



May Dinner Meeting

"NOBLE METAL-CATALYZED HOMOGENEOUS AND HETEROGENEOUS PROCESSES IN TREATING SIMULATED NUCLEAR WASTE MEDIA WITH FORMIC ACID"

Dr. Bruce King
Wednesday, May 14, 2003

Dinner (Cost: \$14.00) American and Chinese Buffet, soft drinks included (cash bar)
Location: King Buffet - 512 W. Cleveland (near UP Mall)
Social Time: 5:30 p.m.
Dinner: 6:00 p.m.
Seminar: 7:00 p.m.

Abstract:

Stimulants for the Hanford Waste Vitrification Plant feed containing the major non-radioactive components Al, Cd, Fe, Mn, Nd, Ni, Si, Zr, Na, CO_3^{2-} , NO_3^- , and NO_2^- were used to study reactions of formic acid at 90°C catalyzed by the noble metals Ru, Rh, and/or Pd found in significant quantities in uranium fission products. Such reactions were monitored using gas chromatography to analyze the CO_2 , H_2 , NO , and N_2O in the gas phase and a microammonia electrode to analyze the $\text{NH}_4^+/\text{NH}_3$ in the liquid phase as a function of time. The following reactions have been studied in these systems since they are undesirable side reactions in nuclear waste processing: (1) Decomposition of formic acid to $\text{CO}_2 + \text{H}_2$ is undesirable because of the potential fire and explosion hazard of H_2 . Rhodium, which was introduced as soluble $\text{RhCl}_3 \cdot 3\text{H}_2\text{O}$, was found to be the most active catalyst for H_2 generation from formic acid above $\sim 80^\circ\text{C}$ in the presence of nitrite ion. The H_2 production rate has an approximate pseudo first-order dependence on the Rh concentration. (2) Generation of NH_3 from the formic acid reduction of nitrate and/or nitrite is undesirable because of a possible explosion hazard from NH_4NO_3 accumulation in a waste processing plant off-gas system. The Rh-catalyzed reduction of nitrogen-oxygen compounds to ammonia by formic acid was found to exhibit the following features: (a) Nitrate rather than nitrite is the principal source of NH_3 . (b) Ammonia production occurs at the expense of hydrogen production. (c) Supported rhodium metal catalysts are more active than rhodium in any other form, suggesting that ammonia production involves heterogeneous rather than homogeneous catalysis.

Biography:

Bruce King attended Oberlin College and was an NSF Predoctoral Fellow with Prof. F. G. A. Stone at Harvard University. After a year at du Pont and 4 1/2 years at the Mellon Institute, he joined the faculty of the University of Georgia where he is now Regents' Professor of Chemistry. His research interests have ranged from synthetic organometallic and organophosphorus chemistry to applications of topology and graph theory in inorganic chemistry and the inorganic chemistry of nuclear waste treatment. Prof. King was the American Regional Editor of the *J. Organometal. Chem.* from 1981 to 1998 as well as Editor-in-Chief of the *Encyclopedia of Inorganic Chemistry* published in 1994. He is the recipient of American Chemical Society Awards in Pure Chemistry (1971) and Inorganic Chemistry (1991). Since 1990 he has published books entitled *Applications of Graph Theory and Topology in Inorganic Cluster and Coordination Chemistry* (1993), *Inorganic Main Group Element Chemistry* (1994), and *Beyond the Quartic Equation* (1996). Prof. King's hobbies include contract bridge, music, and travel.

RSVP: Doug McMillen (email: dmcuille@iusb.edu or phone: 219-237-4222) by Monday, May 12.

Inside This Issue

Minutes from March Executive Meeting	Page 2
National ACS Position on Local & Divisional Funding	Page 3
Winners of Student Paper Day	Page 4
April Meeting – Contact Lens Recap	Page 5
Local Section Annual Picnic Update	Page 6

**2002 Section Officers**

Past Chair/Web - Bill Feighery
Indiana University South Bend
W - 574-237-4311

F - 574-237-6589
wfeigher@iusb.edu

Chair - Doug McMillen
Indiana University South Bend
W - 574-237-4222

F - 574-237-6589
dmcmlle@iusb.edu

Chair Elect - Dan Brown
Bayer Corporation
W - 574-264-8747
F - 574-262-7886
Daniel.Brown.b@bayer.com

Councilor-Phil Bays
Saint Mary's College
W - 574-284-4663
F - 574-284-4716
pbays@saintmarys.edu

Mem at Large - Rachele Yung
Halsey Drug
W-574-842-3305 ext. 53
F-574
rhall@halseydrug.com

Secretary - Chris Dunlap
St Mary's College
W -574-284-4658
F - 574-284-4716
cdunlap@saintmarys.edu

Treasurer - Pat Boettcher
Dynamic Metal Forming
W -574-295-5525
F - 574-295-5074
boett@sbt.infi.net

Alt Councilor - Deb McCarthy
Saint Mary's College
W - 574-284-4660
F - 574-284-4716
dmccarth@saintmarys.edu

Filterpaper - Andy Edelbrock
Bayer Corporation
W- 574-262-6967
F- 574-262-7886
Andy.Edelbrock.b@bayer.com

NCW - Dave Pearman
Helena Laboratories
W- 1-800-231-5663 x 762
F - 1-409-842-1874
dpearman@helena.com

Minutes from the March Executive Meeting

St. Joseph Valley Section of the ACS,
Executive Committee Meeting
March 31st, 2003; 6:00 p.m.

In attendance: Doug McMillen,, J. Philip Bays, Andy Edelbrock, Pat Boettcher, Deb McCarthy

Excused: Chris Dunlap, Dave Pearman, Rachele Hall, William Feighery, Dan Brown

The meeting was called to order at 6:10 pm in Room 132, Science Hall. The Treasurer's reported that the checking account is currently \$3425.68. No additions have been made to the CD account. There was brief discussion about the 2001 bill for one tour speaker that ACS seems to be double billing. It was decided that Pat will pay one charge and send in both invoices and see it will go away. The February 11, 2003 Minutes were unanimously approved. The next Filter Paper deadline is April 22, 2003. The next Executive Committee meeting will be at 5:15 P. M. immediately preceding the general meeting at Pasquale Rulli's Restaurant on April 28, 2003

Andy reported on the final details of the April 28th meeting. The information will be sent in the Filter Paper due out tomorrow. The undergraduates participating in the Student Paper Day and the eight Chemistry Olympiad finalists and their teachers and parents will be invited. The Section will cover the cost of the students' and the teachers' dinners. Doug has volunteered to arrange the May 14th Dinner meeting that will feature R. Bruce King, an ACS tour speaker.

On behalf of Dan, Andy brought the list of speakers we are requesting for the coming season with the other Sections in our tour area. Once they have been assigned we will receive the list and the dates. Phil gave a brief overview his Councilor's Report from the 225th ACS National Meeting New Orleans. The details will be included in the next Filter Paper (4/2/03). Doug announced the 50-Year ACS members. He will issue a letter inviting them to be the Section guests at a meeting in the fall. Andy noted that the he had received an invitation for section members to attend a conference on Friday, April 25 at the Advanced Photon Source (Argonne National Laboratory). He will send an email to all those in the section that are on email since the deadline for registration is soon.

Phil updated us on Student Paper Day, April 24, 2003. The number of student participants will require three sessions and so he will need six judges. The other Executive Committee members agreed to assist in locating judges or will serve as judges if possible. There was a brief discussion to ascertain why the Section gives a \$50 prize for a literature paper and a \$100 prize for a research paper presentation. We will continue to examine the issue and may consider changing to \$75 in each category. There was no Web Page Update since Chris was home with the new baby boy, Ian Samuel Dunlap. There was no National Chemistry Week Report. Doug will contact Dave Pearman to see if want to continue to be the NCW Coordinator.

Respectfully,

Deb McCarthy
(for Chris Dunlap)



ACS National Section Position on Local & Divisional Funding

YOUR TIME TO VOTE:

The Petition to Increase Funding for Local Sections and Divisions

Ruth Hathaway, Chair
Divisional Activities Committee

Yorke E. Rhodes, Chair
Local Section Activities Committee

In the column that appeared in *C&E News* on February 10, 2003, entitled "The Big Society with the Little Societies Inside", we along with Frank Blum (2002 Chair, Divisional Activities Committee) discussed the funding needs for both Local Sections and Divisions within the ACS. At the recent meeting in New Orleans, Council approved the Petition to Increase Funding for Divisions and Local Sections. Now it is your turn, as members of the Society, to ratify the changes in the Constitution required to change the way we fund these two entities. Shortly, you will receive a ballot to vote on these changes. Below you will find some information that you may find helpful in deciding how to vote.

Local Sections and Divisions have their own Articles in the Constitution (Articles XII and XIII). These member units are constitutionally different from other Society units. The allotments to Local Sections and Divisions are also governed by the ACS Bylaws, so changes to the allotment and structure should be incorporated in the Bylaws. The Board of Directors is required to approve Bylaw changes. The membership must ratify changes to the Constitution.

These changes eliminate dollar amounts for local section and division allotments from the Bylaws and distribute 20 percent of the ACS member dues collected to Local Sections and Divisions, in an effort to support Local Section and Division memberships at a similar level. The dues allotment amounts to be distributed to Local Sections and Divisions are based on the relative number of memberships using the year 2000 as a base, which had 55 percent Local Sections and 45 percent Division memberships. The percentage for funding will stay fixed at 55/45. (Total ACS members belonging to a division number ca. 85,000, with total Division memberships numbering ca. 116,000, due to members with multiple Division memberships; Division dues are required. All ACS members are assigned a Local Section membership, numbering 143,000 in 2000; Local Section dues are optional.)

The petition provides a modest increase in funds to Local Sections and a significant increase in support to Divisions. The funds so allocated will be distributed to individual Divisions (34) and to individual Local Sections (189) by DAC and LSAC, respectively. Council must approve these distribution formulas at least every three years, with prior review of the Board Committee on Budget and Finance.

The Divisional Activities Committee (DAC) plans to distribute the money based on a significant increase in the base allotment; a modest increase in per member allotment; an increase in National Meeting Programming funds; and a fraction for innovative projects, especially those promoting Local Section and Division cooperation and collaboration such as programming at regional and local meetings.

The Local Section Activities Committee (LSAC) will distribute a base amount to each Local Section and a per capita amount, ensuring that each Local Section's current yearly allotment will remain stable. Although there is a normal fluctuation in Local Section allotments due to changes in membership, existing funds will remain effectively the same for each Local Section. Additionally an innovative projects fund will be established to fund Sections with special financial needs that can improve their programming and fund innovative projects that could normally not be funded. Favored new activities will be those that involve joint interaction of Local Sections with Divisions or with other Local Sections.

Local Sections will receive their additional funds in the first year and thereafter. The Divisions' additional funds will be stepped up over four years from 2004 to 2007, when fully funded.

The total increase needed to fund this petition is approximately \$9 per member. This funding will come from a combination of a progressive temporary assessment (to a total of \$8 in 2007) and cost savings/increased revenues in Society operations (\$1 initially). The temporary assessment of \$2 per each year (\$2 in 2004, \$4 in 2005, \$6 in 2006 and \$8 in 2008) is just that, temporary. It will allow the Board to find alternative funding mechanisms within the next 4 years. This assessment will be reviewed at least annually, and if funding is found, the assessment may be lowered or cancelled before 2007.

One of the issues that have led to deficit spending for Divisions is that much of the program money raised in the past from companies, foundations, etc. has become significantly more difficult to acquire. Both Divisions and Local Sections have not been able to fund innovative projects because of additional costs. The new, modest Innovative Projects fund will allow both DAC and LSAC to select and help fund those projects that will have the greatest impact. The revised petition, with the temporary assessment and allocations implemented over time is supported by the Board of Directors and the Society Committee on Budget and Finance, and has been overwhelmingly approved by Council via voice vote in New Orleans. Council has approved the distribution formulas for both LSAC and DAC. All the Officers in the Presidential succession at the time the petition was drafted are signatories on the petition.

The petition supports the two major membership components of ACS. These programs that Divisions and Local Sections conduct are of importance to the entire membership. Firming up our volunteer base will strengthen the Society as a whole, and will benefit us all. Look for your ballot in the mail, and please vote!



SJV Local ACS Student Paper Day

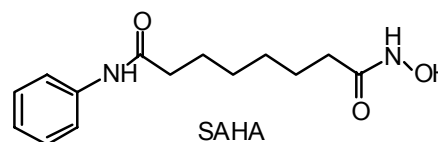
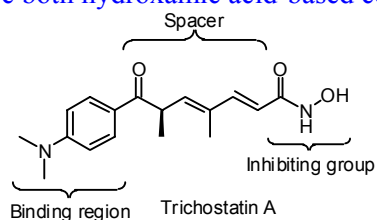
Students from IUSB, Notre Dame and Saint Mary's College competed in the student paper day competition held on April 24th of this year. There were 30 papers presented total and it encompassed three sections: 2 research and 1 literature. There were eleven papers each in the research sessions and eight in the literature. The top papers in the research were awarded a prize of \$100 and the top prize in the literature was \$50. The winners are listed below.

Research Session I **Analysis of CLiP-170 Using Structural and Sequence Determination Programs** **Peter Godlewski - University of Notre Dame**

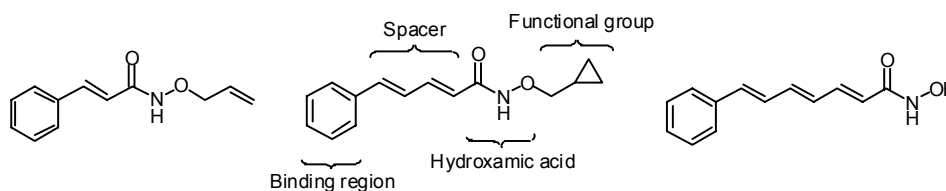
The cytoskeleton is a highly dynamic structure composed of many elements. Cytoskeletal filaments are constantly growing and shrinking in various parts of the cell, while motor molecules use these filaments to move various "cargos" around the cell. Understanding the way the dynamics of the cytoskeleton is regulated is integral in understanding the basics of cell motility and biology. Microtubules are one of the primary types of cytoskeletal filaments. One of the protein families implicated in regulating the microtubule skeleton are the CLiPs. The primary member of the family is CLIP-170, a protein that tracks the plus end of microtubules and stabilizes microtubules in vitro. One aspect of my work was to understand the way CLIP-170 might be regulated, and how this regulation relates to the structure. CLIP-170 is an extended molecule that dimerizes through a long C-terminal coiled-coil. Electron micrographs have suggested that the protein might fold upon itself, interfering with the activity of the microtubule binding motifs that are at the N-terminus. The initial hypothesis was the N-terminus could be interacting with a Zn knuckle domain that is found at the C-terminus. This idea was tested by comparing the sequence data to structure data to look for amino acids like prolines that can induce kinks in coiled-coil regions. A proline region within the coiled-coil was found in CLIP-170 that corresponded to a break in the structure according to our models. Comparison to other members of the CLIP family showed these prolines were at the same distance from the N-terminus regardless of the size of the downstream coiled coil. This seems to refute the idea of the N-terminal domain interacting with the knuckles because of the variable size of the C-terminus. The conserved distance between the beginning of the protein and the bend could prove to be significant and will be the subject of further study.

Research Session II **Synthesis of Potential Histone Deacetylase Inhibitors** **Elizabeth Mocadlo - University of Notre Dame**

Histone deacetylases (HDACs) mediate changes in nucleosome conformation and are important in the regulation of gene expression. Hydroxamic acid-based HDAC inhibitors act selectively to inhibit tumor cell growth. The structure of a bacterial HDAC homologue suggests that HDAC inhibitors have a maximum inhibitory effect when they consist of an enzyme binding region, a spacer, and an enzyme-inhibiting group. Trichostatin A (TSA) and suberoylanilide hydroxamic acid (SAHA) are both hydroxamic acid-based compounds that have proven to be potent inhibitors



In this study, the synthesis of hydroxamic acid-based products with added functionality on the hydroxamic acid and different spacer lengths is investigated. The free hydroxamic acids were also synthesized to serve as standards for the comparison of the functional groups that may induce additional reactivity. The compounds synthesized are currently being tested for HDAC inhibition.





SJV Local ACS Student Paper Day

Literature Session

Fighting Anthrax with a Mutant Toxin **Cameron Collins - Indiana University South Bend**

In a post September 11 world, bioterrorism has become an increasing threat to the safety of citizens in the free world. America has seen first hand how easily diseases such as anthrax can spread, as well as how fast they kill. The bacterium that causes the anthrax infection, *anthracis bacillus*, is a very contagious and lethal toxin that can easily be weaponized. Vaccination is possible, but usually impractical. Antibiotics can be effective, but with the increasing resistance of antibiotics towards pathogenic bacteria, new approaches to the treatment of the anthrax infection must be developed. Recently, mutant forms of a subunit of anthrax have been shown to be potent inhibitors of toxin action in vitro and in vivo.

Anthrax bacilli produce three proteins: protective antigen (PA), lethal factor, and edema factor. The PA facilitates translocation of the lethal factor and edema factor toxins into the cytosol of mammalian cells via a structural change in PA (heptamerization) followed by membrane insertion.

One way to inhibit infection is to block translocation of the toxins. PA mutants have been identified that co-assemble with the wild-type PA and block translocation of the toxins into the cell. These PA mutants have been shown to be strong inhibitors of toxin action, and appear to be useful in the treatment of anthrax infection.

April Dinner Meeting - Contact Lens Recap

Approximately 50 people attended the April dinner meeting, which included guests from the local high school who either competed in the chemistry Olympiad, taught the students or sired the students. In addition, we had several students from the local universities who presented papers at the student paper day. The food was fantastic and the talk was very enjoyable. Dr. Valint led us through the history of contact lenses from the conception at the turn of the 1900-century by Adolf Fick with a lens that covered both the cornea and sclera and required cocaine anesthesia to the more current silicone hydrogel lenses. The first hard polymethyl methacrylate lenses were developed in the late 1940 after RAF fighter pilots that had their canopies shoot up were evaluated for years later and found to have plastic slivers embedded in their eyes and there was no signs of rejection or problems. The first hydrogel lens was made and patented by Otto Wichterle in 1954 and made by spin casting. He sold the patents to a polymer company that was later acquired by Bausch and Lomb in 1971. The soft contact lens can be made by a wide variety of methods and these include rod casting, spin casting, spin-lathe casting and cast molding. Most of the lenses are made from hydrogel polymers that incorporate hydroxyethylmethacrylate HEMA and n-vinyl pyrrolidone (NVP). AccuView contact lenses incorporate 2 % methyl acrylic acid into the hydrogel mix and this increases the water content of the hydrogel from 38% to 58%. The soft contact lens market can only be increased further or make inroads into the spectacle wearers with longer wear lenses or essentially making them less of a hassle. The drawback to the extended wear lenses are they need to be very oxygen permeable because the cornea tissue receives its oxygen through the fluid around the eye and its contact with the air. The next step in the evolutionary ladder was the development of semi-rigid gas permeable contact lenses. These lenses are capable of exchanging around 25% of the tears around them in a blink of the eye compared to soft hydrogel contact lens, which exchange between 1-5%. Unfortunately, they are more rigid than the soft lenses and more people don't seem to be able to tolerate them as well. Research continued into silicone hydrogels where the oxygen permeability is over 50 times as great as the soft hydrogel lenses. Unfortunately these do not wet very well and tend to stick to the eye. It was indicated that in early testing, these contact lenses were capable of tearing out the cornea when they were removed. It was found that with oxygen plasma treatment, the surface could become more wetttable and this appears to be from the silicone being modified to silicates. A question was raised about bifocal contact lenses and how they are made. Dr. Valint indicated that these are made by spinning one lens first and then adding more monomer in the center to form an inner circle at one power and an outer ring at another. This is necessary because as one blinks, the contact lens not only moves up and down and side to side but also spins.



THE FILTERPAPER

Andy Edelbrock
Bayer Corporation
Elkhart, IN 46514

DON'T FORGET **RSVP Monday May 12th for the May Dinner Meeting
ACS Picnic on August 9th – Mark Your Calendar Now**

**If you are receiving a paper copy of the filter paper send your Name
and E-mail address to Andy.Edelbrock.b@bayer.com**



Page 6

St Joseph Valley ACS Annual Picnic

The annual (or almost annual) St Joseph Valley ACS picnic has been scheduled for August 9th this year. The festivities will be at Bendix Woods again but we have a venue change with the DeNeze shelter this year. This shelter is nearer to the playground and has both horseshoe and volleyball areas provided and therefore we only need to bring the shoes and ball instead of everything else. We look forward to seeing more and more people each year. Of course this year, it will even be easier to break the attendance record of last year. Hopefully this is an advance enough notice for everyone to mark your calendars well enough in advance. As always, your entire family is welcome to join us up to about 3rd cousin's 6th removed. We will be supplying the meat, buns, chips, pop, beer, wine, charcoal and chefs as always. We may still require the flare for lighting the charcoal depending on the memory of the lighter people. We only ask that you bring a dish to pass. The gates open at 10:00 and lunch is usually around 1:00. The hard-core members usually have a second round around 5-6. Mark your calendars. We will be sending out a filtercard in July to remind everyone and ask for RSVP's. That way we will know the quantity and quality of items needed. This is your due's money at work, so come on out and enjoy the party. RSVP anytime to [Andy Edelbrock 574-262-6967](mailto:Andy.Edelbrock.b@bayer.com) or Andy.Edelbrock.b@bayer.com. I will only need to know how many adults and children. Any and all games are welcome. Come on out and join the fun and party on the St Joseph Valley Local ACS.