

THE NUCLEUS

February 1988

Of the Northeastern Section of the American Chemical Society

Vol. LXVI, No. 5

Monthly Meeting:

*Chemical Risks
in the Laboratory*

Norris Summer Scholar Reports

Health and Safety

Historical Notes

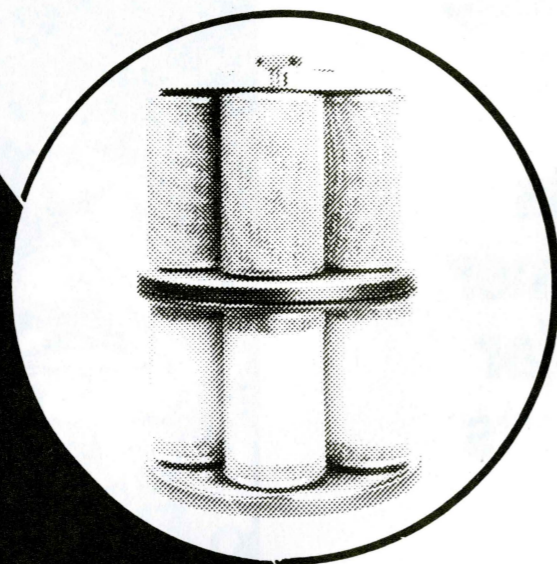


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THE NUCLEUS

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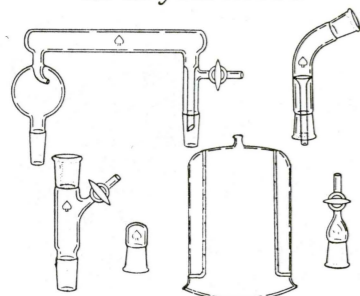


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February Meeting

The 706th Meeting of the
Northeastern Section of the
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Thursday, February 11, 1988

Simmons College
300 The Fenway
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All activities will take place in the Main College Building.

5:30 p.m. Social Hour: Special Function Room

6:30 p.m. Dinner: Fens Cafeteria

8:00 p.m. Lecture: Rm. C101

"Chemical Risks in the Laboratory" by Dr. L. Christine Oliver

Refreshments will be served after the lecture.

Dinner Reservations should be made no later than February 5. Please call the ACS office at 262-9639. Reservations not cancelled at least 24 hours in advance will be charged at the appropriate dinner rate: \$13.00 for ACS members; \$15.00 for non-members; \$5.00 for students; \$8.00 for retired members. Free parking is available behind the Main College Building; enter from Avenue Louis Pasteur. **THE PUBLIC IS INVITED.**

Abstract

*Chemical Risks in the
Laboratory*

Dr. L. Christine Oliver

The 1980's ushered in an era of rising concern about the adverse health effects of exposure to chemicals, both in the occupational and in the environmental setting. This talk focuses on exposure to chemicals in the laboratory, using organic solvents as an example. To be emphasized are detection and prevention of exposure-related illness and disease. The roles of medical surveillance and environmental monitoring, and regulatory requirements for employee notification and education will be discussed. ◇

Biography

Dr. L. Christine Oliver

Dr. Oliver received her A.B. and M.D. degrees from the University of North Carolina in Chapel Hill, and her M.P.H. and M.S. degrees from Harvard School of Public Health in Boston. She is Board Certified in Internal Medicine and Occupational Medicine. She is presently an Assistant Professor of Medicine at Harvard Medical School and a member of the Staff of Massachusetts General Hospital in Boston, where she codirects Occupational Medicine. She takes care of patients with known or suspected occupational disease, and teaches, does research, and consults in the area of occupational medicine. ◇

Coping With Job Loss

The Committee on Professional Relations of ACS has sponsored a new pamphlet entitled *Coping with Job Loss* which is now available from the Office of Professional Relations. The Committee thinks that the information which was included in the pamphlet will be useful to ACS members and others who find themselves unemployed for whatever reason. The intention was to be realistic in assessment and honest in identifying problems that a professional must deal with in the first few weeks of unemployment.

Management and personnel staff are encouraged to obtain copies of *Coping with Job Loss* for distribution at their places of work. Anyone wishing to obtain a copy of the pamphlet should contact

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A new booklet for the '88-'89 season will be prepared soon. We'd like new members to join us in our "hobby". I say hobby rather than work, because it is fun. Call the chairman to get acquainted, and discuss your ideas.

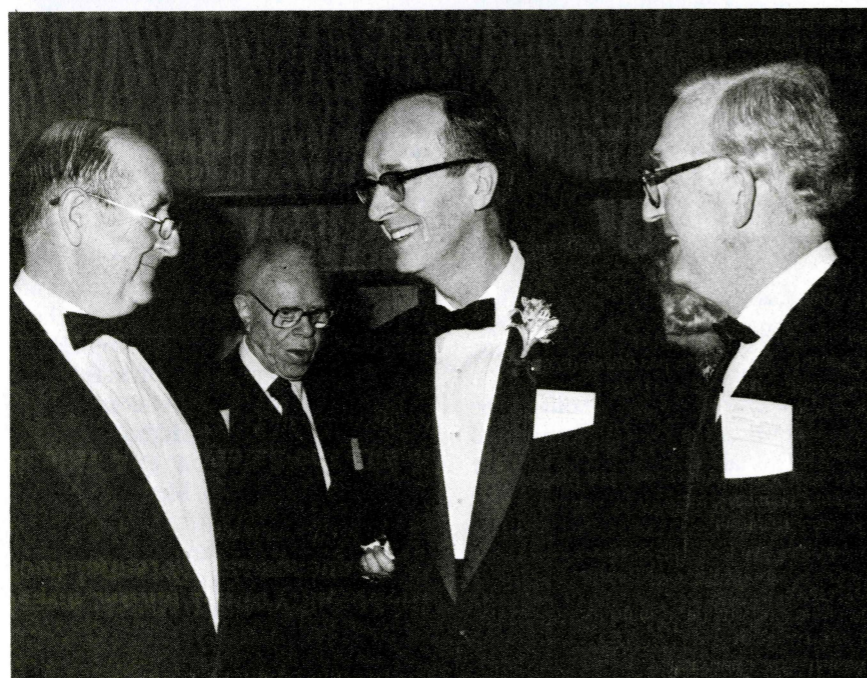
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Mrs. J. I. Lambert (the awardee's mother), Dr. Joseph B. Lambert and Mrs. Lambert

Photos by Andrew Fingland



Dr. and Mrs. Joseph Bornstein (Boston College) speaking with Dr. William Doering (Harvard).

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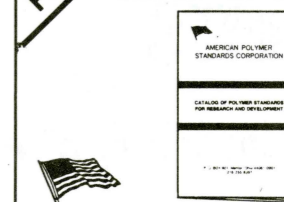
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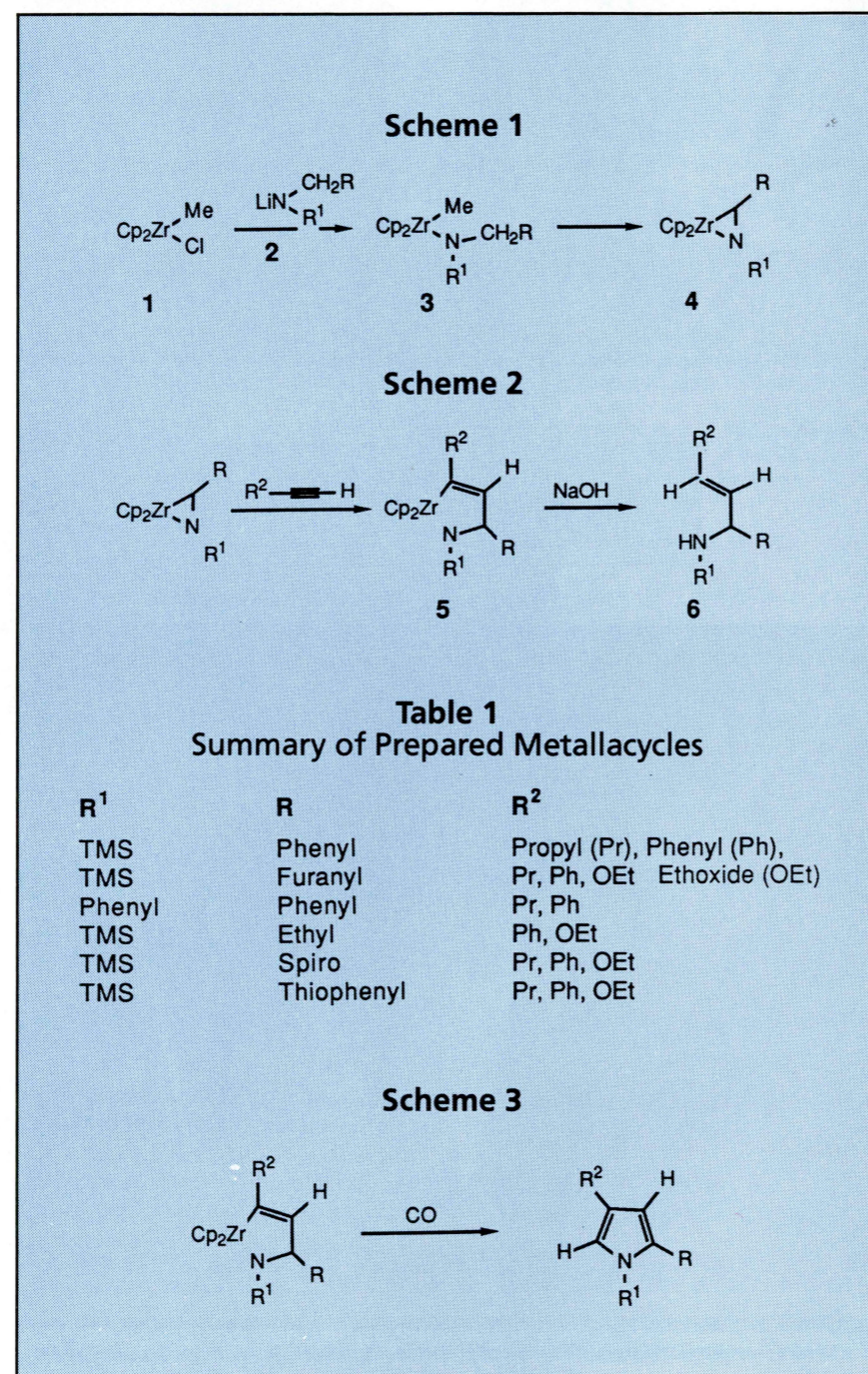
I—Regiochemistry of Alkyne Insertion in a Zirconium-Imine Complex

By Anne Michelle Baranger
Faculty Advisor:
Stephen L. Buchwald
Chemistry Dept., MIT

Organozirconium chemistry has great potential for use in organic synthesis. The zirconocene unit has the ability to simultaneously stabilize and activate small organic molecules. Making use of this ability, many interesting organic molecules can be synthesized from relatively simple starting materials.

The development of the general synthetic route to imine complexes of zirconocene outlined in scheme 1 (below) has enabled the investigation of the synthesis of a wide range of nitrogen containing compounds. Zirconocene methyl chloride (1) is coupled with a lithium amide (2) to form an intermediate amide complex (3). Upon further reaction, methane is eliminated to form the desired imine complex (4). These imine complexes react rapidly and quantitatively with unsaturated functional groups such as alkynes, olefins, carbonyl compounds, imines, and nitriles to form metallacyclic compounds. These metallacycles can be subsequently converted to a variety of nitrogen containing organic molecules.

Of particular interest has been the coupling of terminal alkynes with the imine complex (scheme 2). Insertion of an asymmetric alkyne can, in principle, result in the formation of either the 4-substituted or 5-substituted regioisomers. To determine the regiochemistry of this reaction, a study of the reactions of a number of alkynes with several different imine complexes was undertaken (table 1). Base hydrolysis of the initially formed metallacycles (5) produces the corresponding allylic amines (6). In some cases it was necessary to



acylate these amines to facilitate purification by chromatography. The multiplicity of the vinyl carbons in the proton coupled ¹³CNMR spectra of the allylic amines was used to determine the position of substitution of the olefin moiety. In all cases only the 5-substituted regioisomer was observed. This result is presumably steric in origin.

The alkyne insertion reaction has great synthetic potential. For example, it has been found that reaction of the alkyne metallacycles with carbon monoxide results in the formation of a pyrrole (scheme 3). The entire conversion, which is highly regioselective, to the substituted pyrroles can be performed without the need for the isolation or purification of any intermediates. The conversion of an amine, an inactivated alkyne and carbon monoxide to a pyrrole provides a general method which utilizes readily available, simple building blocks. The generality of the reaction, its experimental simplicity and the mildness of the reaction conditions make this a useful means for the synthesis of polysubstituted pyrroles.

The synthesis of pyrroles is only one example of the usefulness of zirconocene coupled imine chemistry. Future work will investigate the utility of the azazirconacyclopentene intermediates as vehicles for the preparation of a variety of organic compounds including pyrrolinones, allylic amines and α -functionalized allylic amines. \diamond

The Northeastern Section, ACS, awards three summer research scholarships each year to students within the Section. These grants, which are known as the Norris Summer Scholarships, are supported by funds from the James Flack Norris Memorial Trust Fund which is administered by the Section.

II—Stability of IL-1 mRNA: Investigation of the SIB Sequence as a Potential Nuclease Binding Site

By Beth Armitage
Faculty Advisor:
Andrew C. Webb
Dept. of Biological Sciences
Wellesley College

In the past, the kinetics of mRNA expression have been described as falling into two categories. The mRNA is present in the cytoplasm at constant levels if it codes for a protein which is used as part of the cell's structure or regular machinery. If the mRNA codes for a protein which is synthesized in response to a stimulus, then it is not present in the cytoplasm prior to stimulus, appears quickly following stimulus, and remains at a constant level for a many hours post-stimulus.

In the last year it was recognized that for competence factors such as granulocyte-monocyte colony stimulating factor (GM-CSF) and interferon (IFN) and for oncogenes such as c-myc and c-fos, the kinetics of mRNA expression do not fall into either of these two categories. For these proteins, mRNA is synthesized in response to a specific stimulus. However, the cytoplasmic levels peak and then fall off again within a few hours.

Similar kinetics have been found in our lab. Using the human monocytic leukemia cell-line, THP-1, we have been studying the molecular biology of interleukin-1 (IL-1), an important protein in the immune system. The cytoplasmic level of mRNA coding for IL-1 peaks at approximately 3 hours after stimulation of the THP-1 cells with lipopolysaccharide, then falls to 20% over pre-stimulus level within 6 hours, and remains at this latter level for at least 15 hours.

This unusual pattern raised many questions in my mind: What mechanism produces these kinetics? Why is

there a low level of mRNA that remains constant after the peak? What is the significance to the cell of each phase in this time course? In this and other systems, the stimulus which triggers protein synthesis also triggers cellular differentiation. Could the peak of mRNA level act as an internal signal causing this change? Whatever the implication of these unusual kinetics to the cell, they provide a fascinating phenomenon for study.

The first step to understanding the mechanism responsible for these kinetics was to separately assess the contribution of the rate of synthesis and that of the rate of degradation. Experiments called nuclear run-off assays measured the amount of mRNA synthesized from the DNA template. The results were amazing: the kinetics of mRNA synthesis were very similar to those of its cytoplasmic levels. Essentially, the mRNA was being digested as soon as it was transported into the cytoplasm.

A review article written by Brauerman in January explored several hypotheses to account for the wide variability in mRNA stability. He lent particular credence to the idea that there may be enzymes which recognize specific sequences in the mRNA and are thereby triggered to digest it. This mechanism is a well-known way in which DNA is degraded, but no one has yet shown an analogous system for RNA. At the same time, Shaw and Kamen published an article identifying an AU-rich sequence common to the mRNA coding for competence factors and oncogenes with a high degradation rate.

Since a similar AU-rich sequence was present in the IL-1 mRNA, I was excited to explore the validity of Brauerman's hypothesis in our system. I planned to compare the rates of

Continued on page 10.

Stability of IL-1mRNA

continued from page 9.

degradation for the natural mRNA and for a synthetic, control mRNA after exposing them to THP-1 cytoplasmic extract, which presumably contains the digestive enzyme. I chose to construct a control which would be identical to the natural mRNA coding for IL-1 except for an alteration in the AU-rich sequence.

In order to synthesize such a control mRNA in large quantities, it is first necessary to construct a new DNA sequence. In the gene coding for IL-1, the recognition sites for the enzymes Xmn and Stu surround a region, 231 base pairs long, which corresponds to the AU-rich sequence in the mRNA. My goal was to invert this region so that the resulting mRNA would be identical to the original in length and in sequence, except for a nonsense sequence in the AU-rich region.

The IL-1 gene was contained in a pGEM-2 plasmid, and housed in an E.coli strain. The Stu enzyme will only cut methyl-free DNA. Therefore my first step was to isolate the DNA from the storage E. coli and then use a process called transformation to put it into a non-methylating strain of E. coli. After several hours of growth to produce a large quantity of non-methylated plasmid, the DNA was isolated and then cut with Stu and Xmn.

The next task was to ensure that these cuts were successful. In a process called polyacrylamide gel electrophoresis (PAGE), DNA fragments will run through a gel at different speeds with respect to their length due to an imposed electric field. Bands, representing fragments of a unique length, can be visualized under ultraviolet light following staining with ethidium bromide. If the Stu cut were successful, it would result in a single band because within the IL-1 and pGEM sequences there is only one Stu site. If the Xmn cut were successful, it would result in two bands because there is one recognition site in the IL-1 gene and a second in the region of the pGEM plasmid coding for ampicillin resistance. One of the resulting fragments contains the Stu site. Therefore if a Stu cut were to follow an Xmn

cut, this fragment would become shorter by 231 base pairs, resulting in three bands: one the same as in an Xmn cut only, one representing the 231 fragment, and one representing the shortened fragment. By running the results of a Xmn-only digest next to a Xmn/Stu digest on PAGE, it becomes evident if either or both of these enzymes produced a successful cut.

Once a successful cut was achieved, the pieces were religated by a T4 ligase enzyme. Both Xmn and Stu cut the DNA so as to leave blunt ends which can reanneal without necessarily recreating the original sequence. In the IL-1 gene, if half of an Xmn site recombines with half of a Stu site a new Eco RI site is formed. In addition, the other Xmn site in the plasmid which creates a second possible site of recombination occurs in the middle of the Amp-resistance gene. Therefore if there were any recombination at this site, the plasmid would not confer resistance to ampicillin-containing medium therefore prevents the growth of any plasmid which contains recombination at this site.

Once the DNA fragments are religated the resulting plasmids are transformed into a strain of E.coli so that they can be produced in enough quantity to analyze. Each colony consists of a single type of recombination. Then the DNA from each colony must be isolated and analyzed to determine which of the possible recombinations occurred. There were a limited number of possibilities in this case because religation occurred with only three fragments. Recombination at the Xmn site which is located in the amp-resistance gene was eliminated as a possibility because the transformed bacteria were grown on amp-containing plates. Only three possibilities resulting from recombination of the 231 base pair fragment were therefore likely to be found: deletion, inversion, or original orientation. If the original IL-1 gene was recreated, there would be only one Eco RI site and therefore hydrolysis by this enzyme creates a single linear piece of DNA. If the 231 base pair fragment was

deleted, an additional Eco RI site would exist and cleavage by this enzyme results in two fragments. If the 231 base pair fragment was inverted, there would be two additional Eco RI sites created and cleavage results in three fragments. Therefore, by isolating the DNA from each colony, cutting it with Eco RI, and running the fragments on PAGE, the type of recombination can be determined.

My work is now in progress to isolate the clone which contains the inverted 231 base pair fragment. Once I identify this clone, I will use the SP6 system in the pGEM-2 plasmid to synthesize mRNA from the control and from the natural IL-1 gene. Comparison of these two mRNAs with respect to their rate of degradation will provide important insight into the role of the AU-rich sequence in stabilizing the IL-1 message. If it is found to be important to the instability, the next step would be to isolate and characterize the hypothetical enzyme. The synthesized mRNA with the nonsense sequence replacing the AU-rich sequence will be a helpful control to have for these future experiments. ◇

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Health & Safety On My Mind

By M. A. Solstad

Those of you manufacturing, compounding or otherwise using chemicals in fairly large quantities had better pay attention. The phase in portion of EPA's SARA Title III is more than half over. I'll bet some of you didn't even know it had started. I missed the beginning myself; some of the sections are complex to say the least.

That's why, when the fall newsletter of the ABERN Environmental Safety Corporation of Wallingford, Connecticut, was entirely devoted to an overview of SARA Title III, I wanted to share it with you. With thanks to the editor, Howard J. Cohen, CIH.

S.A.R.A. Title III. On October 17, 1986, Congress enacted into law the Superfund Amendments and Reauthorization Act of 1986. One portion of this legislation is Title III, the Emergency Planning and Right-To-Know Act of 1986. A number of events occurred that led to the enactment of the legislation. The most significant of these was the release of methyl isocyanate in Bhopal, India. This tragedy focused public attention on chemical operations in their backyard and the potential for a catastrophic release.

The fact that a well respected company such as Union Carbide was involved in the Bhopal incident, caused the public to question the adequacies of safety precautions at all manufacturing locations. The other issue that catalyzed this piece of legislation was the public's awareness of hazardous waste contaminating the ground and water in their communities. Congress was forced to increase regulations on industries that use chemicals and SARA Title III is the first of probably many other pieces of legislation in this area.

Title III is designed to start communities planning for emergencies and to allow EPA to begin to assess the magnitude of chemical releases into the environment for routine operations. Future legislation will hinge on the results of this data collection and the success that industry has in working with their local

community.

Title III consists of basically four issues:

- Emergency planning (Sections 301-303)
- Emergency Notification (Section 304)
- Community Right-To-Know Reporting Requirements (Sections 311 and 312)
- Toxic Chemical Release Reporting (Section 313)

We have attempted to highlight the requirements of each section. Certain rules published by EPA are final while others are interim and will be finalized later this year. We have included a timetable for the various requirements, a list of the various sections, and a description of the list of chemicals that applies to each section. The timetable for these regulations is extremely tight with some deadlines already gone and others approaching quickly. It will probably take several years for business to comprehend and comply with these regulations.

Emergency Planning. The purpose of this section of the regulation is to initiate emergency planning at the local and state level. The Governor of each state is required to designate an emergency response commission. This commission then divides the state into local emergency planning committees (LEPC). The LEPC consists of elected officials, police, fire, civil defense, public health professionals and others. Fire departments will probably be the focus for many LEPCs.

Each facility that falls under the requirements of these sections of Title III (301-303) must designate by September 17, 1987, a representative to the LEPC. A facility must comply with these sections if it produces, uses, or stores any extremely hazardous chemical at or above the threshold planning quantity set by EPA. Those facilities currently excluded for these requirements must notify their LEPC within 60 days of a change in their status.

The LEPC must develop an emergency response plan by October 17, 1988.

This plan includes:

- Identification of facilities handling extremely hazardous substances (above their threshold planning quantity) and the transportation routes used to bring them to and from the facility.
- Emergency procedures for both on-site and off-site incidents.
- Designation of community and facility coordinators.
- Methods to be employed for estimating the magnitude of an accidental release.
- Equipment available during an emergency.
- Evacuation plans.
- A description and schedule of training programs for emergency response personnel.

Emergency Notification. This portion of Title III (Section 304) is simply an extension to the local and state level of requirements currently mandated by CERCLA. Previously, the National Response Center had to be notified whenever a spill exceeded the reportable quantity established for any of 717 hazardous substances. Title III now requires the additional notification of the state and local emergency planning commissions. Notification must include:

- Chemical name
- An estimate of the quantity of chemical(s) released into the environment
- The time and duration of the release
- The Medium (air, land, water) affected by the release
- Health risks associated with this chemical(s)
- A written follow-up summarizing the incident after it is over

Community Right-To-Know. Facilities, required to have Material Safety Data Sheets (MSDS) under OSHA's Hazard Communication Standard, must submit a copy of their MSDS to their: Local fire departments, state emergency planning commission and LEPC.

Continued on next page.

Health/Safety

continued from page 11.

Alternatively, a list of chemicals organized into health and physical hazard categories may be sent to their agencies. EPA originally proposed to have 23 categories, but they are likely to reduce this to five in order to simplify and encourage the use of chemical lists. If MSDS are sent, updated copies must be forwarded to all three agencies. The alternative list is likely to be preferred by all three agencies, since it reduces the amount of paperwork they must process. The timetable for sending this information is:

- October 17, 1987 for quantities of chemicals stored greater than 10,000 pounds.
- October 17, 1988 for quantities above 500 but below 10,000 pounds.
- October 17, 1989 for all chemicals not previously reported.

More detailed information on chemical storage is required under Section 312 of Title III. A report known as Tier I must be filed by March 1, 1988. It covers all hazardous chemicals as defined by OSHA. The report groups chemicals into categories and requires information as to the volume and location of these chemicals. Tier I reports are sent to the same agencies that receive the MSDS or alternative reports. Any of these agencies may request a more comprehensive report, Tier II, that breaks the inventory into specific chemical species. This section of Title III also has provisions that allow local fire departments to inspect any facility covered by this section.

Toxic Chemical Release Information. Title III requires that EPA establish an inventory of chemical emissions from certain facilities (Section 313). A facility is included in the reporting requirements of this section if it meets all the following criteria:

- Has ten or more full-time employees
- Falls within the Standard Industrial Classification Codes (SIC) 20-39
- Manufactures, processes, or uses a toxic chemical in excess of the threshold quantity set by EPA.

The chemicals list used for this section is currently a list of 300 substances listed as toxic by the states of Maryland and New Jersey. EPA will probably expand this list in the future. The threshold quantities for these chemicals are:

- 10,000 pounds used in any calendar year requires filing by July 1 of the following year, starting in 1988.
- 75,000 pounds manufactured or processed requires filing by July 1, 1988.
- 50,000 pounds manufactured or processed requires filing by July 1, 1989.
- 25,000 pounds manufactured or processed requires filing by July 1, 1990.

The report that must be filed is a comprehensive five page document for each chemical covered by the regula-

tion. The report requires:

- Chemical identity
- Activities and uses of this substance
- Quantity stored at any one time
- Quantity released to air, water and land, including off-site locations.
- Waste treatment information including efficiency and waste minimization.

The report requires, in essence, the facility to perform a mass balance and account for what happens to the chemical as it is used. This section will be a key part of the future EPA to plan and control industrial pollution for years to come.

The requirements of SARA Title III are complex and extensive. The timetables required by Congress will make total compliance difficult if not impossible. ◇

Key Dates to Remember

October 17, 1987	MSDS or list of MSDS chemicals submitted to State commission, local committee and local fire department (§311(d))
March 1, 1988 (and annually thereafter)	Facilities submit their emergency inventory forms to State commission, local committee and local fire department (§312(a)(2))
April 17, 1988	Final Report on emergency systems study due to Congress (§305(b))
July 1, 1988 (and annually thereafter)	Covered facilities submit initial toxic chemical forms to EPA and designated State officials (§313(a))
October 17, 1988	Local emergency planning committees complete preparation of an emergency plan (§303(a))
June 30, 1991	Comptroller general report to Congress on toxic chemical release information collection, use and availability (§313(k))
October 17, 1991	EPA report to Congress on Mass Balance Study (§313(l))

Board of Directors Meeting

Northeastern Section, ACS

November 5, 1987

The Chair, Lloyd Taylor, opened the meeting in the Norris Room, MIT, at 4:40 pm. The following members of the Board were in attendance: E.J. Billo, C. Costello, A. Dey, W. Foye, E. Garber, T. Gilbert, W. Gleekman, M. Hearn, A. Heyn, E.A.H. Hopkins, D. Howell, T. Light, J. Perkins, J. Piper, A. Reis, D. Rickter, M. Simon, M.A. Solstad, and L. Taylor.

Dr. Taylor announced that Robert O'Malley will be the new representative of the Northeastern Section to NERM.

Secretary: David M. Howell briefly described the new electronic method of transferring the meeting minutes that was used for the first time in the transmission of the October minutes.

A number of errors were noted in the minutes for that meeting which have been duly corrected in the official version. The following substantive correction was made by Dr. T.S. Light, Chairman of the Constitution & Bylaws Committee: The Proposed Bylaw Amendment as proposed by the Board of Publications was VOTED in October.

Also, The Budget changes suggested in the October Treasurer's Report were VOTED.

After the corrections were made, the minutes were approved as corrected.

Chemical Education: Michael Hearn, Chairman of the Chemical Education Committee moved that the Board of Directors reconvene as a Committee of the Whole to consider some Chemical Education matters that had been brought up at the last meeting. The motion was seconded and VOTED.

At 5:20 PM, the Committee of the Whole disbanded and it was VOTED to go back into the regular Board meeting. At that time, the regular Board recommenced. The following motion was made, seconded, and VOTED: "Consistent with its enthusiastic support for the High School Chemical Education Program, and with gratitude to those who undertake its hard work and in correction of a clerical error, the Board of Directors of the Northeastern Section

of the American Chemical Society hereby awards an additional Honorable Mention in the 1987 Ashdown Competition."

The Treasurer, James Piper presented his report. The Treasurer's Report was accepted as presented.

The Chairman of the Board of Publications, Arno H.A. Heyn, moved that an additional \$2000 be allotted in the Budget toward the December issue of the NUCLEUS in light of the vote of the October Board of Director's Meeting.

Desk top publishing is still under study. Savings appear to be in the range of \$200 per issue at the most.

The Chairman of the Budget Committee, James Piper announced that it is time for the present committee chairman to submit preliminary estimates for the 1988 budget. The deadline is December 3, 1987 (Remember, the total budget for the section is less than it used to be. Therefore, chairmen should justify their requests.) The Budget Committee will be meeting in December.

In recent years the Budget Committee has been constituted to include the Treasurer as Chairman, the Chairman of the Northeastern Section, The Chairman-Elect, the Chairman-Elect-Elect, and a member of the Board of Trustees. A discussion followed concerning the official dates of beginning and ending each year's budget.

Trustees: Janet S. Perkins commented that the Trustees felt that the Trustees could provide some monies toward the coverage of the Budget Overrun. She will make a proposal to cover this at a later time.

Membership: Lloyd Taylor requested suggestions for a new Chairman of the Membership Committee.

Public Service: It was pointed out by several members of the Board in connection with reviewing the October minutes that Dr. Phyllis Brauner, Chairman of the Public Service Committee, is in fact, Co-Chairman of the Chemistry Day celebration. She is responsible for many of its activities here in the Northeastern Section. Valerie

Wilcox is the official contact with the National ACS staff in Washington.

The meeting was adjourned.
Respectfully submitted,

David M. Howell,
Secretary

The Northeastern Section, ACS ◇

Nominations Sought

Nominations are being received for the 1988 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry. The annual award, consisting of an appropriate scroll and honorarium, is presented by the ACS Northeastern Section. Nominees must have served with distinction as teachers of chemistry in a university, college or secondary school.

Nominating materials should include a curriculum vitae and a listing of honors, awards, and publications, especially those germane to the Norris Award, a nominating letter, and as many seconding letters as are necessary to convey the nominee's qualifications for this award. These letters should outline, in narrative form, the reasons why the candidate is deserving of the Norris Award. They could include comments on the impact of the nominee's teaching at the high school or college level, the influence of the nominee's textbooks, articles or activities on chemical education at the national or international level, and the success of the nominee in inspiring students to spend their professional lives in chemistry. Materials should be of the usual 8½ by 11 size, but should not include reprints of published materials.

Nominating materials should be sent before April 15 to Dr. Emily P. Dudek, Department of Chemistry, Brandeis University, Waltham, MA 02254. ◇

HISTORICAL NOTES

More Biographies of Chemists and Chemical Engineers

Edward R. Atkinson
Amherst, MA

Aubrey K. Nicholson, 84, former chairman of the board of Hollingsworth & Vose Company of East Walpole, died on January 4, 1987. His entire professional career of 54 years was with Hollingsworth & Vose, which he joined after receiving the S.B. in chemical engineering from M.I.T. in 1922. He became vice-president in 1943, president in 1946, and chairman in 1961. In 1971 the A.K. Nicholson Research Laboratory was dedicated in West Groton as an expression of gratitude for his many years of leadership of the company. Throughout his career Nicholson was active in the various trade associations of the paper industry.

Albert Szent-Gyorgi, 93, a biochemistry pioneer, who won the Nobel Prize in 1937 for identifying Vitamin C, died on October 22, 1986. His death preceded by one day that of Edward A. Doisy, 92, who won the Nobel in 1943 for his isolation of Vitamin K and two female hormones.

Extended biographies of Szent-Gyorgi may be found in the *Boston Globe* for October 24 and the *New York Times* for October 25, 1986. He was a native of Budapest. His medical studies began in 1911 and ended in 1917, a period during which he fought in the medical corps of the Austro-Hungarian army on the Russian and Italian fronts. During the 1920's he avoided life under the Hungarian communists by foreign travel, during which he received the Ph.D. at

Cambridge University in 1927. He returned to Hungary in 1932 and remained there until 1947. It was during this period that his work on Vitamin C and on the Krebs Cycle was carried out. His escapades during the Nazi occupation were legendary. One better known to musicians than to chemists was his saving of Zoltan Kodaly's piano from the hands of the invaders.

After arriving in this country Szent-Gyorgi settled at the Marine Biological Laboratory at Woods Hole and for the remainder of his life studied the mechanism of muscle contraction and developed unique hypotheses for the mechanisms of cancer. His views that free electrons were involved in the abnormal behavior of body cells were not

Continued on next page.

Historical Notes

continued from page 14.

widely accepted. His research funds were sometimes cut off because he insisted on carrying out "pure" research, without specific programs.

In protest of the Vietnam war he refused to pay income taxes. He predicted that unless the world population was controlled we would become cannibals. He was a bitter opponent of nuclear armaments.

William Elwood Craig Yelland, 77, retired chemist with the U.S. Army Natick RD & E Center, died on January 19, 1985. Bill was a native of Peterborough, Ontario. He received the B.S. (1930) and Ph.D. (1936) degrees from M.I.T. He spent three years working for Prof. E.R. Schwarz in the Division of Industrial Cooperation at the Institute on problems of the textile industry. A visitor in his laboratory at that time was J.R. Katz, one of the pioneers of polymer science and an international authority on the chemistry of starch. Because starch was the standard warp size in the textile industry it was not surprising that Bill found employment with the Corn Products Refining Co. where he remained until 1945. He then moved to the Harris Research Laboratories in Washington and in 1956 came to the Quartermaster laboratory in Natick where he served as section chief for textile problems including parachute fabrics and their flameproofing. For these services he received the U.S. Army superior performance award.

I first knew Bill when he presided over the quantitative analysis laboratory during my sophomore year at M.I.T. We subsequently enjoyed many a B.S.O. concert together. During his years on the plains of Illinois he learned to pilot small planes. During his Natick years he and his wife made their home in the Fayville section of Southboro where they entertained cats; at one time I think they had about 25, each with its own personality. During his Washington years Bill was active in the affairs of the Masonic order. ◇

College Grants Award Program

The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Inc., and its cosponsoring technical societies, the Spectroscopy Society of Pittsburgh (SSP) and The Society for Analytical Chemists of Pittsburgh (SACP), are happy to announce the 15th year of funding for The Pittsburgh Conference Memorial National College Grants Award Program. At least eight (8) colleges will be selected to receive awards (\$2,500 maximum), based on their submitted proposals, for the purchase of scientific equipment, audiovisual and other teaching aids, and/or library materials for use in the teaching of science at the undergraduate level.

To be eligible for an award, the school must meet these criteria:

- (1) A school must have an enrollment of not more than 2,500 students, and
- (2) Receive no more than 25% of its operating budget from national or

state governments. Two-year community colleges sponsored by political subdivisions of a state are not bound by these requirements.

- (3) Requests for materials to be used only for research purposes shall not be funded.
- (4) Previous awardee schools are not eligible for an award for a three-year period following their award. (For example, the 1985, 1986, and 1987 awardee schools are not eligible for the 1988 program).

Any interested faculty member is urged to participate by completing an APPLICATION FORM and submitting it with a PROPOSAL (original and 3 copies of each), by April 1, 1988, to Richard S. Danchik, The Pittsburgh Conference, Inc., 12 Federal Drive, Suite 322, Pittsburgh, PA 15235. Award-winning schools will be announced by May 1, 1988. ◇

Funding Sources Bulletin Board

Are you looking for federal funding to explore a research idea? Do you need to know who funds research in your area of interest? ACS can help. The Department of Government Relations and Science Policy maintains an experimental electronic bulletin board guide to grants and contracts in the chemical sciences and engineering, for access by ACS members.

The bulletin board is called ChemREFS™, which stands for Chemical Research and Education Funding Sources. All you need to access ChemREFS™ is a computer, modem, and telephone—and best of all, access is free. You only pay for long distance charges you may incur.

Once online, you'll find over 250 files describing chemical research and education programs at a variety of federal agencies, each with its own directory.

Among those represented are: Department of Agriculture, Environmental Protection Agency, National Institutes of Health, and National Science Foundation.

Area-specific and targeted programs, such as instrumentation funding, young investigator programs, and women and minority programs, are described in their own directories.

All files can be downloaded to the user's system. Users can contact the ACS System Operator by electronic mail or by telephone. ACS members interested in obtaining a user manual should contact Ms. Mary L. Tichava, Office of Science Policy Analysis, Government Relations and Science Policy, American Chemical Society, 1155 Sixteenth Street, N.W., Washington, D.C. 20036, (202) 872-4384. ◇

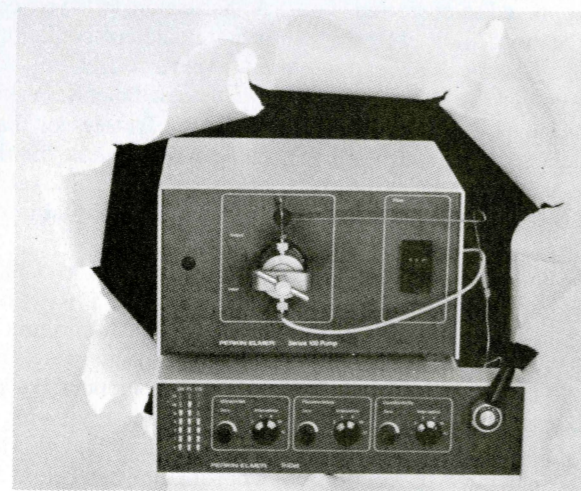
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Calendar

Monday, February 1

Professor David Evans (Harvard)
"Studies in Asymmetric Synthesis"
Brandeis University
Gerstenzang 122 at 4:00 P.M.

Dr. Robert Griffin (MIT)
"Solid State NMR of Proteins"
Boston University
Science Center Room 107 at 4:00 P.M.

Tuesday, February 2

Dr. Paul Davidovitz (Boston College)
"How do Gas Molecules Enter Liquid Droplets to Form Acid Rain?"
Southeastern Massachusetts University
Science & Engineering Building Room 305 at 11:00 A.M.

Monday, February 8

Professor Robert O. Watts (University of Washington)
"Infrared Spectroscopy of Van der Waals Clusters"
Boston University
Science Center Room 107 at 4:00 P.M.

Tuesday, February 9

Dr. Rita Blumstein (University of Lowell)
"Thermotropic Liquid Crystalline Polymers"
Southeastern Massachusetts University
Science & Engineering Building Room 305 at 11:00 A.M.

Tuesday, February 16

Dr. Bonnie Wallace (Rensselaer Polytechnic Institute)
"Biophysical and Biochemical Methods for Studying Protein Structure"
Southeastern Massachusetts University

Science & Engineering Building Room 305 at 11:00 A.M.

Thursday, February 18

Professor Robert J. Angelici (Ohio State University)
"Heterogeneous Catalytic Hydrodesulfurization of Thiophenes in Petroleum: An Organometallic Perspective of the Mechanism"
Harvard/MIT Inorganic Seminar Series
Harvard University
Mallinckrodt Room MB-23 at 5:00 P.M.

Monday, February 22

Professor Glenn McGarvey (University of Virginia)
"Chemical Studies on Polyene Macrolide Antibodies"
Boston University
Science Center Room 107 at 4:00 P.M.

Tuesday, February 23

Dr. Louise H. Foley (University of New Hampshire)
"Biomimetic Synthesis of Natural Products"
Southeastern Massachusetts University
Science & Engineering Building Room 305 at 11:00 A.M.

Monday, February 29

Professor James Ibers (Northwestern University)
"Transition Metal Chalcogenides in Solid State and in Solution"
Boston University
Science Center Room 107 at 4:00 P.M.

For additional seminar information, call:
Boston College—(617) 552-3605
Boston University—(617) 353-2500
Brandeis University—(617) 736-2500
MIT Polymer Seminar Series—MIT
ext 3-3115

Notices for the NUCLEUS Calendar should be sent to:

Marilyn J. Schneider
Department of Chemistry
Wellesley College
Wellesley, MA 02181

Phone: 235-0320, ext 3031

(Note: Material should be sent so that it arrives before the first of the month prior to the month for which the event is scheduled.)

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DIVISION
MEETING

MARCH 5, 1987

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Providence College,
Providence, RI

William C. Griffiths, Roger Williams
General Hospital/Brown Univ.,
"The Role of Chemistry in
Diagnosis"

James Belliveau, Providence College,
"The Analytical Chemistry and
Kinetics Used in Pharmacology"

Michael C. Weiman, Roger Williams
General Hospital/Brown Univ.,
"The Biochemistry of Drug Action
on Cancer Cells"

For additional information,
write to:

Secretary, Department of Chemistry
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