compounds carotene and lycopene that are yellow, orange, and red, as well as xanthophyll which is yellow. The pigment flavonoid has compounds flavone and flavonol (yellow) and anthocyanin that can be red, blue, purple, or magenta.

When leaves are green, it is because they contain a lot of chlorophyll. Chlorophyll masks all other pigment colors. The anthocyanins will mask carotenoids. As summer turns to autumn, decreasing light levels cause chlorophyll production to slow and the green color will fade. At the same time, anthocyanin production in leaves increases in response to increasing sugar concentrations. Leaves with a lot of anthocyanins will turn red. Leaves with good amounts of both anthocyanins and carotenoids will be orange, and leaves with carotenoids but little or no anthocyanins will turn yellow. In the absence of these pigments, other plant chemicals can affect

leaf color. An example is tannins, which cause the brownish color of some oak leaves.

Options: Does the season in which the leaves are picked affect their colors? Also try using frozen chopped spinach leaves. If your chromatogram is pale, the next time use more leaves and/or smaller pieces.

References:

*Dr. Anne Marie Helmenstine at

<http://chemistry.about.com/cs/howtos/ht/paperchroma.htm>
and

<http://chemistry.about.com/library/weekly/aa082602a.htm>

SciFinder®

Provides Drug and Biotech Researchers Efficient Access to Information on Biotransformations

*Chemical Abstracts Service (CAS) is addressing the growing interest in biology-based synthesis by making access to information on enzymatic reactions and other biotransformations easy to find through its SciFinder research tool. A new audience of researchers eager to go beyond traditional synthetic processes has found a wealth of information in the literature and patent records in CAS databases. CAS has demonstrated SciFinder and its biotech applications during recent American Chemical Society national meetings and found substantial interest among researchers in the biotech and pharmaceutical industries.

"CAS has processed decades worth of journal literature and patents containing information on biotransformations--reactions mediated by biological species--including enzymatic reactions, which our scientists have been analyzing and adding to CAS databases," said CAS Vice President, Editorial Operations, Matthew J. Toussant. "An explosion of interest in using enzymes to synthesize substances more efficiently has made CAS databases and search tools such as SciFinder useful in many hot research areas of industrial biotech."

CAS reaction information extends back to 1840 and among the 11 million reaction records are thousands for biotransformations. Applying such biotransformations to industrial processes can improve cost efficiency and environmental safety, via greener methods. In addition CAS literature databases reference a wealth of research on biological processes relating to drugs, food, materials and energy, among other applications.

Just as yeast has been used since ancient times to induce fermentation for making beer, biological entities and enzymes play a role in many chemical reactions. Applying such biotransformations to industrial processes can improve

cost efficiency and environmental safety. For example, biologically important chemicals can exist in two molecular forms that are mirror images of each other, with a right-hand and left-hand version. But only one version (or stereoisomer) may be valuable for the intended purposes (medicinal, specialty chemical and others), and isolating it may be difficult and costly using classical organic synthesis. However, a biological entity may produce an enzyme that is naturally selective for the desired molecule. Using such enzymes in biocatalysis can produce high purity substances in the desired quantities. SciFinder can easily lead scientists to information on these innovative chemical processes.

CAS has continuously enhanced SciFinder since its inception and SciFinder 2007 introduces a slate of new options and features to add additional power to the exploration of CAS' extensive information resources. These improvements will allow users to:

- Combine answer sets for substances, reactions and references – users will be able to combine a saved answer set with an “active” set of answers in SciFinder, to arrive at a focused set of answers; for example, references for a given research topic can be combined with the results of a saved author search; options to “combine,” “intersect” or “remove” answer sets allow the user to include only the desired references from the saved and active sets;
- Export commercial chemical records from CHEMCATS® into Excel – users can move catalog information for commercially available chemicals into spreadsheets for sorting and manipulation.

More information about these and other new features of SciFinder can be found on the CAS web site at <http://www.cas.org>.

Where Have the Chemistry Sets Gone?

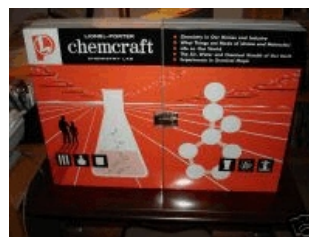
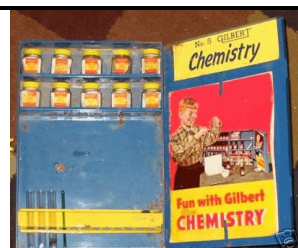
By R.W. Von Korff -

(Reprinted with permission of R. Von Korff and Ann Birch, Editor, The Midland Chemist Local Section Newsletter)

Chemical Heritage has published several articles on chemistry sets and how they fit into the legacy of chemistry.¹⁻⁴ From these articles, two phases are evident in the history of these chemistry teaching tools. In the 1930s–1950s, chemistry sets played an important role in stimulating young people to become chemists or to at least become familiar with chemicals. They provided small wooden or glass containers with solid chemicals as seen in the



cover illustration of Chemical Heritage, Spring 2001. The physical form of an element or compound, whether solid or liquid, crystalline or amorphous, and the color were evident. However, from the 1980s on, a different picture emerges, with dilute solutions replacing the vivid materials of years past. Schmidt suggests that “Liability concerns have forced most of what is ‘dangerous’ out of the sets, no doubt also forcing out some of their mystery and appeal.”¹ Sacks’ initial sentence, “There has been an increasing restriction on the availability of many chemicals in the past 40 years,”² is followed by the citation of the Columbine High School incident as an example of how easily obtained chemicals can be deadly when misused.



With these thoughts in mind, I’d like to illustrate how important an exciting chemistry set was in initiating my research career, and reflect a bit on chemistry sets as they are used today.

My first chemistry set was obtained at the age of 11 in Portland, Oregon, while the family was touring the west. It led to my desire and determination, encouraged by my Dad, to become a chemist. The picture shown below, taken 5 years later, is of my first lab in what had been the sewing room of my grandmother’s home. By this time, I was taking a correspondence course in chemistry. The texts are shown in the upper right of the photo and the chemicals on the shelves to the left. (My experiences in obtaining chemicals from the drug store were nearly identical to those given by Sacks, Linus Pauling as cited by Sacks, and Talkin³.) The experiment in progress involved the preparation of ethyl ether from alcohol (denatured, I’m sure). The source of heat was an open flame fed from a portable acetylene tank; cooling of the distillate was via gravity-fed ice water—definitely a dangerous way to do this experiment as an explosion could have resulted!

In my late teens I was fortunate in having a much larger lab built by my Dad with a fume hood, Kipp generator, analytical balance, gas and water connections, etc. I worked methodically through the chemistry of as many elements as possible using Treadwell and Hall’s text on qualitative analysis as my guide.

In the late 1940s my thesis research at the University of Minnesota required trapping of $C_{13}O_2$ and $N_{15}H_3$. I frequently transported a five-gallon container of several gallons of liquid nitrogen about six blocks by bicycle to the

university lab for my experiments. In various analytical and synthesis projects during my career I worked with perchloric acid in the determination of silicon in iron, perchloric–nitric acid mixtures for wet ashing of agricultural products, or blood to determine silicon from silane-coated plastic tubing used in heart perfusions in the early days of heart surgeries. Similarly, I used diazomethane for methylation, and phosgene and liquid ammonia for various syntheses, all accomplished without problems. In later years I was amazed that some of my biochemist friends refused to have perchloric acid in the lab or were fearful of using diazomethane. I learned that proper planning and care would prevent disasters.

Some 15 years later, while on a National Heart Institute post-doctorate under David E. Green⁵ I was able to break several log jams holding up the publication of a couple of important papers. One involved a coenzyme Green thought to be to be different than Coenzyme A (CoA) while others in the field were sure it was CoA. As he left for vacation, Green assigned me the task of comparing two analytical procedures, one that required what he termed Co-reductase and the other a classical method for the determination of CoA. When he returned from vacation he looked at the data, which showed identical results for the two assays on the same samples. This resulted in a boost to my reputation for the year.

A couple of months later we made a surprising discovery of how Coenzyme A could be isolated in large amounts by a relatively simple process. However, the manuscript could not be released because of the appearance of glutamic acid and glycine, not components of CoA. It was found, by questioning the analysts, that they were using an acid hydrolysis prior to microbiological analysis. This resulted in the release of glutamic acid and glycine, the latter from decomposition of the adenine moiety of CoA and the former from glutathione, an agent used in the isolation of CoA. This finding allowed release of the manuscript⁶ for publication. Later I was involved in the removal of another log jam that involved an answer to the mechanism by which acetate ion is converted to a high energy form (acetyl CoA) for further utilization. Much of the approach that I took to these and other problems can be attributed to those early days in my home lab.

Experiments with chemistry sets in the 1980s were a disappointment to me and failed to interest my oldest grandson in chemistry. (A Harvard graduate, he is now a graduate student with a major in math and physics at the University of California, Berkeley.) To perform an experiment one withdrew a few drops of dilute chemical solution by means of a plastic pipette bulb and added it to a test tube or beaker with other constituents—not exciting or particularly educational. My first reaction was to write letters to the ACS and to the manufacturers of the sets. However, living 700 miles away from my grandchildren and procrastination overcame my first

reaction. But reading about the experiences of others as described in Chemical Heritage rekindled my interest in recounting my own experiences.

It is interesting to speculate on the factors that may be responsible for the decline in the availability and usefulness of chemistry sets. They are probably numerous, including an increase in fear of chemicals due to misuse of tremendous quantities of certain chemicals e.g., ammonium nitrate; fears promoted by increased publicity of environmentally toxic chemicals; changes in the nature of chemical research and teaching methods; and exponential growth in the availability of computers, leading to some attempts at the use of virtual labs employing computer software experiments. One such case I explored was very misleading in regard to safety aspects. Also, experimentation online is a bit like reading hundreds of pages from a good book on a computer screen instead of turning pages by hand in an easy chair...not nearly as rewarding!

I owe an undying debt of gratitude to my wife Jane whom I lost to an amelanotic melanoma after 47 years of marriage. Her everlasting support and encouragement was a priceless gift of love.

—References



1. James Schmidt, “The Chemistry Set: Chemistry’s Legacy of the Home Laboratory,” Chemical Heritage, Spring 2001, p. 12.
2. Oliver Sacks, “Hard Times for Curious Minds,” Chemical Heritage, Spring 2001, p. 27.
3. Phillip S. Talkin, “A Nostalgia Cocktail,” Chemical Heritage, Fall 2001, p. 22.
4. Rosie DiVernieri, “The Chemistry Set: From Toy to Icon,” Chemical Heritage, Spring 2006, p. 22.
5. Institute for Enzyme Research, University of Wisconsin, Madison, WI.
6. Helmut Beinert, R.W. Von Korff, D. E. Green, D.A. Buyaske, R.E. Handschumacher, Harvey Higgins, and F.M Strong, “A Method for the Purification of Coenzyme A from Yeast,” J. Biol. Chem., 200, 385. (1953).

Midland Editor’s Note: Dick has been a member of the American Chemical Society since 1939 and has had a rich and varied career. He obtained his Ph.D. in 1951 from the University of Minnesota and began working with Dr. Lewis Thomas. After six months, he went to the University of Wisconsin at Madison on a National Institute of Health fellowship, working with Dr. David Green, a famous enzymologist. In six months they made three important

discoveries involving CoA and fatty acid oxidation. After a year, Dick returned to the University of Minnesota as an associate professor in biochemistry, working again with Dr. Thomas. According to Dick, Dr. Thomas was not only a great medical research investigator, he was also the author of a number of well-read books and was a frequent contributor to the *New Yorker* magazine. After Dr. Thomas left, Dick worked with Dr. Robert Good, who did the first human bone marrow transplant, then with Dr. John Anderson, head of pediatrics in the medical school. In 1966, he moved to Maryland to become director of biochemical research, initially for Friends of Psychiatric Research, Inc., and then for the state of Maryland's new Maryland Psychiatric Research Center in Catonsville, Maryland. In 1977 he came to Midland as a research professor in biochemistry at what is now the Michigan Molecular Institute, retiring in 1985 at the age of 68.

News From National ACS

ACS Launches Social Networking Site

In late 2006, the American Chemical Society launched a new social networking site targeted to professionals, students, and researchers interested in and working in biotechnology.

BiotechExchange.org provides individuals the opportunity to meet, dialogue, discuss, debate, and interact with other researchers and professionals involved in discovery and process development for the pharmaceutical and bio-based materials industries. BiotechExchange.org provides a forum to share information, identify opportunities, and seek collaborations with fellow scientists and industry professionals. Features on the site include:

- Pre-meeting information from event organizers
- On-site blogs from event attendees
- Virtual poster sessions (including peer-review)
- Audio casts, news feeds, and journal article summaries

In addition, the site will permit the creation of special interest groups. These enable smaller collections of individuals to gather and share specialized information of interest. More information regarding the creation of groups may be found at www.biotechexchange.org.

Call for Scholars Program Applications

The American Chemical Society Scholars Program is now accepting applications for the 2007-2008 academic year. Information and the applications documents can be found on our web site at <http://chemistry.org/scholars>. Applicants can now apply ON-LINE at the same web site.

Alternatively, interested individuals can contact us by e-mail at scholars@acs.org; they can call toll-free 1-800-227-5558, extension 6250; or they can write to:

American Chemical Society - Scholars Program
1155 16th Street, N.W., Washington, D.C. 20036

The ACS Scholars Program and Project Seed are 2001 winners of The Presidential Award for Excellence in Science, American Society of Association Executives Mathematics, and Engineering Mentoring. The ACS Scholars Program is a 1997 winner of the American Society of Association Executives (ASAE) Award of Excellence. The American Chemical Society sponsors scholarship programs for qualified applicants who want to enter the fields of chemistry, biochemistry, or chemical engineering, and students seeking a two-year degree in chemical technology. The programs are designed to encourage African-American, Hispanic, and American Indian students to pursue undergraduate college degrees in the chemical sciences and chemical technology. The goal of these scholarship programs is to aid in building an awareness of the value and the rewards associated with careers in science and to assist students in acquiring the skills and credentials needed for success in these areas.

The scholarships are awarded on the basis of merit and financial need to high school seniors planning a science preparatory program of study, and college students who are currently freshmen, sophomores, or juniors who are committed to the study of chemistry, biochemistry, chemical engineering or other chemically related fields such as environmental science, materials science or toxicology and are interested in pursuing careers in one of these fields. Students interested in two-year chemical technology programs and careers in this field are also eligible. Students must have strong academic records and show an interest in and potential for careers in the chemical sciences. Students intending to pursue careers in medicine are not eligible for scholarship awards. The amount of each individual award will depend upon the availability of funding, the number of scholarships awarded, and evidence of financial need. Scholarships will be given up to a maximum of \$3,000 per year. The awards in the ACS Scholars Program, as well as those in the co-sponsored programs are renewable.

Mentors Wanted!

The U.S. National Chemistry Olympiad Invites You to Apply for the Mentor Position. High School and College educators are invited to apply for a position as mentor for the U.S. National Chemistry Olympiad program. (Preference will be given to high school teachers). To learn more or to apply visit: www.chemistry.org/education/olympiad.html