MACTLAC

MIDWESTERN ASSOCIATION OF CHEMISTRY TEACHERS IN LIBERAL ARTS COLLEGES

2007 Annual Meeting Report
The 55th Meeting of MACTLAC
Chemistry at the Interface with Biology: Biochemistry and Beyond
Viterbo University, LaCrosse, WI
October 19 – 20, 2007

General Session 1- Friday Afternoon – 1:00 pm

Ron Amel welcomed the 112 MACTLAC participants to the Friday Plenary session and gave an overview of the meeting. He introduced the Viterbo University team in charge of putting on the meeting: Michael Collins, the program chair; Kyle Backstrand and Dorothy Leonard, registration; Ruth Davis, posters and signs; Vaughn Rodgers, vendors; and Glenn Temple, the Natural Division Chair. Ron then made a few housekeeping announcements about obtaining receipts for registration and tickets for the banquet. He also mentioned computers being available and how people could access them.

Ron then introduced Dr. Mary Hassinger, the Dean of Letters and Sciences, who welcomed the MACTLAC chemists to Viterbo University. In her remarks Dr. Hassinger mentioned that the new building had been opened in the fall of 2003 and that the university serves 2000 undergraduate students. There are seven on the biology faculty, five in chemistry and one in physics. There are 130 science majors, but nearly 300 students when you count nursing and science majors. The philosophy of building the new building was to separate the boundaries between biology and chemistry. The faculty members are together, and the students are integrated. Dr. Hassinger taught chemistry for 15 years before moving into administration. She presented to the group her top ten reasons to teach chemistry at a liberal arts college ending with reason number one being "You really do change lives".

Dr. Hassinger's welcome was followed by Michael Collin's introduction of Larry Que. In 2005 Michael Collins joined Larry Que's research group for a sabbatical. Michael mentioned that Dr. Que has over 400 publications and now is the chief editor of the Journal of Biological Inorganic Chemistry.

(After the Plenary talk the Iowa, Minnesota, and Missouri delegates were directed to meet to elect new state representatives.)

Next Meeting

University of Dubuque, October 17-18, 2008

Molecular Visualizations:
Do Our Students See What We See?

(Full advertisement inside)

Visit the website – www.mactlac.org

Plenary Address

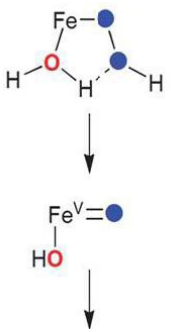
Bio-Inspired Organic Oxidations
Dr. Larry Que
3M/Alumni Professor of Chemistry
University of Minnesota
Summary provided by Michael Collins of Viterbo University

Dr. Que presented the chemistry of high-valent oxo-iron(IV) and oxo-iron(V) compounds in activating oxygen for stereospecific hydrocarbon oxidations. "Fenton-type" chemistry, which has been known for over a hundred years, involves the production of OH radicals from hydrogen peroxide in the presence of iron. These radicals can oxidize hydrocarbons to alcohols and diols, but there is no stereo selectivity in the reaction. The high valent oxo-iron(IV) chemistry carries out oxidations at very high levels of stereospecificity.

These oxo-iron intermediates are also considered to be the active species in the catalytic cycles of mononuclear non-heme iron enzymes that activate oxygen to carry out a wide range of substrate oxidations in most organisms. Within the past four years, such species have been identified in three mono-iron non-heme enzymes, namely Tau-D, propyl 4-hydroxylase, and the halogenase cytC3, and all are characterized as having a high spin iron(IV) center with a Fe=O unit that inserts the oxygen atom into the C-H bond. It is this Fe=O unit that has been synthesized and characterized in a variety of biomimetic complexes containing tetradentate and pentadentate ligands.

"Rieske dioxygenases" also have a mononuclear iron active site, but must store two oxidizing equivalents either in the Fe(III)-peroxo bond or in a corresponding cis[HOFe(V)=O] species. See the figure (analogous to Fig. 19 in X. Shan, L. Que Jr. , *Journal of Inorganic Biochemistry* 100 (2006) 421–433). A functional model for the Rieske dioxygenases has been identified that can catalyze olefin cis-dihydroxylation converting as much as 95% of the H_2O_2 oxidant into cis-diol. The complex of pentadentate N4Py, for

example, is not at all a cis-dihydroxylation catalyst, but complexes of *tetradentate N4* ligands exhibit varying efficacies in converting H_2O_2 into cis-diol. One of these tetradentate complexes, Fe(tpa) (TPA = tris(2-pyridylmethyl)amine), forms cis-[HO-(tpa)Fe(V)=O], after O-O bond heterolysis of its cis-[H_2O-(tpa)-Fe(III)-OOH] precursor. Computational chemistry has shown that this water assisted intermediate is capable of stereo-specific alkene dihydroxylation. The mechanism proposed in the figure accounts for the experimentally observed incorporation of solvent water into the products.



General Session Two – Friday Evening

The Changing Ecology of Science and How That Affects Funding Strategies for Scientists, Educators and Foundations

Dr. Jim Gentile,
CEO, Research Corporation

Dr. Gentile began his talk by discussing the changing forces that guide research and discussed how that affected funding. In his discussion he made the following points.

- In trying to deal with the walls of Science you must begin by understanding the obstacles or impediments
- Funding tends to drive science, so do we set a direction or let evolution work?
- Dr. Gentile spent time looking at a number of the different drivers of science.
- Science research has been transformed by the intersection of the digital revolution, the recombinant DNA revolution, and the instrumental revolution.
- Most scientists use sophisticated instrumentation rooted in the physical sciences and massive data acquisition that creates vast data bases.
- The implications of complex research are that as that knowledge increases, the research becomes more complex.

- Collaboration is an indispensable ingredient of innovation. In an interview 76% of CEQ's thought that collaboration was of great importance but only 50% were doing it.
- Things that catalyze innovation
    - Must think broadly, act personally
    - Must force an outside look every time
    - Must innovate through the integration of science and technology

- Barriers to research exist at the interface of the department. Tenure, promotion, education, training, funding organizations, and peer review can get in the way.

Dr. Gentile then described a number of the goals of the Research Corporation. This involved enhancing and strengthening the scientific curriculum by enhancing research. Research Corporation seeks to raise the national profile of the Research Corporation so as to raise the response to innovation. Some key points to the strategic plan are to ask "what are the emerging needs, where is science going and how is it getting there", and "how can we identify the frontiers?" Research Corporation will seek to provide for institutions initial funding streams, and promote collaborative appointments for research institutions.

Finally, Dr. Gentile mentioned three types of Awards that Research Corporation is proposing for the future, the Cottrell Single Investigator Award, the Cottrell Collaborative Award, and the Cottrell Scholar Program.

The Cottrell Single Investigator Award will be to promote research for the young faculty member at predominantly undergraduate institutions. Only tenure-track faculty members within the first three years of their fist tenure-track appointment will be eligible for single-investigator awards. There will be no renewals of the single investigator awards.

The Cottrell Collaborative Award is to promote research projects that *significantly overlap* within the fields of astronomy, chemistry, or physics regardless of their academic department. $100,000 awards will be available for this grant.

The Cottrell Scholar Program is designed to promote the development of talented young researchers. The Research Corporation will define the topic of the institute. The first of the institutes will be "Water," and it will be hosted at the Biosphere. Details of this program will be made known as it becomes better defined.

Dr. Gentile finished his talk by telling the group what we could do to help each other. He suggested that we form peer review groups and peer review committees to assist one another in putting together the necessary proposals.

General Session Three – Saturday Morning

GlaxoSmithKline Research and Development: A World of Career Opportunities
Dr. Matt Hemberger,
GlaxoSmithKine Principle Scientist

Dr. Hemberger indicated that he wanted to highlight some of the different areas of some of the different drug manufacturing processes. He indicated that he would divide his talk into several major parts. He would start out by discussing a little bit about the world of GlaxoSmithKine to give the audience an idea of what the company was looking for and manufacturing. He was then going to talk about the process of drug discovery, then chemical development, and finally pharmaceutical development. He eventually applied all of these things to graduates trying to get a job in industry.

Key points related to World of GlaxoSmithKine

- ✓ GSK is responsible for 6.3 % of global pharmaceutical sales ($43, 000,000,000)
- ✓ GSK makes prescription medications, vaccines, and consumer healthcare products
- ✓ GSK offers HIV/AIDS and anti-malarial medications at not-for-profit prices
- ✓ Dr. Hemberger discussed the three phases of drug testing employed by GSK
    - Phase 1- Select Drug Target
    - Phase 2 – Demo chemical activity & acceptable safety profile in target patient population
    - Phase 3- Conduct large study to determine safety & efficacy (600 – 10,000)

Key Points to the Process of Drug Discovery

- ✓ Requirements for Drug Discovery Chemist
    - Outstanding People person
    - Creativity
    - Teamwork
    - Integration of the Global Corporation with the Scientific community
    - Domination
- ✓ Drug Metabolism and Pharmacokinetics- The study of the disposition of the drug in the body and the factors affecting it
    - There is a Quantitative Group and a Qualitative Group within this area

Key Points to the Process of Chemical Development

- ✓ At this point you are getting into the three phases of drug testing
- ✓ Efficient medicinal chemist will differ from an efficient process chemist
- ✓ Looked at differences between medicinal chemist and synthetic chemist
- ✓ Took an example molecule and looked at

- Salt selection
- Process of chemical optimization
- Looked at opportunities in chemical development
- Looked at pharmaceutical development – 1600 people in 10 studies
- Looked at important considerations for development of robust and efficacious product
- Looked at impact of development
- Physical properties- can have a dramatic effect on stability and bioavailability and processibility of product
- Degradation chemistry- need to study the degradation chemistry of the active pharmaceutical ingredient & we need to identify impurities and study the degradation of any impurities that are present as well
- Looked at organic chemistry of the molecule- the organic reaction mechanism and intermediates
- Looked at physical chemistry of the molecule- kinetics, thermochemistry, photochemistry.

✓ Formulation- gravitating toward chemical engineering
- Best to formulate the same way if possible
- Analytical Development – To develop robust and practical dissolution method to predict in vivo release profile of different formulations
- Stability Testing- Packaging, Shipping, Heat, Humidity, Etc

Facts Relating to Jobs in Chemistry

✓ Other departments that Chemists fit into well
- Preclinical information Technology
- Regulatory Dossier Filing
- Pharmaceutical Development Quality Assurance
- Regulatory Affairs

✓ Finding a job
- Get an internship even if it does not pay just to get a foot in the door
- Take a second shift to get the foot in the door.
- Use the company website
- Google your interviews. Try to connect.
- It is not what you know. It is who you know.

✓ How important is an ACS accredited degree?
- It does play into it. It is nice to see, but not having one does not eliminate a person.

✓ How much Virtual Chemistry should one get?
- Get as much virtual or computational as possible.

✓ In designing a chemistry curriculum, what do we need to include?
- We need to include how to write.

MACTLAC General Business Meeting

1. President Michelle Applebee opened the meeting at 9:58 am thanking the Viterbo University team for the excellent meeting and arrangements that had been made for it.

2. The second order of business was the approval of the Amendments to the MACTLAC Constitution. There was some discussion about the wording of the amendments. It was agreed upon by the membership to vote on slight wording changes as given below.

   It was moved, seconded, and passed that Article III Section 1 be amended to read as follows.

   Section l. The general officers of the Association shall consist of the President, President-Elect, Past-President and Secretary-Treasurer. The immediate Past-President shall continue for one year as a member of the Executive Council. In addition, each state shall have one representative chosen from its own membership. These State Representatives together with the four general officers shall constitute the Executive Council. **Any State Representative unable to attend an Executive Council Meeting may designate a proxy, from the MACTLAC membership, to represent his or her state**. All individuals, **including proxies**, shall have a vote. A representative of the host institution for the next annual meeting shall have the privilege of attending Executive Council meetings as a non-voting member.

   It was moved, seconded, and passed that Article III Section 3 be amended to read as follows.

   Section 3. Vacancies in the membership of the Executive Council caused by resignation or death shall be filled by a majority vote of the Executive Council. **In the event that the President cannot attend the annual meeting, the President Elect shall preside.**

3. Larry Ferren presented the secretary-treasurer report.

   Larry presented the following treasure's report.

2006– 2007 Treasurer's Report

assets	9/1/06
checking	$7091.60
savings	$ 0.00
total assets	$7091.60
income	
dues collected	$ 919.00
St. Mary's meeting	$ 3555.00
interest	$ 46.88
total	$ 4520..88
expenses	
postage, duplicating, website	$ 135.80
St. Mary's meeting	$ 4423.19
placement, archives	$ 1060.78
total	$ 5619.77
assets	9/1/07
checking	$5992.71
savings	$ 0.00
total assets	$5992.71
increase (decrease)	($ 1,098.89)

The secretary-Treasurer's report was approved as read.

4. Tracy Thompson gave the Archivist report. Tracy announced that she had gotten the 1950's and 1960's material duplicated onto acid-free paper. She is trying to get all of the material duplicated onto acid free paper. Thus far the duplication cost has totaled $148.00. Trace has been organizing and inventorying the material. In the process she has found a number of interesting items including a photo of Linus Pauling attending one of the MACTLAC meetings. About 1000 prints have been allocated for preservation. Tracey has not been printing out all the prints of recent meetings. Instead, they have been placed on a website,"Smugmug.com." She has placed 50-60 prints from the last meeting into acid-free boxes.

Tracy will begin looking at the 1970 & 1980 material soon. The first priority is to get it onto acid-free paper. The question of scanning the documents has been discussed but not resolved. The same is true about placing the photos on the website.

Thus far about 2000 copies have been made, and $375 of the $1000 that has been allocated has been spent of which $148 went toward duplication.

5. Larry Ferren gave the Placement report. He mentioned that the Placement service existed to help qualified candidates find positions in MACTLAC schools where positions were being opened by retirements. It also existed to help those schools locate candidates who shared the values of MACTLAC institutions and to help those two get together. He listed some of the services that were provided by the Placement service for both the candidates and the schools. In his report he mentioned that this past year there were

   7 active candidates seeking positions
   25 positions in MACTLAC schools
   1 placement of a MACTLAC candidate into a MACTLAC school

   At the time of the MACTLAC meeting there were already 13 positions available in MACTLAC schools this year. A number of potential job candidates were attending the meeting and would be going to a special session for them just after the general business meeting. He thanked the Viterbo team for putting together the panel on the topic, "So You Want to be a College Professor".

6. Michelle Applebee announced Iota Sigma Pi, the women's honor society. This group is looking for (female) members and for female honor students in their junior year for the purpose of awarding scholarships. For more information people can try the website: http://www.iotasigmapi.info/.

7. John Moore from the Journal of Chemical Education presented any person in his or her first year of teaching who was also attending the meeting a free one year subscription to the JCE. Seven people qualified for the award and came forward, Julia Barker from Elmhurst College, Kevin Braun from Beloit College, Robert Clark from Valparaiso University, Erin Dahlke from Loras College, Chris Hamilton from Hillsdale College, Laura, Lynch from Grinnell College, and Heather Mernitz from Alverno College. Thanks, John, for the continuation of this long-standing tradition of yours at MACTLAC. Your support is certainly appreciated.

8. Michelle Applebee introduced Brian Johnson from the University of St. Johns/St. Benedict's in St. Joseph, Minnesota as the new Minnesota representative for a three year term, Erin Dahlke from Loras College in Dubuque Iowa as the new Iowa representative for a three year term, and Bernhard Hansert of Westminster College in Fulton, Missouri as the Missouri representative for a three year term. These elections

represent the new apportionment in the bylaws recently passed at the 2004 Clarke meeting. "Election of State Representatives shall occur on a rotational basis every three years (Michigan and Indiana; the next year Minnesota, Missouri, and Iowa; then the third year Illinois and Wisconsin)"

9. By acclimation Michael Ross from the University of St. Johns/St. Benedict's in St. Joseph, Minnesota was elected to the office of President elect for 2008 after the nominating committee entered his name into nomination.

10. Mark Sinton's name (from the University of Dubuque in Dubuque Iowa) was entered into nomination by the nominating committee for the position of Secretary-Treasurer. He was elected by acclimation.

11. By acclimation the general membership approved sending letters of appreciation to the following:
    - Michelle Applebee and her Dean, outgoing President for her year of outstanding service
    - To outgoing State Representatives: Matthew Riehl and his Dean (Minnesota) and Mark Sinton and his Dean (Iowa)
    - To Viterbo University for hosting the outstanding meeting (letters will be sent to the President, the Dean, and to Michael Collins, Meeting Coordinator).

12. Mark Sinton issued an invitation to the 2008 MACTLAC meeting at University of Dubuque October 17 -18, 2008 in Dubuque, IA. The topic is "Molecular Visualizations: Do Our Students See What We See?" Mark talked briefly about the topic of Molecular Visualizations. Viterbo then officially passed the MACTLAC signs to next year's Host.

13. Future meeting sites were announced.

2009	Hope College
2010	Either Luther College or Westminster College
2011	Alverno College

14. The new MACTLAC president, Michael Collins of Viterbo University assumed the duties of office. He awarded door prizes and at the conclusion of the door prizes asked if there was any new business.

15. There being no further business, the motion was made, seconded, and approved unanimously to adjourn (10:45 am.).

Respectfully submitted,

Larry D. Ferren

Larry Ferren, Secretary-Treasurer

Honorary and Emeritus Members

Honorary membership is granted only by a unanimous vote of the Executive Council, and shall be reserved for those persons who have rendered extraordinary service to the Association or who have made noteworthy contributions to the improvement of chemistry teaching in member colleges. To be considered for honorary status, the candidate must be nominated by a colleague in a letter submitted to the Secretary-Treasurer at least one month prior to the Annual Meeting at which the letter is to be considered by the Executive Council. A second letter of support from another colleague should also be submitted at least two weeks before the Annual Meeting. These letters should attest to the criteria needed for honorary membership status.

Emeritus membership is reserved for any person who has been an active member of MACTLAC for 10 years and who has retired from teaching. An Emeritus member will be excused from further payment of dues and will be listed as an Emeritus member. Anyone seeking Emeritus membership should request it, preferably by sending a letter of request to the Secretary-Treasurer of MACTLAC.

No one applied for Emeritus status this year. The Executive Council invites any nominations for Honorary or Emeritus status.

Molecular Visualizations: Do Our Students See What We See?

MACTLAC 2008
University of Dubuque
Dubuque, Iowa
October 17-18, 2008

The use of molecular visualizations in our classes has certainly become much easier with the recent availability of inexpensive molecular visualization computer hardware. We can now present computer based visualizations in the classroom that would have been unheard of even five or ten years ago. The 2008 MACTLAC meeting with thus explore the uses, advantages, and disadvantages of computer based molecular visualization in the classroom.

MACTLAC News

MACTLAC Placement

MACTLAC's Placement Officer maintains a list of faculty positions available within the MACTLAC Colleges. Our goal is to ensure that candidates are in contact with the colleges having positions available. The Placement officer also has a list of candidates who are seeking positions if any schools are interested in making contacts with promising candidates. See the advertisement for MACTLAC Placement on the next page.

A list of available positions is also kept on the website at http://www.mactlac.org/.

MACTLAC Website

MACTLAC's website is located at http://www.mactlac.org/ Feel free to visit the site to get information on the organization and the services that it offers. Check out the links page. There are some things on that page that might be of interest to some of you.

Listserv Set Up for MACTLAC Members

Craig Bieler, MACTLAC's webmaster, has set up a Listserv for the members of MACTLAC to use for discussion of topics of mutual interest.

> *To subscribe*: Send an email to imailsrv@mactlac.org with the phrase 'subscribe mactlacinfo (your full name)' as the body of the letter. Place nothing in the subject.
>
> *To post*: Send your message to mactlacinfo@mactlac.org.
>
> *To unsubscribe*: Send an email to imailsrv@mactlac.org with the phrase 'unsubscribe mactlacinfo' as the body of the letter. Place nothing in the subject.

MACTLAC Placement
Send all Positions
To
Larry Ferren
lferren@olivet.edu

Refer Job Candidates
To the Same Address

Discussion Groups A

Discussion Session: A1
Date: October 19, 2007
Time: Friday 3:00- 4:00 PM
General Chemistry Session
Session Leader: David C. Speckhard, Loras College
Recorder: Michelle Applebee, Elmhurst College (applebee@elmhurst.edu)

Notes:

How do we include Biochemistry and biology into General Chemistry?
Link general chemistry with introduction BIO class?

Salsa experiment for the like of Biology and Chemistry -- extra of salsa ingredients in bulk and then separatory funnel extraction in chemistry lab to then take extractions solution to biology for microbiology

News report review and then go beyond the article to critique the science involved and relate it to theory.

Unit on biomolecules (bonding, polarity, etc) with lab including molecular models (physical and computer) to investigate concepts. Students like physical models (from questioning). Models from MSOE (nylon models). – referenced in a *J. Chem. Ed.* article.

BIO chemistry. 2 is atoms to macromolecules – bonding for chemistry in Ch. 7 or 9 is there a better way to move up bonding in Chemistry?

Why not bonding first, math later?
Can be done and students liked it,
1st semester is bonding, structure, then 2nd semester organic/biochemistry
Stoichiometry is a sophomore class

Thinking of a combined 1st term BIO and CHM course: Environmental theme, students have strong background in BIO and CHM. Problem based/case-study based directive to teach chemistry / biology required. Second theme is fats.
Module approach: Green house gases (1st term), water (2nd term) -- Grinnell (Leslie Lyons)

4 weeks: Lewis dot structures, IR, etc. – team approach

BIOCHEM integrations: GOB for nurses --- take general science with unit conversions and stoichiometry.

Interparticle forces (determinations, solubility applications), periodic trends and bonding, polarity -- then second term look at bigger molecules – metabolic pathways, etc.

Focus on how we represent molecules in different ways, and using tools to apply to larger molecules (e.g. recognize functional groups, relate to polarity, pH for AA and relation to Acid/Base theory).

Integrated core – didn't work, intimidated students – no math, building molecules

2nd semester general chemistry topics taught in semester 3

1st semester was more organic chemistry – no appearance of previous chemistry course. Therefore, it is scary to those with a strong back ground.

BIO has seminar /special topics first term until students have had 1st term of integrated core.

ARE students afraid of the fact its organic chemistry?

--not really, they are ready for organic

Nursing – lose accreditation if student don't pass nursing test the first time.

-- add math to keep from 'killing' people

-- visualize the theory with them.

Incorporate BIO examples –

Why is there longer degradation when a land fill capped?

Mini examples

Cooperate with BIO professors –

What is being taught in what order?

Interact with electron pushing in both area (BIO and CHM)

Drugs (crack vs. cocaine) examples with topics that interest students.

Not covering DNA, transcription, etc – not my knowledge base and covered in other areas

e.g. –**FRAGILE X Syndrome--- 1/130 women carry gene for cognitive disorder -- repeating unit expands "over time" and stops/starts methylation process . Methylation occurs in cancer suppressor genes which then cause mutations**.

Topics of pharmaceutical applications – drugs with biological side effects

Generals of theory – e.g. lock and key mechanism understanding without doing inhibition kinetics.

Discussion Session: A2
Date: October 19, 2007
Time: 3:00 – 4:00 PM
Topic: Organic Chemistry
Discussion Leader: Mark Sinton

Mark: introduced the idea of the frontiers of chemistry and biology. Stated he was a biochemist but finds it hard to incorporate biology into his organic chemistry….difficulty is that his students don't necessarily have a strong enough background.

Everyone introduced themselves name and institution

Joe: Start a chemistry class with why you need to know this stuff…ie: organic with why organic is needed for biologists. His students are biologists taking 1 semester of organic chemistry.

Brad: One interest for many is drugs. So try to approach a class (mainly 2nd semester) with "drug of the day" (can be a class)….teach the organic class by teaching based on a certain drug. Collects pens from pharmaceuticals and asks "pen worthy" questions and students can "win" a pen. You can get the information off the internet. Integrate the information on drugs within the standard organic chemistry topics. "So many drugs not enough time…I don't have time to do all the drugs I would like to do" (Quote of the day). He gave us many examples of how to build concepts around drugs. Molecules and Medicine (by Corey…publisher: Wiley) is a new book that has a lot of this taken care of. (Steve)

Mark: Again it may depend on the students in your class: his don't have enough biology to understand necessarily

Brian: Does a similar thing. Tries to focus on medicinal chemistry but is still teaching the concepts. Also uses environmental examples (ie: oxidations in p450). Doing partition coefficients and acid base chemistry would be some examples. Using medicinal chemistry theme: what happens when you take certain drugs, what happens to your body? His concern: content-what if you don't get to all the 'content' that is expected from us teaching "organic chemistry"? Tries to coordinate with what he can do in lab with what he does in lecture.

Joe: So what do we have to cover in organic chemistry?

Jonathan: All reactions are important….

Mark: Benefits to being ACS certified and not…and what you teach may depend on where you are with ACS certification.

ACS is changing what must be taught in organic chemistry. One core course and an optional advanced course is required. After the 1 core course the students should be ready to take a majors biochemistry course.

Organic text Clayton (oxford press) approaches chemistry by mechanism not functional group so they can hit things in one semester and then go back to the topics again next semester.

One way to cover all the material is to do some of it as pre-lab quizzes when related to a lab topic.

Some students don't want all biological examples…so you should try to vary your examples when teaching.

It's good to enforce in your students an interdisciplinary approach…almost every problem today isn't just chemistry or biology or physics…it's going to be a mix of "subjects"

Personal connections are good….if you are willing to share some data from your own experience (drugs you are on and why…or maybe were in the past) or where you were before and what you did…anything that you can bring in.

Textbooks:

Bruice: Students like it. It has a mechanistic approach and problems are good.

McMarry: has a new book targeted for biology. One person has taught out of it: a lot of errors in problems…maybe has been updated.

Smith: fairly good, some biological examples but a classic text.

Back to the idea of the introduction to organic and then upper level course- Some schools are moving to the intro course and then upper level split for biological and chemical approaches to organic.

More discussion on how to teach organic chemistry with relevance without "other" (biological) background- You need to teach them what they need to know and explain to them that you are giving them organic chemistry tools to understand other aspects of their science experience.

Courses will vary at every school based on what your make-up is.ie: pre-professional, field based biology, all chemistry majors…etc…

Does anyone use a case based approach to teaching? Example: A and B form of DNA and why are there 2 different forms of DNA? What is different chemical….and then study the ring structure or ring conformations….Concerns with case study: with Wikapedia and other online sources they'll have a fast almost "throw away" answer almost immediately. Different research these days-

Case studies that interpret data are more useful than ones where they need to look up information. What is the output of a case study? They answer questions on the case study and on the output of data from the paper. The questions force interpretation of data. It didn't seem that too many people work with case studies.

Others have students look up papers (landmark papers) but not in a case study sense.

Olga: send out new spectroscopy book. Tabor? It had 100-200 problems of mechanism and spectroscopy.

Green chemistry? Atom economy chemistry? Some are trying to think about scale and solvents but not necessarily changing their approach.

Waste disposal: try to find a small company that the big companies sub-contract too…and you may save money!!

Discussion Session: A3
Session Title: Physical Chemistry
Date: October 19, 2007
Time: 3:00 – 4:00 PM
Session Leader: Carolyn Mottley, LutherCollege
Session Recorder: Willa Harper, Olivet Nazarene University (wharper@olivet.edu)

Notes:

Introduced selves—
What do we want to talk about?

Discussion—How do we approach having more Biochemistry students in Thermo, so dropping off population in Quantum (P Chemistry II?)

Some have 1 semester Life Sciences in alternate years from full year (have physics majors in thermo)

Is Quantum more useful for Biochemistry majors?

Is Biochemistry a major? Or is it a different major?

Some have separate majors for it. Discussed rigor of classes—what book to use?

Atkins P Chemistry for Life Sciences used in some rigor and good apps. Some are not very rigorous.

Change Physical Chemistry. For biosciences

Are there good exit (ACS) exams? Exams don't relate things well.

Stand alone vs. class-associated lab for P Chemistry—which is better?
Discussed how we do this at our schools.
One school has P Chemistry and Quant with integrated labs separate from each lecture.
Spec and separations→2 classes of this sort
Thermo & Kinetics

ACS is cutting back lab hours because lab work is so automated
Use some software things like Igor (analysis--$125 coursework, licensure)
Mathcad, etc,
Discussed kinetics/Problems with Excel 2007
ESR-U of Iowa has one.

How do students get involved in undergrad research?

Bring them in early for research.
Logistics for student research—time element
Contact hours vs. semester hours for faculty? Not the same release hours for research for faculty

For getting some students "together" about research—put a definition of "scholarly research" in syllabus

What textbooks are we using for regular P Chemistry?
7th ed. Atkins or 8th ed. / McQuarrie & Simon / Laidler, Meisner, & Sanctuary, Engel & Reid

Who has Web-based homework in P Chemistry? 2 schools do it.
Wed. assign company fee for instructors: $12 for access code; $12 for each semester →for students

Discussion Session: A4
Date: October 19, 2007
Time: 3:00 - 4:00 PM
TOPIC: Inorganic Chemistry
Claude Mertzenich Luther College, Discussion Leader(mertzecl@luther.edu)

Inorganic chemistry at Luther College will be teaching inorganic chemistry starting in 7 week of coordination theory and organometallic chemistry and the second 7 weeks will be solid state chemistry and bioinorganic. A separate physical inorganic course will be taught later that includes group theory.

A junior senior course

Bioinorganic texts

Larry Que

Harry Gray et el

Solid state will it include crystal symmetry? Probably

Structure solving done as final project.

Expand on a single chapter in a standard text

Is primary literature used?

Crystal structure project based on literature within two weeks

Students write short review articles on primary literature and used in teaching the course

Literature used for bioinorganic, materials, and solid state used

Material companion text, Is it used in advanced course as a supplement but not as a primary text?

Are there coordination chemistry examples in materials companion? Not really.

You can not use a single text for the inorganic course.

No text is satisfactory.

Shriver & Atkins (Shriver) and Miessler and Tarr used. Shriver is getting better.

Miessler and Tarr depend on MO diagrams but that is also a weakness.

Bioinorganic taught 1 to 2 weeks at ¾ the way through a course.

Teach 2/3 of a credits worth in a sophomore-junior level course.

Use it near the end of the course as showing applications of coordination chemistry and acid-base theory (hard-soft).

Descriptive chemistry of NO molecule used.

TNT poisoning in a paper prepared for Chemical Educator and chemistry known for 100+ years but not yet worked out

A winter interim course on explosives next discussed

Is there a move for bio-focus of the inorganic course?

No, but this may be more interesting to students. I think other will do it. A use of this with a hook for biology majors to minor or double majors. Others have senior courses that are only chemistry majors.

What can you ask for questions in a bioinorganic chapter? Question can be found in other chapters.

Proteins are nonpolar solvents and a source of ligands.

A third of all enzymes use metals and the metal is what is important.

Que's high-valent Fe(V) was discussed.

Acid-base and redox chemistry is important in bioinorganic chemistry.

Importance of multi electron systems and oxygen activation discussed.

Do you have labs with the course? Bioinorganic labs? Synthesis porphyrins, high-valent metalloporphyrins, cobalt salen (a vitamin B12 model and oxygen binding compound), and redox chemistry.

Importance of crystallography even with biological molecules is growing. This is what is done in many chemistry research papers.

Powder diffraction was discussed and its use in the general and inorganic courses. Simple compounds without crystallization solvents should be easy to do with improvements in crystallization diffractometers.

What equipment is available for laboratory? Vacuum-nitrogen available at some colleges but not glove boxes.

Discussion Session: A5
Date: October 19, 2007
Time: 3:00 - 4:00 PM
Topic: Analytical/Instrumental
Kyle Backstrand, Discussion Leader

How biochemistry incorporated in Analytical (e.g., labs or lecture)?

pH, acid/base; buffers ; impact on peptide/protein structure, enzyme rates…

Many biology majors take quantitative analysis.; many of them need to see why quant is important

Bio students get journal article related to bio principle, using analytical techniques – shows them the relationship b/w analytical and bio; e.g., gravimetric determinations of fat in beef. Write summary, critique and discuss in class.

Iron determination in horse ferritin (done in gen chemistry at Hope) but could be done in analytical (Fe-phenanthroline); find the % capacity of the ferritin used up by the Fe; some computational and some spectroscopic relationship

Vitamin C experiment (kinetics/quant)

Importance of solution equilibria, understanding pH and charge relationships in biological systems; link to biotechnology.

Most schools represented at this meeting offer a biochemistry major; not ACS certified at Hope (a mix of biology and chemistry.); 5 core courses & appropriate additional credits may allow the department. to be ACS approved, and therefore both biochemistry and chemistry would be ACS-approved degrees

Grinnel, Iowa requires research based thesis for chemistry, not biochemistry degree; others require it for both (e.g., Monmouth); Viterbo requires a research component for all sciences (chemistry, biochemistry, bio, etc.) as part of a three-semester sequence (1-writing a proposal, 2-doing the research (year or summer or REU), 3-write formal paper/ presentation); many pre-meds and pre-professionals choose biochemistry major instead of chemistry major. Biochemistry major has lot of courses, not able to require some that would be desired (e.g., instrumental); difficult to meet credit-limitations (e.g., 32 credits). Many Bio folks don't want to take analytical or more chemistry courses. Some bio departments have chosen to require chromatography or environmental analytical techniques—i.e., they see the need for some analytical techniques.

Integrated lab (Monmouth) often taken along with instrumental analysis; some bio or biochemistry students could take that to improve their instrumentation skill/familiarity since they don't take instrumental analysis.

For biochemistry: One semester of p-chemistry; Advanced biochemistry – no lab

What biology courses are part of the biochemistry major? Molecular, bioinformatics, cellular, (Monmouth)

Some allow students to do both a biochemistry and chemistry. Major (double-dipping); many don't allow that, or even getting a minor in chemistry if getting a major in biochemistry.

Concern re: getting enough inorganic into the analytical courses (as well as the biochemistry connection) e.g., the importance of knowing transition-metal chemistry. (Fe, Cu, Mg…) the metal and complexation chemistry important for biochemistry is often overlooked.

Question re: why not doing some analytical experiments in general chemistry (e.g., gravimetric); put more quantitative work in general chemistry and free up more lab time in analytical. Importance of repeating key concepts from general chemistry.

Put some general chemistry/analytical info into organic (e.g., kinetics)

Introducing computer-interfaced experiments in general chemistry. (e.g., Vernier software)

Content-centered vs. discovery approach (process); POGIL activities lead them to new discoveries and learning on their own which is more science-like than just focusing on transmitting content. Can be frustrating for some students; students are more vocal (both good and bad). Active learning in teams (e.g., 3—one is manager, one is technician, write a contract; get a problem to be solved); they get a resource manual for technical work; they devise their experiment, do it, write a lab report and a cover letter re: the solution to the problem, for the client. Do ~10 problems over the course of the semester. Having a client to whom they address their reports/letters helps them focus and know at what level to explain their work. Contracts among student teams have built-in consequences (some of which may include going to see the instructor).

Lab report writing: rubric for letter-writing and for lab-report writing; some checking of each other's work.

Pro's and Con's of teams were discussed. Some teams end up with one person overloaded or taking on too little responsibility. Random selection or professor-selected team-members? Grading – all the same for all team members or different for the individual members? Both some team grades and some individual accountability (e.g., oral quiz on what they're doing). How to teach teamwork? Provide information on how to work

together, establishing a team contract, ethical behavior as a team member, sharing loads equally. Give scenarios re: group dynamics or ethical problems that they need to solve.

Lab sizes : 15 desirable but more often 24 in each section.

Electrochemistry experiments: 3-electrode systems pre-printed on paper (Bioanalytical Systems) to do cyclic voltammetry; disposable & inexpensive. Stripping voltammetry; spectroelectrochemistry; LC-amperometric detection also being done.

Discussion Session: A6
Date: October 19, 2007
Time: 3:00 - 4:00 PM
Topic: Biochemistry
Discussion Leader: Kathleen Parson, Macalester College

Discussion Group A: Biochemistry

A. Introductions:
    a. Issues – 200 vs. 300 level biochemistry, how to teach biochemistry without organic chemistry., creating a biochemistry major, what should be included, what to put in a two part course versus a one semester course, what textbook to use, several first year people, importance of organic chemistry in biochemistry, those with a background in cell/molecular. In a class (mixed with those who don't), active learning techniques in the classroom, how chemistry and biology work together to offer biochemistry courses/curricula.
B. How do you organize your two semester course?
    a. Up through carbon metabolism
    b. Maybe a little nucleic acids
C. In a 200 level biochemistry course – is organic required?
D. Biochemistry in the spring of sophomore year. One semester of gen chemistry., two semesters of organic, and then biochemistry. Med schools don't require two semesters of general chemistry – just really the two semesters of organic. Many med schools are requiring a semester of biochemistry.
E. Co-teach – how do you divide the credits? Rockford – doesn't do an equal split (6 credits for a 4 credit class) 2/3 credits. Team teach in the classroom – both need to be in the classroom – talk to dean.
F. Assessment – use ACS biochemistry exam, ETS has been used, changes in the course in response to assessment data, many assess in a senior capstone course. Maybe this group should set some assessment standards. The test shouldn't drive the course if you use the ACS exam. You need to be responsive to the changes in

science. GRE – integrated in cell/molecular. Some stopped using the ACS . Use of portfolios to document progress. Alverno – one learning event for each class. Viterbo – student reflection, career building, science events. Alverno – college wide, Viterbo – science division.

G. How many turned in Howard Hughes proposals? Could money help solve this dilemma. Course release to a set a faculty? How do you get the biology and chemistry faculty to work together to align their curriculum? Many faculty are over committed: teaching and pedagogy suffers. Equipment needed to offer upper –level lab courses. How much overlap between cell/molecular. Separation courses, and biochemistry labs.
H. What is the realm of the biochemistry lab? What is unique? Ongoing discussions with biologist to discuss the labs. Enzyme kinetics ! Mechanisms. Proteins. Chemistry of techniques, make up the materials as a class. Apply the labs to a problem and research question. That way if there is an overlap – it doesn't matter because it is based on a question. Ames papers based on a general biology course.
I. Does anyone use a lab text book. No one in the room. Time constraint – many are too long. Good biochemical techniques book – is a good supplement.
J. Have students develop a biochemistry lab in groups.
K. Journals Cell Biology Education was suggested in addition to the ACS and ASBMB education journals.
L. Kathleen discussed a handout she created on sabbatical on pedagogy of science teaching. Email her if you want a copy.
M. Discussion of active learning strategies. Case studies approach. Connley's case study book was discussed.
N. Group work – purposeful groups to handle deficiencies
O. Clickers – no one used for biochemistry, but some used in other classes. Low cost clickers (green, yellow, red – red means stop if they don't understand)
P. Use of technology – modeling programs? Bioinformatics activities, rasmol, hyperchemistry,

Discussion Session: A7
Date: October 19, 2007
Time: 3:00 - 4:00 PM
Topic: Liberal arts chemistry
Discussion Leader: David Oostendorp, Loras College
Session Recorder: Andy Axup, St. Ambrose University (axupandreww@sau.edu)
Session Notes: 12 attending

To talk about:

Liberal Arts Chemistry: 6 Gen/Org/Bio: 4 Other topic: non-sci/non-health: 2 Art, Food

Issues: Math Skills
Motivation
Special Topic Courses vs. Traditional Liberal Arts Chemistry

Special topic—all gen educations are special topics—seeking to develop 5 core areas of understanding to round out Liberal Arts curriculum and have students interconnect across disciplines

Relevant labs we remembered as enjoyable by students. For nursing students: use lab manual and present in an interesting way: use instrumentation (IR to confirm aspirin synthesis). Cover topic before needed in other class. (Buffers in chemistry before needed in A & P). Lab experience is memorable even if technical skill is not.

Linking labs over several weeks (Acid content of juice followed by vitamin C next week).

Lab write-up: students like leading questions, less so writing essays

Liberal Arts students may enjoy free response

Nursing enrollment has increased, running out of lab space.
1 semester nursing 5
2 semester nursing 3

Nursing requirement from 10 to 5 to 4 credits.

Liberal Arts Students: seek change in attitudinal, identify relevant from irrelevant. Use C & News for extra credit writing.

Introduce the neat aspects of chemistry. In food chemistry talk about; solubility of sugar in water; freshness of meat; reading food labels.

Create background knowledge, initially mostly lacking without high school chemistry.. (Use smell to correlate molecular shapes.)

Other Trade Books: *Napoleon's Buttons* students assigned chapters and make presentation

What Einstein Told his Cook N.Y. Times Science Section (Tuesdays)

Caveman Chemistry

Philip Ball: *Bright Earth: History of Pigments*
Life's matrix: biography of Water

XCWCS: Patricia Hill: *Short course in Chemistry of Art*

Discussion Session: A8
Date: October 19, 2007
Time: 3:00 - 4:00 PM
Topic: Meet the Speaker: Larry Que
Biological themes in chemistry
Session Leader: Kevin McMahon, Carroll College
Session Recorder: K. McMahon, Carroll College (kmcmahon@cc.edu)

Session Notes:

Q- How can we incorporate biology introductory chemistry curriculum?
A- Difficult to do; can be done, careful planning

Q- What do you need in undergraduates going on to graduate school?
A- Looking for problem-solving skills
Student will find niche
Knowledge base can be improved with choice of courses

Q- How many good students accepted to grad programs in MN?
A- About 50 (1/3 foreign)

Q- What role does working with liberal schools play in recruiting?
A- Very important to host undergraduates/give talks at schools (part of recruiting budget).

Discussion Groups B

Discussion Session: B1
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic: General Chemistry
Discussion Leader: Brock Spencer, Beloit College
Recorder: Gail Vojta, Carroll College (gvojta@cc.edu)

Notes:

Participants discussed some biologically-related labs that they currently use: Fe content in various biologically related compounds, fat module labs, NMR analysis of fats

It was suggested to collaborate with a biology faculty member in the analysis of biochemicals. Biochemistry faculty members are a good resource for labs that would bring biologically relevant examples into General Chemistry.

Discussions between biology and chemistry departments could also be useful. Using similar instrumentation in both biology and chemistry labs (UV-Vis spectroscopy and pH meters, for example) allows students to see how the two fields are related. Using similar instrumentation in both departments may foster development of interdisciplinary experiments.

Participants discussed the pros and cons of bringing more biology into General Chemistry. Many chemistry classes serve biology majors as well as chemistry majors, and it is helpful to highlight the links between biology and chemistry for both groups. It is also important to explore other interdisciplinary links with physics, material science, and math. Some faculty felt hesitant to bring more biology into their courses as their own backgrounds were weak in biology.

Emphasis on environmental issues is also a way to bring biology into the chemistry classroom.

Participants discussed the variety of writing assignments used for lab reports. Resources in the campus' writing centers may also prove helpful for students.

Discussion Session: B2
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic: Organic Chemistry
Discussion Leader: Brian Thompson, Alverno College
Session Recorder: Laura Parmentier, Beloit College (parmentr@beloit.edu)

Start with introductions: 16 participants

One lab that is most cross-disciplinary in lab: hexane, toluene, CH_2Cl_2
Brian N-T: drug discovery, choose a plant, extraction, chromatograph, quantitative assay, then grow the plant, extract, and do the chromatography and assay. Organic chemistry is used as a tool.
Focus on interdisciplinary ~ 2 lab periods

Question—have biology students do some assays and share the week? No

Natural products class, brine shrimp assay, extract something, bioassay, share with biology students perhaps have biology students assay crude, then chemistry students fractionate and quantify to share skills.

Polarimetry-have students bring in something they think is optically active. For example, plant extract fractions would tie in.

Extract lycopene from tomato paste-UV to assess
Spinach leaves – UV-Vis-Chlorophyll a and b, carotenes, column—chromatography (glass pipette)

Q-what is biology lab about? How do we set context that we can connect to as chemists?
A-Do biologists try to incorporate chemistry into their classes/labs? Ha, ha

Larger variation in biology curriculum in general, so background may vary considerably.
Also want to try to make connections within chemistry—model what we teach.
Bring in faculty members into organic class for introductions. Share molecular visualization, inorganic chemistry, etc.
Shift in changing research/teaching models, cross-disciplinary I research more than in teaching—core biology courses have changed much in 10 years.

Back to cross disciplinary approach:
Coordinate biology and chemistry class-shared expertise
Techniques and strategies from own discipline first half
2nd half tem up to solve some problem

Some article in J. Chem Ed. Barriers – structurally barriers, scheduling. Paired courses for 1st years ex. Cell biology and organic share labs.

At Cornell College paired chemistry and physics many years ago. Last spring introduction to biology and introduction to chemistry., 2 blocks, 25 students. Don't know if successful—may be not! Cindy Strong would be a good contact.

At Earlbaum (ask George Lisensky) History, Philosophy; Jerry Baker, Chemistry, Physics

Back to lab idea for a module—collaborative
Ex. at Nathland – phosphate analysis-chemist, limnologist
In H_2O
Had a "hopeful conclusion." But scheduling problems.

Env. Institute in Michigan
Biology students collect sample on boat
Chemistry students analyze in basement – need to make both sides fun
Do it as a team rather than divide students teach each other.

Cell Biologist/biochemist pair team taught lab with biologist. Since upper-level courses, much overlap between students and concepts.

Possible barrier - # of student ex 12 in biochemistry; 50 in cell bio
Can do more discovery with fewer students. As biochemistry enrollments increase, harder to pair with cell biology —too many courses

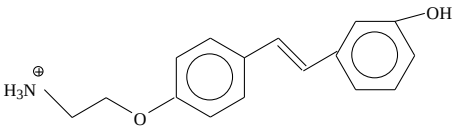
Research-rich labs, have carry over from year to year, generate data and improve OR share data between schools to model research environment

Cholesterol from gall stones – DEPT
Addison Ault (O Crystals
N) CH_2

Competition – 6+ Addison Know
(2),4 – ditrobenyl pyndine

J. Chem Ed.
Index
Look up Addison

Citrus bioregulator synthesis lab
Combine with gene expression – hormonal regulation
Brian Nowak-Thompson - @ Northland
Laura Parmentier @ Beloit will look up reference; parmentr@beloit.edu



Discussion Session: B3
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic: Physical Chemistry
Discussion Leader: Carolyn Mottley, Luther College
Session Recorder: Brad Sturgen, Monmouth College (besturgeon@monm.edu)

Session Notes:

"Lab and Biology"

Kinetics
Use biochemicals for labs
Traditional thermo labs are generally not being taught

Software	**Lab Course**	
Madonna (Kinetics modeling)	final exams	yes/no
GEPASI	notebooks	yes
Igor		

Writing
Long reports
Short reports
Calculation reports
Self evaluations
Group reports (1st author concepts)
Formatting
Peer evaluations not useful

Discussion Session: B4
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic: Inorganic Chemistry
Discussion Leader: Brian Johnson; St Johns and St Benedicts, Saint Joseph, MN
Recorder: Kenton Renkema; University of Evansville (kr79@evansville.edu)

Session Notes:

Hanzer Westminster College - No Inorganic lab, Johnson, Moore, Harper, Hadley, Reihl.

How to introduce schlenk techniques without having to keep up with all the back ground things. Urea with boric acid, poryphin Mn as Oxygenation, Trithiacylcononane, microscale nitrogen triiodide-

Inorganic Experiments, Microscale Synthesis, Angelici's book quite high end, General Chemistry Material Science Companion.

MRSEC, Thermochromic,

J Chem Ed "Ferrofluids"

Discussion on what is being covered in the lower level inorganic versus the senior level course.

Early

Coordination Chemistry, General Descriptive Chemistry for non organic,

Any Bioinorganic books?

Not too many. Often times too high of level for the students

Other text:

Miesser and Tarr Best for symmetry and Bonding

Shriver and Atkins maybe a little glossy, but pretty well rounded.

Sharpe and Housecroft

House and House very descriptive

Rodgers Quite Descriptive. Maybe need to supplement

When is Inorganic Taught?

How are you teaching descriptive inorganic?

Homework, Let students pick somewhat, Help them boil down to generalities. Teach in a jeopardy format.

How to understand the descriptive chemistry?

Use labs to introduce the facts and then try to explain based on generalities why.

What will you do different because of the new ACS guidelines?

More lab sections have opened up.

Very little change for the small departments but not enough faculty to take advantage of the faculty

Still very rigid in our demands.

How to make chemistry more attractive?

Make alcohol ☺ then drink.

Very intentially recruit students out of the freshman courses.

Take the honor sections and get the faculty to present interesting topics throughout the semester, then have them do a research project at the end of the semester.

Take students out. Run more experiments with students.

Discussion Session: B5
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic/Title: Analytical/Instrumental
Discussion Leader: George Lisensky, Beloit College
Recorder: Michelle Applebee, Elmhurst College (applebee@elmhurst.edu)

What Biology are you doing in Analytical / Instrumentation in lab?

Vitamin B1 by fluorescence kinetic assay
HPLC of OTC pain killers – student designed experiments – start with isocratic and buffer better with gradient -- NMR and UV-Vis
Absorption and Fluoresence – Riboflavin – standard curves and unknowns
GC/MS – methyl esters – fats -- make from corn oil, peanut oil, etc
Prepared with NaOMe and THF -- hydrogenate oils (oil, Pt, H_2, charcoal, shake)
Vegetable oil in IR – sunflower, olive, soybean -- get peak positions (average for known and unknown) – smallest value of differences gives unknown i.d.
Iron in food with AA --- Project, find method—[ ] selects method
ashing oven as first step
Head space GC of different age scotches

Course about what biologist need to know about our black boxes.?

Module approach – 21 hours of each instrument (HPLC, GC/MS, electrochemistry, project, IR and NMR,
Hours for instrumentation for majors
1 semester course + 10 freshman year
6 semester hours in instrumentation
1st semester general chemistry. (GC/ IR/ NMR) , 4 semester hours
4 semester hour instrumentation, quant (1/3 is instrumentation), organic and biochemistry
Instrumentation not required. – but many take it.
Extaction of cocaine from money by GC.
Immunoassay cartridges of drug analysis.
Microdistributing technology – drug cassettes
Lynn peavey – forensics presumptive drug testing (Nik paks)
Drugs from Aldrich – 1mg/ml in MeOH

How do we get instrumentation in classes for them to ask how they work?

Ocean Optics – diode arrays -- collect data then determine what wavelength

Used in multiple classes, but need a computer.

Choice of grating and diode array (4000 elements, 0.25 nm resolution)

Freshmen students using it.

Profile and connections are easier to use.

General Questions regarding Analytical

Is there a traditional sophomore wet class? -- Yes

Columns for proteins- are there cheaper ones? -- Guard column is a MUST.

Graphing – template in excel for general to get write graph

-- delta graph ($50), sigmaplot ($800), axum, kaledograph

Discussion Session: B6
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic/Title: Biochemistry
Discussion Leader: Kristy Miller, University of Evansville
Session Recorder: Kristy Miller, University of Evansville (km123@evansville.edu)

Notes:

There was discussion of components of 1st semester and 2nd semester biochemistry lab. 1st semester lab consists of modeling, buffers, kinetics, etc. 2nd semester lab consists of independent projects or class projects that extract, isolate, and characterize a protein.

There was discussion of lipid experiments:

Extraction of triacylglycerol from nutmeg followed by TLC

Extraction of lipid from egg yolk and GC analysis

There was discussion of carbohydrate labs!

Comparison of bacterial and salivary amylase

There was discussion of faculty load of lab hours
Some institutions give 1.5 hours for an afternoon lab, some 2 hours for 3 hour lab, some hour for hour.

There was discussion of assessment measures for biochemistry, suggestions and methods included.

ACS biochemistry exam

Use of lab practical for assessment

Discussion Session: B7
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic/Title: Liberal arts chemistry
Discussion Leader: Mark Sinton, University of Dubuque
Session Recorder: Deborah Breiter, Rockford College (dbreiter@rockford.edu)

Notes:

Introductions – many teach using Chemistry in Context – there other models? How to develop a course with appeal to non-majors?

Nutrition – edible labs

Be sure to look at poster about Chemistry of Food course. Use actual data concerning aspartame, introduce taste-testing of sweeteners. Difficulty with quantitative-pH and logarithms. Use media. pH – color – wonder paper and markers from Crayola – develop their own?

How much science or science with lab required? Quantitative? Some schools require 1Q course from 4 quarter with 2 labs in 2 different disciplines and 2 semesters of class/lab to 2 science courses with no lab

Monmouth has interesting Liberal Arts Sine- 1 course each year – difficulty getting faculty tot each. How long are labs? 2–4 hours. Many non-majors labs are 1.5 hours.

Are GOB courses for non-majors? Not too many use for non-majors. Discussion about teaching majors and non-majors together or separately. Pre-lab? Some use as a screen before doing lab.

Discussion Session: B8
Date: October 19, 2007
Time: 4:15- 5:15 PM
Topic/Title: Meet the speaker: Jim Gentile
Undergraduate research strategies
Discussion Leader: **Jim Vogel, Saint Mary's University, MN**

Notes:
Session Notes:

What is initiative of Research Corp? (Q of Dr. Jim Vogel)

Introduction of Speaker: BS, St. Mary's in biology with Ph.D. and research in genetics/molecular biology

View of science: scientists addressing *problems* as clusters of science/so complex problem can be addressed)

Not removing Cottrell Science Scholar award but non-chemists doing chemistry will be able to apply

Pool split into two: individual and collaborations doing (at same institution) this type of interface science

Questions –
1. conflict of research/interdisciplinary work with course curriculum as disciplinary
A – cut to chase and teach students to *think* as chemists etc. give examples as concepts related to interdisciplinary problems

2. Capturing student interest
A – problem solving, hands-on, new pedagogy

3. undergraduate research program

Most productive/spirited are sophomores/juniors; not seniors

How do you get students motivated?

How do you design an undergrad research projects without being repetitive? Especially in timeframe of undergrads?
A – create team with specific roles; weekly meetings help people "buy-in"; help students find their path for future

Students learn more than science…they learn life lessons

Required research is not necessarily a good idea; those students not wanting to do research can "drag" down and those who do research *want* to and will be faithful.

Undergrad view: "research is scary…we have to do our own work without help"

- Helps to see how research projects correlate to class..bring in parallel experiments
- Also helps to bring people into lab as "workers" not researcher because it makes research less scary

Response: important to bring research into class

- Show excitement and have students summarize
- Bring into experiments
- Show how your friends are involved
- Older students can spark interest in younger
- Be open in who you accept

Research should be brought into teaching load and administration should support it.

David Lopoto/Elaine Seymour > SURE Survey
Examined undergrad research at many schools

- Found those doing undergrad research are best students: purest form of student learning

How can we rearrange curriculum to support research? How can we discuss with administration?

Get to know your Deans as a person.

Discussion Groups C

Saturday 11:00 AM-12:00 PM

Discussion Session: C1
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: The pros and cons of a Natural Science Division Structure
Discussion Leader: James Goll, Edgewood College
Session Recorder: Beth Jensen, Aquinas College (jenseeli@aquinas.edu)

Session Notes:

Gattleuders J.G. (leader) [computer did not allow log in]

James Goll. had NS structure at 2 previous institutions

Both smaller but currently has grown recently

Single chair then split into Biological and Physical Science division tends to meet weekly

Entire dept. (all science) meet less frequently, less accomplished per meeting. Beware of adding another layer of bureaucracy. Better to have single departments reporting directly to Dean.

Issues of mutual interest can be addressed—not dissimilar in other college areas

More cooperation/coordination with other disciplines (e.g., course scheduling)

Collaboration with biology, physics, math?

NS division may not assist with this (say University of Evansville)

Elected senators have “areas meetings” for math, science departments--better to present a unified front on college issues that come up

Rockford College—division chair of larger group have more clout because of representing more people

Principia College—started sort of informally was later recognized by the College and used as template for other faculty groups (“units”) still have departments and department chairs. Each unit is about the same size. Science unit would probably meet regardless of recognition.

Rockford—CUR onsite visit recommended combining chemistry and biology →budget combined, chair could split that back out to the departments

Loras did this 14 years ago; it works OK. Raised awareness of what the other programs do--has not resulted in cross-research

Some colleges need a formal structure to allow them to interact interdisciplinary—others don’t . Compensation for being chair? Most said 1 course (Rockford said 1 hour) release time.

Principia gets none, $2500 instead, but small departments (less than 3 faculty) treated differently than large.

Upper Iowa→ Math, Science Division has senior “movers” on campus, get a lot done, like this. Very small department 1 or 1.5 person department..

Seems to work best if the division has about 10 faculty, works less well with more

Deans don’t want to try to meet with a large number of chairs (10-15 max)

Committee assignments—divisional representation/ some schools require certain number faculty from each division on some or all committees.

Discussion Session: C2
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: Modern pedagogies and technology in large classes
Discussion Leader: Mike Seymour, Hope College
Recorder: Andy Axup, St. Ambrose University (axupandreww@sau.edu)

What is a “large” class?

In a classroom for a section:

120 in auditorium

35, 40-60, 65-70, 80 in General chemistry (ringers with 350)

What are people using?

Webassign.net (Brown LeMay and Bursten): problems associated with book, varies numerical values for each student, limit the number of tries, immediate feedback. Can write own problems, use for pre-lab questions. No cost to school, students purchase access card ($10). Accessible from any internet access. Webassign is independent of publisher. Can modify criteria or write your own.

Quizdom: in class “clicker system.” Collects individual responses and displays class response distribution. Integrates with PowerPoint.

TurningPoint: similar to Quizdom. Now uses RF system. Use in General Chemistry, Introduction to Biology integrates with PowerPoint. 4-5 questions per class. Either multiple choice or numeric response (depending on model). Clickers: ($40) to student; RF receiving system ($95). Is helpful to identify confusion at the time of instruction.

Students are pretty good at bringing to class. The units are small, can be transferred to another student. Students can sell to next year. No licensing issues.

BlackBoard: Load module for your text book from publisher. Used for quizzes. Accept that students may work together, reference materials, etc. Is supplemented with hardcopy portion. Quiz primarily for formative rather than evaluative. You can also use computer lab to do quiz individually. Question set for General Chemistry available from JCEOnline Qbank. It provides feedback. It also has clicker questions.

CD Test bank from publisher:

ERIS (McGraw-Hill): having difficulties with system, provides feedback.

Time spent per week on electronic format:

30 minutes per assignments, perhaps longer if calculation heavy.

Two assignments, due Monday and Thursday, roughly 40 minutes each.

Usually counts about 10% of grade, goal is to get students to do some work.

Value in multiple choice questions as preparation for ACS or other standardized tests. But like to have variety of question types.

ACS exams for final in General Chemistry and Organic Chemistry. Valuable for "Assessment" criteria with national norms.

CPR: Calibrated Peer Review (http://cpr.molsci.ucla.edu/) Writing component for some "writing intensive" courses. Students have to respond to writing prompt, have guiding questions. Can use canned sets or write your own. Students have to calibrate by evaluating examples and then evaluate anonymous papers. They then evaluate their own paper. It's free but you need an administrator at your school. Minimum class size is around 15.

TurnItIn.com: Students submit to website, it's screened for plagiarism, stored, and report returned to instructor. It can also be used for feedback to students.

Summary:

Homework widely done electronically to handle load of grading.

CPR: opportunity to electronically grade writing.

Discussion Session: C3
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: Meet the speaker: Matt Hemberger
Helping students learn the skills they need to be successful professionals
Discussion Leader: Vaughn Rodgers, Viterbo University
Recorder: Vaughn Rodgers, Viterbo University (verodgers@viterbo.edu)

Session Notes:

Some in session wanted some of his skills. He will check to if it's possible.

1. Matt talked about salaries for BS, MS, and Ph.D.

2. Also talked about process to get slide presentation approved.
3. The general consensus was that his talk would be good for a general chemistry class, as far as the need to know solubilities, thermo, kinetics, etc., and the proper method of taking lab notes.
4. The question was asked, "What do two member departments do to help improve instrumentation specialization?" Matt suggested to partner up with Loral industry, to get students coop in science to get experience.
5. What do you look for on resumes? Undergraduate, research, specialization on an instrument, size of school, be able to react to stress

Discussion Session: C4
Date: October 20, 2007
Time: 11:00 AM 12:00 PM
Topic/Title: Establishing cross-discipline collaborations
Discussion Leader: Glena Temple, Viterbo University (ggtemple@viterbo.edu)

Session Notes:

Beloit—interdisciplinary building
Group discussion
Inquiry based teaching

Grinnel—module based

Physical placement makes teamwork

Differences: Lab notebooks
Writing styles

Changing concepts from semester to semester within disciplines vs. cross discipline

"Repeat from lab Notebook"—give a bad example

Grinnell cross-disciplinary grant fund to develop cross-disciplinary courses
Hire people who can teach cross disciplinary
"Chemists/English"
"Chemists/Art"

Barrier—Staffing; time

Math is a barrier

Discussion Session: C5
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: Process Oriented Guided Inquiry Learning (POGIL) in the Biochemistry classroom
Discussion Leader: Christine Rener, Carthage College
Recorder: Kristy Miller, University of Evansville (km123@evansville.edu)

Process Oriented Guided Inquiry that seeks to get students to allow students to come to own conclusions. POGIL developmentally guides students through material. POGIL has been shown to "bring up" weaker students. POGIL addresses and break down misconceptions students often have.

Some goals of POGIL are that students form concepts in their own mind and then apply those concepts. Students seem to prefer active learning method and can see the process. However, some of the more advanced students feel slowed down by this approach. The group dynamic and grouping is critical so that students are kept on a pace they are comfortable. Often the communication skills the "stronger" students develop are very beneficial.

Beware, often when POGIL techniques are first introduced, instructor evaluations can often go down. However, the method is effective in retaining students in the course. It is often important to be consistent in introducing and implementing POGIL techniques. For instance, a POGIL technique or activity is used every Friday.

An example of a POGIL activity involving empirical formula was discussed. In the activity, students are each given a "role" as a presenter, a technician, and a recorder, etc. Instructors often assign the "roles". For instance, if a particular student is shy, make him or her the "leader/manager". Roles are often emphasized for various reasons but one reason is "time on task". Sometimes activities might be too extensive to complete in a one class period unless roles are assigned. One way to check the answer is to have the recorder record the answer on the board and the other groups can see if their answer is correct. Also, a "communicator" role can be assigned in which that person is the only person who can go group to group and determine the correctness of an answer.

Juniors and Seniors tend to be very motivated in understanding the concepts before moving on. POGIL actually allows for individual accountability and also group accountability. If students don't understand a particular question, sometime it should be suggested to the group to "role with it" because often the next question will answer the question.

Unfortunately, there is not a lot of material published regarding POGIL exercise in the biochemistry classroom. POGIL. Organic has a couple of exercises but there is also an individual at Arkansas Tech who uses POGIL only in her biochemistry classroom.

POGIL technique has the assignment of being prepared for class, the class POGIL activity that replaces the lecture, and the POGIL skill exercise is the homework. Sometimes the "strong" students might understand concepts by just reading the text before class but POGIL will allow those students delve into the material in a different way.

There are some data that suggests that students that go on to more advanced courses do better if they have done POGIL than just merely learned by lecture method.

Students get a group grade and assessment for POGIL activity. However, one can implement a quiz after the activity that is individually graded. Some instructors do not grade on how much was accomplished on activity because often the answers that are turned in are very seldom wrong.

In designing one's own POGIL exercise, it is important to determine the goals and outcomes one wants students to comprehend and apply in a certain chapter, etc.

Ideally POGIL is best used in a classroom with 50 or less. When dealing with large class sizes, one can post a list on the classroom door as to what group and role each student is assigned.

POGIL encourages everyone coming to class prepared.

For more information about POGIL: www.POGIL.org.

Discussion Session: C6
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: Viterbo's Science Building: building on a tight budget; conceptual scheme, and tour
Discussion Leader: Mary Hassinger. Viterbo University

Attendance: 18

Attendees: 6 in the dreaming stage, 1 planning now, 1 building now, 3 have new buildings completed, others remodeling or just interested.

Areas discussed:

Advance Planning
Take the time to visit places and talk to people
Project Kaleidoscope workshops
Beloit & St. Olaf – buildings are LEED certified
Visit Fisher / Hamilton headquarters for furnishings details

Architects

Luther College is building now using Opus Design/build
Holobird & Root – many science buildings in Midwest
Monmouth – Burt Hill architects
Viterbo – TCI of La Crosse

Design and planning
Think about teaching pedagogies in master plan
Shapes of teaching spaces
Space organization - mix departments for integration/collaboration
Key area: ventilation
energy conservation
flexibility/mobility
Core facilities such as shared stockrooms

Funding
LEEDS building – people will give to sustainability /energy conservation

Discussion ended with 12 attendees touring the Viterbo University Ethics, Science, and Technology Center (opened Fall 2003).

Discussion Session: C7
Date: October 20, 2007
Time: 11:00 AM - 12:00 PM
Topic/Title: So you want to be a college professor: strategies and tactics. A panel discussion for graduate students, post docs and interested MACTLAC members
Discussion Leader: Amanda Nienow from Gustavus Adolphus; Heather Mernitz from Alverno; Erin Dahlke from Loras; Mark Nussbaum from Hiilsdale, and Wally Fu from Hope
Recorder: Larry Ferren, Olivet Nazarene University (lferren@olivet.edu)

Session Notes:
David Oostendorp gave overview of session
Introduce selves and told where they are in the process
Panel: Wally Fu at Hope College;
Mark Nussbaum at Hillsdale College
Heather Mernitz, Alverno College
Amanda Nienow, Gustavus Adolphus College;
Erin Dahlke, Loras College
David Oostendorp, 21 years at Loras College;
Mark Sinton – University of Dubuque—in midst of search for person
Tracy Thompson – Alverno College– on hiring end

17 people in audience
Julie Barker – Adjunct at Elmhurst
Julius Glenn
Audrey Eigner- – University of MN
Yun Liu- – University of MN
Joe Scanlon - – University of MN
Ashley Jay – University of MN
Kelly Anderson – University of MN
John Lewin – University of MN
Bruce Marquis – University of MN
Amy Stutzman – University of Dubuque
Janice Hall Tomasik – University of Wisconsin, Madison
Erick Leggans – University of MN
Kyle Backstrand- Viterbo University
Mike Collins – Viterbo University
Larry Ferren – Olivet Nazarene University
Adam Moser – University of MN
John Kirk – Visit faculty member, University of Iowa

Ask the new hires about the process they went through – what helped them
1. Having a clear letter of application was important
2. Experience in the classroom was important. Having taught in the classroom was important.
3. One person had 15 applications out. She pulled out after interviewing at Alverno because that was the position she wanted. She researched each institution and each department and tweaked the application to fit the department. She did not apply at any institution that she did not feel that she would fit.

Ask—if you come from larger state school and do not have experience at small school or have not gone to small school, how do you overcome that?
1. It is more important that you are committed to being a teacher and that you know about small liberal arts school.

2. Where you were educated is not that important.

Do you pay attention to research proposal? How do you look at start up funds?
1. We do not have start up funds. We tell the applicant that.
2. For most of us teaching is important. Research varies in importance. It is okay to ask or look at Webpage. If each professor has own page with research interests detailed, research is important. Also, look at the job add for clues.
3. Schools look at research proposals to see if students can do project.

One applicant asked what students are capable of doing in research.
1. Tracy indicated that you have to take students where they are and guide them.
2. Tracy talked about teaching oriented schools
3. Mark Sinton talked about the pace of research being much slower than at research oriented institutions
4. Erin mentioned that in her research statement—she listed some off- shoots that her research could go in.
5. Do not be scared to ask questions and make certain that you fit the institution.
6. Know the mission statement—look over the website.
7. It is okay to ask serious questions.

One applicant felt she was a generalist, but he sees postings that are specific.
1. When special advertisement – may be looking for one to take leadership for area.
2. In 3 member department—probably want a generalist – In a 5 member department may want more of a specialist
3. Do not hesitate to apply if you have the skills, but be honest.

Applications – What about joint positions?
1. Suggest look for cities that have several colleges so spouse might work at different colleges
2. Small community colleges might provide the opportunity for spouses

Interview Process
1. May be asked to teach a class or give a presentation. Do not blow them away with the presentation. You will have undergraduates at the presentation.
2. Ask a lot of questions about your presentation.
3. Ask for time with students without professors being present.

Question for those who came into education from industry.
1. Mark had been in education, then to industry, and back to education. It was easy to justify.
2. Wally was let go by Pfizer—Taught as adjunct. At Hope as adjunct he presented research proposal to Dean. Got hired full time.
3. Communicate that you know what you are after—that you have a passion for teaching; not that you that your industrial job.

4. Sell your industrial experience.
5. You are looking for a vocation, a career, a good fit—not just a job.

How is background viewed?
1. Schools will probe your experience to see how they could use you.

The session ended at noon:

VENDORS

Thanks to the vendors, sponsors and their representatives for coming to this year's MACTLAC meeting.

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President	Michael Collins	Viterbo University
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Secretary/Treasurer	Mark Sinton	University of Dubuque
Placement Officer	Larry Ferren	Olivet Nazarene University
Archivist	Tracy Thompson	Alverno College

State Representatives for 2007 -2008

Illinois	Dawn Wiser	Lake Forest College
Indiana	Kent Renkema	University of Evansville
Iowa	Erin Dahlke	Loras College
Michigan	Mark Nussbaum	Hillsdale College
Minnesota	Brian Johnson	College of St. Benedict/ St. John's University
Missouri	Bernhard Hansert	Westminster College
Wisconsin	Kyle Backstrand	Viterbo University

MACTLAC Weather Report

It has become somewhat of a tradition to mention something of the weather surrounding the MACTLAC meeting.

Friday's Weather- Friday started out as a cool blustery day with temperatures in the mid 45-50 ^{O}F in the morning. The morning started out rainy and overcast. By noon the temperature was up to 55 ^{O}F with no rain. The day was grey however and remained overcast and gloomy.

Saturday's Weather- Saturday's weather started out as a clear cool crisp fall day with temperatures around 52-55 ^{O}F. The skies were a beautiful blue, and the fall colors were brilliant. Groups of children were out wandering the streets. It looked like they were in costumes trick-or-treating early. It was a gorgeous fall day.

Special Note of Thanks to the Viterbo Team

A special note of acknowledgement and thanks is due to and offered to the Viterbo team for their part in seeing that all the notes for all of the discussion sessions were typed before being sent to the secretary-treasurer for publication. Notebook computers were provided in all sessions for recorders for on-the-spot typing of session minutes if the recorder desired to do so. For the recorders who took minutes by hand, those were turned in and were collected by the Viterbo team. They were typed by secretarial staff before being sent on to the secretary-treasurer for publication. This was a huge help and was very much appreciated. I would like to offer a sincere thank you for this kind service that was so typical of the meeting that was put on.

Changing of the Secretary-Treasurer

Typically, the change over to the new secretary-treasurer occurs during the month of June or July following the election of the new secretary-treasurer. Since the new Secretary-Treasurer, Mark Sinton, will also be hosting next year's meeting at the University of Dubuque, he and Larry Ferren and the Executive Council have jointly agreed to postpone the change over until after next year's meeting. The impact of this is that the membership may continue to send address changes and letters of request for Emeritus and Honorary status or refer new members to Larry Ferren at Chemistry Department, One University Avenue, Olivet Nazarene University, Bourbonnais, IL 60914 until that time.

After next year's meeting Mark will receive all of those items at his location, Mark Sinton, Department of Natural and Applied Sciences, University of Dubuque, 2000 University Ave., Dubuque, IA, 52001.