

MACTLAC

MIDWESTERN ASSOCIATION OF CHEMISTRY TEACHERS IN LIBERAL ARTS COLLEGES



**2019 Annual Meeting Report
The 67th Meeting of MACTLAC
The Chemistry of Art and Artifact Restoration
St. Catherine University, St. Paul, MN
October 11-12, 2019**

General Session 1, Friday Afternoon, 1:00 PM

Dr. Rebecca Loenig Roloff, President of St. Catherine University, opened the meeting by welcoming everyone to St. Paul for the meeting. Dr. Roloff then mentioned that Sister Mary Thompson, a former President of MACTLAC, was her first year chemistry professor. Dr. Roloff spent a few moments describing Sister Mary and the rest of the chemistry faculty at St. Catherine University. Dr. Roloff then mentioned the connection between St. Catherine University's fashion design program and today's presentation topic: the restoration of Prince's clothing. She then briefly described the history of the University. Dr. Roloff then introduced James Wollack, Chemistry Department Chair, who then introduced today's speaker.

Plenary Address

The Chemistry of Art and Artifact Restoration
Thomas Braun, Head of Conservation and Senior Objects Conservator
Minnesota Historical Society
St. Paul, MN

Mr. Braun begin his presentation by thanking everyone due to the fact that chemistry is of major importance in restoration and conservation. He then when on to define the difference between restoration and conservation. For him, restoration is the preservation, or returning an object to a previously know or presumed state, and may include methods to increase its value. Conservation is about saving the history of the object for the future, not returning it to its original state. Conservation is about letting the artifact tell a story, which restoration isn't concerned about. Restoration often uses modern material to complete a restoration, which conservation tries not to do. Conservation is also concerned about reversibility, so that older conservation work can be undone if needed.

Mr. Braun then mentioned that there are now conservation specialists, who only work on certain types of artifacts such as paper item or wood items. A newer speciality is electronic media conservation when the older technology on which they were generated are no longer manufactured.

He next talked about how conservationists are trained. Conservation began in Europe during medieval times. Those early conservationists wanted to keep oil paintings looking nice, so they had to learn various techniques to do that. For example, oil painters often used a varnish that would yellow over 50 years or so, so collectors wanted individuals to remove the varnish without moving the underlying paints. At that time, conservation training was by apprenticeship, which continued until the 1960's and 1970's. Around that time, conservationist became aware that more training was needed, particularly chemistry. Today, most conservationists do not do

apprenticeships, but are instead graduates from Master or Ph.D. level conservation programs. Master level students usually go to work at a museum, while the Ph.D. graduates often go into teaching and or conservation research. Only about 40 students graduate from all US and Canada conservation schools. Job applicants with a chemistry major are highly sought, but all applicants must have an art background, have a portfolio, and have about 350 hours of volunteer work with a conservationist. Three letters of reference from practicing conservationists are also required.

Mr. Braun next presented several examples of before and after pictures of artifacts that have been conserved. The first was of a wood and wicker chair that is located at the Alexander Ramsey House (Mr. Ramsey was the first Minnesota and Wisconsin Territorial Governor) that had been conserved, over half of which needed conservation work. This particular chair is the last of a set that was at the house.

In his second example, Mr. Braun described how the deterioration of early plastics, such as cellulose nitrate, cellulose acetate, and cellulose esters, is a continuing problem. Many of them are highly flammable (the nitrates, in particular), and as they degrade, they release acids which begin to deteriorate any underlying substrates. In this particular example, Mr. Braun described the conservation work done to a ladies fan, which ultimately required that it be photographed and then disposed of as there was no modern material that could be used to replace the cellulose based plastics as are not manufactured any longer. He then described the work done to conserve a similar ladies fan that used ostrich feathers. This conservation project was more successful as ostrich feathers can still be obtained.

Mr. Braun then described conservation work on another plastic based artifact: a plastic Charles Schultz Charlie Brown doll. One of the problems that conservationists are running into is that they don't know how more modern materials age and change over time. In this particular example, the plasticizer had begun to ooze out of the plastic, which appeared as a white discoloration of the surrounding material. The plastic on one of the feet had also become deformed. Mr. Braun described how he was able to get the plasticizer removed and the foot readjusted.

Another example was the conservation of a revolver used by St. Paul Detective Henry Cummings. Detective Cummings was involved in a gun fight between himself and Robert Dillinger. The gun was donated to the Society by the granddaughter of Detective Cummings. When it was received, oils from years of handling the gun had begun to corrode the brass bevel in the gun's handle, which had to be removed to prevent further deterioration of the bevel. There were also several other issues with this gun that had to be conserved.

Mr. Braun then wrapped up his presentation by describing his work to conserve Prince's clothing. The most famous article in the Society's possession is his Purple Rain trench coat, given to the Society by Prince himself. He actually had several of these made, but this particular one is the outfit he used in his Purple Rain film in 1984. The coat also includes the shirt, pants, gloves, and other items that he always wore with it. The major issue they faced when conserving this item is ultraviolet, visible, and infrared light induced fading. Since this item is highly prized for showing, fading due to lighting is a constant problem. When shown, UV and IR filtered lighting must be used with as low a light visible light level as possible. It must also be rotated while on display so as to prevent uneven fading. Lighting must also be on motion sensor control, so that when no one is looking at the coat, all lights can be turned off. Other conservation issues they faced when working with this item was the sweat generated by Prince when he wore the coat.

Mr. Braun has also worked on one of the motorcycles used by Prince while filming Purple Rain. This conservation mostly involved cleaning it and keeping it running (even though running it may never be required in the future). This is an example of what conservationists called large functional items, which need to be conserved in such a way that they are fully functional. Large

functional items are always present a conundrum since their motors need to be run in order to conserve them, but the running of the motor also causes more deterioration.

Mr. Braun closed his presentation thanking everyone in attendance.

Kim Ha then mentioned that the next thing on the schedule will be the breakout sessions. She reminded the Minnesota, Iowa, and Missouri members to meet after the plenary lecture to elect new state representatives, and to let Mark Sinton know of those new representative's names and institutions.

General Session 2, Friday Evening, 7:30 PM

Plenary Address

Chemistry's Grand Transformation: The Green Chemistry Commitment and How PUI's Can Help Us Make It So

Dr. Irv Ievy, Professor of Chemistry, Gordon College
Director, Green Chemistry Commitment, Beyond Benign
Chair, Division of Chemical Education, American Chemical Society

Dr. Ievy began his presentation by letting the audience know that he was raised in a small town in Illinois, so coming to the meeting felt like coming home. Dr. Ievy then mentioned that the high school he attended is named after James Bryant Conant, a high school chemistry teacher for whom the American Chemical Society has an award: The James Bryant Conant Award in High School Chemistry Teaching. Dr. Ievy also noted that while he recently left Gordon College, all of the work that he would describe was at that institution. He then defined green chemistry: chemical products and processes designed to be inherently safer for human health and the environment. He defined it as not another sub-discipline, but one that is part of all chemical practice.

At Gordon College, their green chemistry transformation began with a student's term paper about green chemistry, and was thus student driven from the beginning. At first, he thought "Go hug a tree and forget about this topic", but this student returned with materials supporting her desire to write about this subject. Dr. Ievy was still not convinced, but allowed the student to write their paper. At the March 2003 ACS meeting, Dr. Ievy decided to attend the Sunday session on green chemistry since his student was going to write about this topic. As a result of both events, Dr. Ievy's position on green chemistry changed began to change, and he thus became more interested in learning more about green chemistry and how he could incorporate the concepts into his curriculum. He mentioned that his curriculum transformation took many years, starting with just changing one of his organic labs after attending a University of Oregon Green Chemistry in Education Workshop.

After fully changing his organic chemistry course, Dr. Ievy and his colleagues moved on to general chemistry, then higher level courses such as analytical chemistry and junior/senior seminars, and finally topics courses. After completing this transition, they then moved to incorporate green chemistry concepts into their research, outreach, and activism. Now, Gordon College general chemistry students learn about green chemistry and it's twelve principles through a writing assignment. They then learn about green chemistry metrics. For example, students learn about atom economy (planned waste) and the E-factor (amount of waste/mass of product). For the E-factor, Dr. Ievy described the example he uses to explain that concept to students: 2 green M&M (mass of product) among 200 total M&M's (the amount of waste) is an 100 E-factor of 100.

Dr. Ievy next described several activities he uses to introduce green chemistry concepts to Gordon College students. The first activity uses the lettuce seed ecotoxicity assay, a standard test in toxicology, that student perform to learn about toxicity. In this activity, students soak lettuce seeds

and various substances, and then allow them to germinate. Students can then determine a substance's toxicity by measuring the germination rate of the seeds. A second activity shows students how changing a solvent can have a dramatic impact on waste production. In this activity, students extract limonene using liquid CO₂ rather than the more common solvent dichloromethane. A third activity introduces students to the idea of repurposing by depolymerizing NatureWorks PLA with a base. Once the base is neutralized, the resulting solution can be used as a cleaner.

Dr. Ievy then described the GOLum project, the Green Organic Literacy Forum, and how Gordon College incorporated GHS and SDS information into their curriculum. Green Organic Literacy Forum are projects that are year-long projects completed by organic chemistry students. In its eighth year, roughly 70 year-long projects have been completed and about 600 students trained in green chemistry concepts. The forum has had many supporting partners such as the US and Region 1 offices of the EPA and the ACS Green Chemistry Institute. In the case of GHS and SDS incorporation, students are required to come into lab having read, understand, and know the safety of the materials they are going to use from GHS and SDS information. Dr. Ievy also uses Green Screen Lite as another way to force students to begin to understand the safety aspect of the materials they use in labs and in their research.

Dr. Ievy next described several of the things that have changed in Gordon College's curriculum. The first example involved a dehydration of an alcohol experiment that he changed in his organic chemistry class to make it safer. The old experiment required boiling concentrated phosphoric acid, which he replaced with a clay from France that is food safe. The resulting Zaitsev product yield is actually better with the clay than with the phosphoric acid. Another organic lab that changed was an oxidation of a primary alcohol experiment. The old procedure used PCC/CH₂Cl₂, both which are very hazardous. Now students use an octamolybdate catalyst (which the students must synthesize first) and 3% H₂O₂. This oxidation reaction is actually the first step of a multistep synthesis, several of the steps of which have been modified to be more green.

In analytical chemistry, EDDS (ethylenediamine-N,N'-disuccinic acid) is now used in place of EDTA, which has a long environmental persistence. In physical chemistry, fuel cell, solar cell, and the design of better catalysts have been targets of green chemistry changes. In other courses, 2-methyltetrahydrofuran is now used in place of tetrahydrofuran, and dichloromethane has been switched out for 3:1 ethyl acetate:ethanol, which now can be purchased from MilliporeSigma. Heptane has been used in place of hexane and pet ether. Regardless, protocol validation must be done to ensure that any change doesn't a protocol.

Dr. Ievy next mentioned that some of these changes have begun to be incorporated into biology courses at Gordon College. Gordon College students have also done lots of research on green chemistry and made numerous presentations at ACS meetings. Further, Gordon College's ACS student chapter has won nine consecutive commendable or outstanding awards for their green chemistry outreach.

Dr. Ievy then described the Green Chemistry Commitment in which a school commits to teaching their students about green chemistry across their curriculum. The four pillars of the commitment are theory, toxicology, lab skills, and application. How a school decides to do those within their courses is up to the school. Further, the commitment costs nothing for the partnering school. There are currently 62 institutions that have signed up for the commitment, which includes 2 international schools. There is a one page form that a school fills out to join the commitment. MilliporeSigma also has a guide to help schools make the switch easier as well. Beyond Benign resources are freely available and modifiable under a GNU type license. There is much support from other faculty doing this, along with sessions at ACS, BCCE, and Green Chemistry in Education Workshop meetings. Beyond Benign will also help defray travel costs for those that present at meetings as well.

Dr. Ivey closed his presentation by showing the paper that changed his chemistry career and a picture of the student that wrote that paper. He hopes that in the future the term green chemistry will disappear as everyone will be doing green chemistry as a natural part of the work that they do.

General Session 3, Saturday Morning, 8:30 AM

Plenary Address

Oh No! Ethnobotany. Identification and Communication of Residual Hazards on Museum Artifacts
Rose Kubiatoiwicz
St. Paul, MN

Ms. Kubiatoiwicz began her talk by introducing the idea of a curare tipped darts and how museum conservationists deal with them and other objects that contain toxic substances that may or may not be hazardous after 25, 50, or more after they were made.

Ms. Kubiatoiwicz first ran into this problem in the 1990's while surveying museum artifacts for ethnobotany poisons. One that caught her attention at the time was barbasco vines, which can produce a dust that contains rotenone. If inhaled, rotenone can cause respiratory distress.

She then described the Oh No! Ethnobotany program. This program aims to warn conservationists and other museum workers about plant based poisons that are often found in artifacts through ethnobotany MSDS's, or EMSDS's, and associated labels that she has developed to communicate that information.

Ms. Kubiatoiwicz then described the structure of a typical EMSDS, which are modeled after MSDS's, but contain information that is pertinent for museum workers. EMSDS are to be kept on site, close to the artifacts for which they describe hazards, just like an MSDS.

The pictographs were designed for the same type of purpose, and are meant to be attached to drawers or containers that have hazardous substances. Ms. Kubiatoiwicz showed example labels for tubocurarine and abrin, both of which are highly toxic and are often found in dart and jewelry artifacts.

Ms. Kubiatoiwicz next discussed an analysis done by Dr. Brendan Derham from the University of Newcastle-upon-Tyne, UK, in the early 2000's of 20 of the museum's artifacts that may have contained toxins. The analysis based on GCMS and LCMS revealed the presence of poisons on 12 of 20 objects. Of those 12, 4 out of 6 curare containing artifacts had active amounts of tubocurarin. One of these artifacts had been in the museum's collection since 1956. Several items had no active poison at the spot tested, but those objects are still considered poisonous since only one small area on each object was tested. Thus, other areas may still contain toxins. Overall, the objects that had identified toxins showed no loss of toxicity over greater than 100 years. As a result, museum work requires the assumption that all ethnographic artifacts are poisonous, and should be handled as toxic substances.

While talking about the EMSDS's, the pictographs, and the artifact analysis, Ms. Kubiatoiwicz also discussed how ethnobotany substances are used within their cultures and how they affect human health. She also showed the audience several of the artifacts mentioned during her presentation.

Ms. Kubiatoiwicz closed her presentation by describing how to download EMSDS at her web site Have Gloves Will Travel (www.havegloves.com). To download an EMSDS, click on the Oh No! Ethnobotany tab.

MACTLAC Business Meeting

1. The meeting was called to order at 10:01 AM by President Vince Hradil.
2. Vince Hradil thanked all of the St. Catherine University chemistry faculty for hosting our meeting and everyone for coming to the meeting.
3. The Treasurer's report for 2019 was presented by Mark Sinton. Mark noted that our current checking account balance has decreased significantly now that we've had a host institution request a larger reimbursement amount. Assuming this trend continues, the Association will likely need to revisit how much the Association can reimburse host institutions in the future. Otherwise, the Association is in good financial health. A motion was made to accept the Treasurer's report and seconded. The motion passed.

Year	2015	2016	2017	2018	2019
Beginning Assets					
Checking	\$10,298.66	\$10,865.15	\$9,563.29	\$8,577.40	\$5,971.55
Savings	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Beginning Assets	\$10,298.66	\$10,865.15	\$9,563.29	\$8,577.40	\$5,971.55
Income					
Dues	\$720.00	\$675.00	\$510.00	\$455.00	\$370.00
Annual Meeting	\$2,090.00	\$1,550.00	\$0.00	\$0.00	
Interest	\$11.16	\$10.62	\$9.36	\$15.58	\$8.97
Other	\$0.00	\$0.00	\$6.55	\$0.00	
Total Income	\$2,821.16	\$2,235.62	\$525.91	\$470.58	\$378.97
Expenses					
Postage, copying, website	\$164.19	\$329.91	\$132.87	\$10.00	\$18.54
Annual Meeting	\$2,069.93	\$3,207.57	\$948.02	\$2,689.39	
Placement, Archives	\$0.00	\$0.00	\$0.00	\$0.00	
Other	\$20.55	\$0.00	\$430.91	\$377.04	\$10.30
Total Expenses	\$2,254.67	\$3,537.48	\$1,511.80	\$3,076.43	\$28.84
Ending Assets	\$10,865.15	\$9,563.29	\$8,577.40	\$5,971.55	\$6,321.68
Asset Change	\$566.49	-\$1,301.86	-\$985.89	-\$2,605.85	\$350.13

6. Secretary's report for 2019 was presented by Mark Sinton. He mentioned that the Association's membership seems to have stabilized over the last few years. Mark then noted that he continues to remove members who are more than three years in arrears for their dues as detailed in the Association's By-Laws, Paragraph 2, as well as those members that have either requested their removal or have moved and left no forwarding address. Mark then reviewed the current membership statistics: 33% of our members (77 out of 234) are paid up in their dues, with 15% being excused from paying dues because of their Emeritus or Honorary status (35 out of 234), and the remaining 52% in arrears (122 out of 234). Mark noted that should the membership stand at the end of the year as indicated in this report, 35 additional members will be removed from the membership database for non-payment of their dues. A motion to accept the Secretary's report was made. The motion was seconded and passed.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
Beginning Membership	384	297	287	293	296	253	258	239	230
New Members	3	25	35	11	2	8	20	28	6
Members Removed	90	35	29	8	45	3	39	37	2
Ending Membership	297	287	293	296	253	258	239	230	234
Member Dues Breakdown									
Emeritus and Honorary members	43	47	47	49	47	50	57	39	35
Paid up members	86	65	67	70	64	77	80	59	77
In arrears members	168	175	179	166	142	131	102	110	122
Total Dues Paying Units	297	287	293	296	253	258	239	208	234
Member Dues by Year									
Paid up	86	65	67	70	64	77	80	59	23
One year behind	57	74	83	45	75	29	144	41	53
Two years behind	64	43	47	54	29	46	21	27	34
Three or more years behind	47	58	49	67	38	56	37	42	35

7. Bard Sturgeon presented the Brad Sturgeon presented the 2019 Archivist report. The archives continue to be expanded, although the digitizing of the remaining paper documents is proceeding more slowly than planned. He also showed some of the web pages that can be accessed via the archives. A motion was made to accept the Archivist report, which was seconded and passed.
8. Vince Hradil presented the 2019 Placement Officer for Paris Barnes, who was not in attendance at this meeting. Vince told the membership that not much has changed in the duties of the Placement Officer in the past year. Unfortunately, since Paris unable to attend this year's meeting, there was not a position board advertising open positions. A motion was made to accept this report, which was seconded. The motion passed.
9. The Association's new emerita were next announced by Vince Hradil: Eugene Losey from Elmhurst College and Dennis Brinkman from Indiana Wesleyan University.
10. Next, Vince Hradil introduced the new State Representatives. The new Iowa Representative is Melanie Houser from Buena Vista University. Bernard Hansert from Westminster College will continue as the Missouri Representative. Brian Nell from the University of Minnesota, Morris, will serve as the Minnesota Representative.
11. Vince Hradil next opened the floor for nominations for President-Elect. Tracy Thompson was nominated, and their being no other nominations, a motion was made and seconded to close the nominations. The motion passed. A motion was then made and seconded to elect Tracy by acclamation. The motion passed.
12. A motion was made for the Secretary-Treasurer to send letters of thanks to the following individuals. The motion was seconded and passed.

Outgoing Officers: Vince Hradil

Outgoing State Representatives: Christopher Jordan (MN) and Matthew Zart (IA)

Host Institution: St. Catherine University

Host Organizer: James Wollack

13. Becky Sanders then invited everyone to next year's meeting at North Central College in Naperville, Illinois. James Wollack then passed the MACTLAC meeting banner to Becky.

14. Possible hosts for future years were discussed. The current list is:

2020: North Central (Central)
2021: Carrol University? (East)
2022: Principia College? (West)

15. Vince Hradil then handed off the meeting to the incoming President, Brian Kamusinga from Principia College.

16. Brian Kamusinga asked if there was any other business. There being none, Brian asked if there was a motion to adjourn the meeting. Such a motion was made and seconded. The motion passed. The meeting adjourned at 10:27 AM.

Respectfully submitted,
Mark Sinton
MACTLAC Secretary-Treasurer

Discussion Groups

Microwave Chemistry in Laboratory Instruction

Friday, October 11th and Saturday, October 12th, 2019
2:30-3:30 PM and 10:30-11:30 AM

This session began with attendees introducing themselves and being asked to pose a discussion question.

One of the main points of discussion was the expense, maintenance, and complicated nature of maintaining a working mass spectrometer. For larger classes the challenge of distributing data to students was also raised. This led to a discussion on the value of having students inject samples themselves versus interpreting spectra. Resources and simulation programs were discussed. Most agreed in the first year course spectral analysis is sufficient but most thought by junior or senior year there was value in running and possibly even trouble shooting experiments using mass spectrometry.

Other topics discussed:

Online Resources – Chrom Academy

Calibration – Kovak's index reagents are available for purchase

Mass Spectrometry Urine/Drug exercises – Flinn kits are available for purchase to do these experiments with your students.

At the end of the session a few people went down and looked at the LCMS software for quantitative analysis.

X-ray Crystallography Research and Applications at PUP's

Friday, October 11th, 2019
2:30-3:30 PM

The attendees had a broad range of experience from none to expert. We primarily discussed crystallographic teaching resources that can be used in classes such as inorganic, instrumental analysis, and biochemistry. We discussed the differences in protein vs. single crystal vs. powder

diffraction equipment. We also discussed how to collaborate with institutions for class visits or sending samples to Universities that have diffraction instrumentation, and how PUI's typically aren't charged for such data collection. The group also discussion on how St. Kate's acquired funding for a diffractometer. The session ended with a brief tour and demo of the diffraction instrumentation at St. Kate's. A shared Google folder with teaching resources was also made available to all the attendees of the session.

Mass Spectrometry in the Undergraduate Curriculum and Research

Friday, October 11th and Saturday, October 12th, 2019

2:30-3:30 PM and 10:30-11:30 AM

At first, discussion revolved around the number of times one uses tubes. Most said that they reuse them dozens of times and that the caps often wear out before the tubes do. The number of times a tube can be reused will be reaction dependent. The discussion then moved to the advantages of microwave chemistry. For example, microwave allows for rapid heating and reduced reaction times.

The type of caps used was also discussed: crimp vs. Anton Paar set up. Cap and tube types will vary by distributor. The group then talked about the pro's and con's of batch and sequential reactors. Batch reactors take longer to heat up and run but can do multiple samples at once. Sequential reactors do one sample at a time but require less time to heat and cool. For labs with 10 or fewer groups a sequential reactor works well if run times are less than 5 minutes. Microwave chemistry is a green because less solvent is required. The time that was used for reflux during experiments to complete can be used on other tasks or to do additional characterization.

Chemistry Courses for Non-Majors

Friday, October 11th, 2019

2:30-3:30 PM

The session started with introductions and attendees describing the non-majors courses they teach. Non-majors courses taught spanned a wide range of foci: Food Chemistry, Chemistry for Nurses, Environmental Chemistry, Energy and Chemistry, Chemistry and Society, Agricultural Chemistry, a general lab science course, Chemistry of Bio-organic Molecules, and World of Materials.

Attendees next discussed the typical chemistry for nurses course (GOB). Topics covered in the discussion were textbooks used, content covered, organization of course, how much organic to cover, and online homework systems used. Mastering Chemistry was a popular online chemistry tool. A challenge raised in teaching a GOB course was "how to keep it interesting".

"Boutique" chemistry courses for non-majors were then discussed. Forensic chemistry, environmental chemistry, and service learning components were included in the discussion.

The lab requirement for an institution's general education or core curriculum was discussed. A question raised and discussed was how are "lab" courses determined and who decides? Some attendees noted general education or core requirements are changing at their institution and that language isn't used anymore. There was concern raised about how to preserve the intention of the "lab science" requirement.

The attendees of this session agreed that it would be a good thing for next year's meeting to have a stand-alone session for nursing chemistry/GOB chemistry.

Inorganic Chemistry
Friday, October 11th, 2019
4:15-5:15 PM

After introductions, the group was asked about Raman spectroscopy – do we use it, and in what way. Although Raman spectroscopy is taught at all of the schools represented, instrumentation is not available at most of them and is not used in the lab. The question expanded to what other instruments are used in inorganic laboratory. IR, LC-MS, NMR (¹H, ¹³C, and some ³¹P or other nuclei), cyclic voltammetry, UV/Vis, and magnetic susceptibility are commonly used. Laboratory exercises include synthesis and use of Wilkinson's Catalyst, preparation of Quantum Dots, and Fluorescence spectroscopy. It was pointed out that a fluorometer plate reader with black plates can be used to observe the fluorescence of quantum dots.

The new guidelines from the CPT regarding macromolecular, supramolecular, mesoscale, and nanoscale systems were discussed and faculty shared how these topics were introduced and covered in class and lab. The book *Concepts of Nanochemistry*, by Ludovico Cademartiri and Geoffrey Ozin, Wiley, ISBN-13: 978-3527325979 was suggested as a possible text book. Suggested labs to cover these topics were polymers (part of Biochemistry can fulfill this topic), nylon and ROMP polymerization reactions, solid state synthesis of zeolites, MOF made in DMF, dye sensitized solar cells, and the preparation of perovskites.

The topics covered in sophomore level inorganic courses were also discussed, which generally is a descriptive type of course. Texts by Rodgers and by Raynor-Canham and Overton were mentioned as appropriate books for this type of class.

The usefulness of magnetic susceptibility in the inorganic lab was discussed. This is one of the few experiments that directly measures a quantum mechanical property. Several papers in the *Journal of Chemical Education* have described methods to qualitatively or quantitatively measure magnetic susceptibility.

Finally, Curie Engines made with nickel wire and magnets were described and videos were shared with the group. The attendees were also invited to share materials via a Google Drive folder.

Physical Chemistry
Friday, October 11th, 2019
4:15-5:15 PM

This breakout session opened with a discussion of textbooks. McQuarrie & Simon and Engel & Reid were the two most used. There is interest in moving toward open source materials, especially if they can be customized. LibreTexts was mentioned as a possible open source text. The next item discussed was textbook problem sets. Everyone has issues here. Most back of the book problems have solutions online. Creating new problems takes considerable time and must be repeated regularly. Students still have mathematical skill issues at this level as well. Occasional use of selected journal articles is still a good activity. Google “density functional theory and Hippo sweat”...it's not as exciting as it sounds!

Laboratory experiments were discussed next. There are many good labs out there. The challenge is to find ones that can be run at a given institution and on a minimal budget. Several attendees use the POGIL Physical Chemistry Labs.

It looks like there haven't been any great changes in Physical Chemistry instruction recently. It is still a challenge for students and the ACS is again selling the “Honk if you Passed P-Chem” bumper stickers!

Undergraduate Research at PUI's

Saturday, October 12th, 2019

10:30-11:30 AM

The major theme revolved around how undergraduate research is carried out at different institutions, credit vs. pay, summer and/or academic year timing, research requirement of all or some students, how are faculty and students paired, and whether or not a research class is offered. Finding sources of funding was also discussed. Connections with local industries as revenue generation, working with collaborators to make funding go further, and internal department or college funding of faculty and students were discussed as possible funding sources. A shared Google folder for attendees to share resources was made available to all the attendees of the session.

No reports were submitted for the following sessions:

Friday, October 11th, 2019, 2:30-3:30 PM

Green Polymer Chemistry

Friday, October 11th, 2019, 4:15-5:15 PM

General Chemistry
Organic Chemistry
Analytical Chemistry
Biochemistry

Saturday, October 12th, 2019, 10:30-11:30 AM

The Green Chemistry Commitment: Green Chemistry and Toxicology in the Curriculum
Chemistry and Study Abroad
Meet the Speaker: Rose Kubiawicz

Vendors and Sponsors

The organizers of this year's meeting wish to express their thanks to the following vendors and sponsors:

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MACTLAC Officers, State Representatives, and Other Association Personnel for 2020

Officers:

Past President:	Vince Hradil	Concordia University Chicago
President:	Brian Kamusinga	Principia College
President Elect:	Tracy Thompson	Alverno College
Secretary/Treasurer:	Mark Sinton	University of Dubuque

State Representatives:

Illinois:	Joseph Sumrak	Concordia University Chicago
Indiana:	Sarah Wilson	University of Evansville
Iowa:	Melanie Hauser	Buena Vista University
Michigan:	Kelli Kazmier	Hillsdale College
Minnesota:	Bryan Nell	University of Minnesota, Morris
Missouri:	Bernie Hansert	Westminster College
Wisconsin:	John Morris	Marian University

Other Association Personnel:

Archivist:	Bradley Sturgeon	Monmouth College
Placement Officer:	Paris Barnes	Millikin University
Web Master:	Craig Bieler	Albion College

MACTLAC Weather Report

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

Friday's Weather

Friday's weather was cloudy with light rain and flurries. The day had a high of 43°F (6.1°C), a low of 34°F (1.1°C), and 70% humidity. There was a 20 mph (32 kph) wind from the WSW, with 40 mph (64 kph) gusts. The barometric pressure was steady at 28.88 inHg (733.6 mmHg). The day saw 0.18 in (0.46 cm) of precipitation.

Saturday's Weather

Saturday's weather was cloudy with a bit of light snow in the morning. The high for the day was 39°F (3.9°C), and the low was 33°C (0.56°C). The humidity started at 70% and then slowly rose throughout the day. The day had a 20 mph (32 kph) wind out of the SW that slowly decreased. The day did see a wind gusts of 35 mph (36 kph), however. The barometric pressure remained steady at 28.82 inHg (732.0 mmHg). Even with the snow in the morning, Saturday saw no recorded precipitation.

MACTLAC News

Placement

MACTLAC's Placement Officer maintains two lists: 1) a list of faculty positions available within the MACTLAC member colleges, and 2) a list of candidates seeking positions with member colleges. Our goal is to ensure that candidates are in contact with the colleges having positions available. If you are currently recruiting new faculty, are looking for a teaching position at a Liberal Arts college, or have any other questions, please contact the Placement Officer. A copy of the list of available positions can also be found at www.mactlac.org.

Website

The address for the Association's website is www.mactlac.org. Feel free to visit this site to get information on our organization and the services that it offers. Be sure to check out the links page as there are some things on that page that may be of interest to you.

Honorary and Emeritus Membership

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 to the Secretary-Treasurer. These letters should attest to the criteria needed for honorary membership status. An Honorary member will be excused from further payment of dues and will be listed as an Honorary member.

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 to the Secretary-Treasurer of MACTLAC.

2020 Meeting

Due to the COVID-19 pandemic, our 2020 meeting host, North Central College in Naperville, Illinois, is restricting visitors to their campus this fall to those that only fulfill a required college need. As a result, they will not be able to host our meeting as planned. In light of this development, and in consideration that no other host could organize a meeting on such short notice, the Executive Council has regretfully decided to cancel our 2020 Annual Meeting. The folks at North Central College have graciously offered to host our 2023 meeting, however, and have set up an editable Google Drive document that lists a variety of on-line chemistry resources that you may find valuable. You can access this document at the following URL.

https://docs.google.com/document/d/14GlimUFnensPSINw3BHtI_JwnuD9VWr7vJeMAebFeu0/edit

Our next meeting will now take place in 2021 at Gustavus Adolphus College in St. Peter, Minnesota. The dates and theme for this meeting will be announced at a later time. We will hopefully be able to announce the location for our 2022 meeting some time next year as well.