Grove City College Chemistry eNewsLetter

Fall 2012

Departmental News

By Dr. Timothy Homan, Chair

Construction continues to be in the forefront of attention these days. As you can see from the picture below, progress continues at a rapid pace, as the exterior approaches completion. What you cannot see is the amount of internal work that is already completed. We are told that not only is construction on schedule to be completed by July, 2013, it is highly unlikely that anything now could cause that schedule to fall significantly behind.

The facility is being called the Science, Technology, Engineering, and Mathematics Hall, or STEM Hall for short, pending the receipt of a single gift sufficient to name the building after the donor.

In October, the faculty who will be moving their offices into the new building (Drs. Augspurger, Cramer, Homan, Kriley, and Shaw) had the opportunity to view the new office suites. They and the other faculty from the Biology and Computer Science departments took part in a "room draw", and the three department chairs then assigned offices according to individual preferences.

Planning the move is proceeding rapidly. While an outside moving company will be involved, we are currently deciding which pieces of equipment will need special handling by the manufacturers, and which we can move safely ourselves. The General, Organic, and Physical laboratories will be relocated into STEM Hall, while Analytical, Inorganic, and the Instrument room will remain in Rockwell.

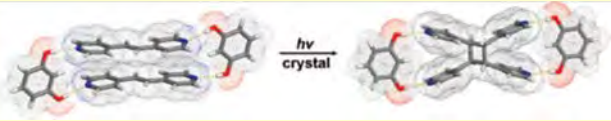
Our newer 60 MHz Anasazi NMR will be moving into the new building. It is a Fourier Transform, permanent magnet instrument. We purchased it four years ago as an affordable teaching instrument, and it is used by the Organic lab students, so that they can be introduced to NMR in the sophomore year. Our 300 MHZ superconducting magnet NMR, which we purchased used 14 years ago, is used for upper division classes and research. When we get the funds to replace it with a new or newer model in the next couple of years, it will be relocated into the new building.

Here is a view of STEM Hall taken from the front of the Breen Student Union. The large windows in the front are where an open-atrium area will be located, similar to the one in the Hall of Arts and Letters, which opened in 2003. You can see the Rockwell tower in the background, and if you look carefully you can see the star on the tower for Christmas.

Summer Research at GCC

As mentioned in the Spring newsletter, nine of our chemistry and biochemistry major spent eight or ten weeks at Grove City doing research on several different projects. Grove City provided housing for the students in the Colonial Apartments which are located on lower campus, next to Carnegie.

Dr. Augspurger directed two students, Jonathan Wood (CHEM, '14) and Peter Foster (CHEM/PHYS/MATH, '13), as they investigated the conformational flexibility of substituted alkenes in the solid state. The work was done in collaboration with Drs. Len MacGillivray (Iowa) and Ryan Groeneman (Webster University). Their experimental work has shown that alkenes with ringed substituents, which include a pyridine ring, can be crystalized along with resorcinol (1,3 di-hydroxy benzene), so that the hydrogen bonds between the resorcinol and the pyridine rings can cause the alkene double bonds to be aligned in such a way that when exposed to ultraviolet radiation they undergo 2 + 2 cyclization:



For the reaction to occur, the double bond must be aligned in a parallel orientation. It has been shown in some cases that even crystals where the double bonds are crossed still undergo reaction. It is thought that this can only happen if the double bonds can undergo a "pedal motion" whereby the double bonds go from the crossed to parallel orientation and back.

John and Peter built models of the solid state crystal of increasing size, and for each calculated the energy barrier to rotation about the C=C. Their results showed that the barrier for a reactant which does not exhibit pedal motion was 25 kcal/mol, while the barrier for one which does appears to be only 14 kcal/mol. They along with Dr. Augspurger attended the ACS Midwest regional meeting in Omaha in October and presented these results in a poster session.

Kyle Emili (CHEM, '15) and Joey Kriley (CHEM, '15), under Dr. Kriley's direction collected water samples from several wells and surface water sources near sites where Marcellus Shale fracking is or will be occurring. They were also able to obtain samples of frack water. They analyzed these samples for several negative ions, metals, pH, water hardness, total dissolved solids, and lac+ bacteria, using ion chromatography and other methods. Their results did not show that any of the sites tested exhibited any contamination due to the fracking. It also is providing a baseline for sites where fracking has not yet begun.

Dr. Kriley also directed Michael Grennek (CHEM, 13) and A. J. Motta (BIOC, '14) as they synthesized two new nickel complexes with bisdi-methylphosphinomethane (bdmpm). One complex contained a single nickel ion (monomer) and one contained two (dimer). They demonstrated that the monomer and dimer can be reversibly interconverted by addition of excess nickel (to form dimer) or bdmpm (to form monomer).

Dr. Falcetta directed Joe Winkelbauer (CHEM, '15) and Erin Epertherner (BIOC, '15) in computational modeling of temporary anions. Temporary anions are metastable species that spontaneously lose an electron. While these anions live less than a picosecond, they have practical implications in laser technology, electronic device production, and in the biological effects of radiation. Joe and Erin tested computational techniques to model CO_2^-. They found that the anion lifetime depends on the specific angular momentum state of the electron as it exits the molecule. While this is known in general, the implications for practical molecular systems are yet to be elucidated. We are presently pursuing the implications of this work.

Aaron Sircy (CHEM, '13) worked with Dr. Falcetta to install, test, and use a new head-space sampling unit on our gas chromatograph. After installation and testing, Aaron worked to develop calibration curves for aromatic hydrocarbons in water and to establish detections for our system. Aaron continues his work this semester.

All of these students will be presenting their results in the Hopeman Student Research Seminar Series, which offers students who do research at GCC the experience of presenting that work in a talk to the academic community.

Student Highlights

On May 19, 2012, twelve students graduated from GCC's Chemistry department. Seven graduated in biochemistry and five in chemistry. One student graduated *summa cum laude*, with highest honors, one *magna cum laude* with high honors, and one *cum laude* with honors.

Six have immediately gone to graduate school. Three are pursuing PhDs in chemistry (at Texas A&M, Purdue, and Duquesne). One is in Duquesne's pharmacy school, another is pursuing a doctorate in physical therapy, and one is getting a master's in education at SUNY Brockport, to teach chemistry in high school.

As has become our tradition, we sent the class of '12 off with a breakfast in the Great Room in the Breen Student Union for the graduates and their families. The picture at right was taken at that time. We always enjoy meeting their parents and other family before the celebration of four years of hard work.

Graduates of the class of '12. Sarah Kuznitz Dennis, Chris Haskins, and Jared Anderson (front), Scott Harman, Caleb Stewart and Shelby Anderson (middle), and Carl Langholf, Riley Workman, and Lucas Walker (back). Not pictured are Rebecca Parsons, Kristen Slinkard, and Michael Cratsley.

Faculty Spotlight

Dr. Susan Cramer

Dr. Susan Cramer joined the faculty of Grove City College in the Fall of 2002. She earned her MS degree from the University of Toledo. Before going on to earn her PhD from the University of Akron, she taught at Malone (College) University.

Susan's main teaching duties are Organic Chemistry I and II lecture and laboratory, Polymer Chemistry and the senior level Chemistry Seminar.

An active member of the Penn-Ohio Border Section of the ACS, Susan serves on the executive committee where she is currently chair-elect and will take on the chair position in January, 2013. Susan also serves as a member of the Pre-health committee, helping to advise students who are interested in health related fields.

The Chemistry Library

Room 201 in Rockwell has undergone several changes in the last 20 years. Facing out onto the Quad from the second floor, “Library” is painted on the door. It formerly held many journals and books on its built-in shelves on each end of the room, and the two rows of stacks on one side.

When computers began to be integrated into the curriculum in the early nineties, chemistry professor Dr. Frank Dalton (who taught general and analytical chemistry from 1990-97) and physics professor Dr. Jim Downey spearheaded having two rows of computer tables installed, to create a computer lab.

However, once students were all given their own tabletPCs, the need for desktops waned and the computer tables were removed. As journals began to become accessible electronically (currently, all of our chemistry journal subscriptions are electronic – we no longer receive paper copies of any chemical journals), the need to keep the journals in Rockwell waned as well.

So, Dr. Kiley took on the task of making changes to the Chem Library. He led the effort to have the stacks removed. Initially, several round wooden tables were purchased for students to use to work on. Then, a long oak table which had been held in storage was brought into the room. The picture below depicts the current Chem Library.

It has become a popular place for students to gather during the day. The white board which was mounted on the wall is typically covered with homework problems. It is also used for small gatherings. Dean of the Hopeman School of Science and Engineering, Dr. Brimingham, hosts a reception for the Hopeman faculty each year at the end of the Fall semester in the Chem Library.