CHEM MAJOR NEWS

In Conjunction with the American Chemical Society Student Affiliates at the University of Pittsburgh

Volume 23, Issue 6 **March 3, 2014**

Fall Term (2151) Registration

March 24 Fall Term (2151) Registration begins **based on credits earned**.

You will be notified of your registration time on your my.pitt.edu page.

March 28 Deadline for applying for August 2014 graduation (140 Thackeray Hall)**.**

*Advisees who already have a permanent advisor should make their registration appointments with that advisor on or after **March 17** for Fall Term (2151).*

*Advisees who were asked to select their permanent advisors (via a letter sent Feb. 1) should schedule their Fall term registration appointment with their new advisor after **March 17**.*

*New advisees who have declared chemistry as his or her major within A&S should make an appointment with Dr. George Bandik, Dr. Ericka Huston, or Dr. Michelle Ward after **March 17** for Fall Term (2151) in 107 CHVRN.*

Departmental Honors? Here's How...

Students who wish to graduate with Chemistry Department honors must satisfy four departmental requirements. Students must have:

(a) an overall QPA of 3.00 or better

(b) a chemistry QPA of 3.25 or better

(c) have completed at least 2 credits of Chem 1710-Undergraduate Research

(d) completed Chem 1711-Undergraduate Research Writing.

Good luck as you strive towards academic excellence!

2013-2014 ACS-SA Officers and Staff

Olivia Goss-*Co-President*
James McKay-*Co-President*
Keith Carpenter-*Co-Vice-President*
Josh Casto-*Co-Vice-President*
Laura Grezzo-*Co-Secretary*
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Kelsey Wiggins-*Senior Affairs Committee*
Aric Berning-*Newsletter Co-Editor*
Mark Mazza-*Newsletter Co-Editor*
Raissa Berry-*Green Chemistry Contributer*

Visit us at http://www.chem.pitt.edu/acs-sa/

ACS-SA Schedule for the Spring Term

MARCH

07	Registration Again!!! with George
14	SPRING BREAK-Have Fun!
21	Green Chemisry at Pitt
28	Saturday Science-One more time!

APRIL

04	Spring Term Birthday Celebration and Officer Nominations
11	Elections
18	SENIOR FAREWELL

CAMPAIGN! VOTE! WIN!

Have you ever wanted to lead a nationally acknowledged award winning student group? If you aspire to such things why not consider running for an office with our ACS-SA group. We boast some 80+ members and have been recognized for the past 22 years by the national ACS for outstanding programing.

Nominations for our 4 elected positions: president, vice president, treasurer and secretary will be held on April 04 at our weekly meeting, 12:00 Noon in 130 CHVRN, and elections will be held on April 11th.

Trevor Hyland and Anisa Mughal have agreed to be Co-Editor's of next year's Chem Major News, Chase Moon, Mike Mizrahi, Ryan Rothman and Drew Tout have agreed to serve as Outreach Coordinators. Thanks to these great folks!

Get involved and help a great group maintain its reputation! We **need** you!

SMALL GRANTS FOR YOUR PROJECTS.

The A&S Office of Undergraduate Research, Scholarship and Creative Activity is offering small grants for your individual research or teaching projects, presentations or creative endeavors. These grants of up to $500 are available for the following kinds of expenses:

research/project supplies
travel if you are going to present a paper at a conference or perform in an artistic endeavor.

To apply for a research/creative endeavors or travel/ presentation grant, you must:

1. Find a faculty sponsor for your project.
2. Complete the application form. Include a detailed description of your project or travel plans and budget.
3. Return the signed form to the Office of Undergraduate Research, Scholarship and Creative Activity, 209 THACK.

Try Something Different...

Need something new and exciting in your life? Tired of the same old thing? How about some new (or not always offered) courses for the Fall term? Three elective courses being offered this fall may bring that zing back into your life! May we suggest:

Chemistry 1310-"Organic Synthesis"

This course fills in the gap between the basic undergraduate organic chemistry courses and the graduate school level. Organic synthesis is the scientific backbone of organic chemistry, and though often neglected in the undergraduate curriculum due to their complexity, synthetic tactics and strategy are among the most creative and useful expressions of scientific excellence.

The course will use modern organic synthesis as a framework to learn about advanced organic structures, organic reactions and organic reaction mechanisms. Outside class, you will learn how to critically read the original literature through periodic assignments.

The course is ideal for anyone who plans to look for a job or continue for an advanced degree in organic chemistry or any area associated with organic chemistry. A reasonable (B or better) knowledge of introductory organic chemistry is expected, but we will open each new topic with a refresher.

CHEM 1460-"Computational Drug Discovery"

This course for advanced undergraduates addresses the recent and emerging roles of computation in drug discovery. In addition to having the opportunity to integrate concepts from biology, chemistry, and physics toward applications in the highly interdisciplinary field of computational drug discovery, students will learn how to critically read research articles and give effective oral presentations. Students will have a hands-on introduction to the latest tools of computational drug discovery by learning how to use the MOE software package. This course will provide a valuable experience for students planning to pursue graduate school, medical school, or careers in industry. Prerequisite: Organic Chemistry.

CHEM 1620 – "Atoms, Molecules, and Materials – Introduction to Nanomaterials"

This will be a course designed to increase students' knowledge and understanding of emerging field of nanotechnology. Nanotechnology deals with materials in nanometer scales, typically one to 100 nanometers. One nanometer is one billionth of a meter; approximately the length of five silicon atoms placed side-by-side or the width of a single strand of DNA. On nanometer scale, materials may possess new physical properties or exhibit new physical phenomena. For example, band gaps of semiconductors can be effectively tuned by adjusting their nano-dimensions. For nanomaterials, number of surface atoms becomes a significant fraction of the total number of atoms and the surface energy starts to dominate. This changes thermal stability and catalytic properties of many materials as we know them.

During the course, the students will gain a sound appreciation of different techniques and instruments involved in the preparation and characterization of nanomaterials. Current and future applications of nanomaterials in medicine, defense, energy production, and computation will be also discussed.

Chemistry 1810-"Chemical Biology"

Revolutionary transformations in chemistry and biology have led to a merging at the boundary of these disciplines where contributions from both fields impact our molecular and quantitative understanding of biology. Rapid growth in this area has been driven in part by researchers applying synthesis, quantitative analysis, and theoretical reasoning to the study complex cellular processes. This course focuses on enzyme mechanisms in biological pathways, kinetics and thermodynamics, and chemical tools to probe and screen components of the cell. Other topics that will be discussed include DNA/RNA processing, macromolecular interactions, chemical signaling, posttranslational modifications, chemical syntheses of biomolecules, and the development of assays for high throughput drug screening.

This course is ideal for students interested in the interface between biology and chemistry. You will first learn to recognize sufficient unresolved problems in biology that will benefit from a whole system chemical and molecular approach to analysis. Chemical tools from all areas of chemistry (analytical, inorganic, organic, and physical) will be employed to characterize and elucidate biological processes. This course will be taught from both a "top down" and "bottom up" approach to characterizing cellular responses. Individual interactions and mechanisms of biological pathways ("bottom up") will be discussed in addition to and in context with the analysis of a global cellular response ("top down") to chemical agents such as drugs, inhibitors, or chemical probes.

Chem 1810 fulfills one of the two elective biological courses for the chemistry bioscience option. Prerequisites include both Biosci 160 and Chem 320. Students can only receive credit for one of the following courses: Chem 1810, Biosci1000, or Biosci 1810.

So as you can see, there is something for every chemical taste available to you this Fall!!

Green Chemistry

by: Raissa Berry**,** *Green Chemistry Contributor*

Some of the major goals of Green Chemistry are to limit hazardous synthesis, design safer chemicals, and also to maximize the use of all materials and by-products involved in synthesis. Recently, attempts have been made to apply these ideas to the Bayer process for aluminum extraction from bauxite. This process has been used since 1887 for global aluminum production. While it is known as the most economic method for acquiring alumina from bauxite, the process also produces a large amount of hazardous by-product that has recently caused concern in the waste-management industry.

One specific by-product of extracting aluminum from bauxite ore using the Bayer process is red mud. Red mud is a residue that is highly basic and contains great quantities of metals such as iron oxide, aluminum, titanium, sodium oxides, radioactive uranium, and many more. Roughly 120 million metric tons (1.2×10^{11} kilograms) of red mud is made per year during aluminum mining. This mud is created whenever bauxite is treated with sodium hydroxide to create alumina. The sodium hydroxide is then recycled and the red mud that remains is pumped into settling ponds. Eventually, the pH of the mud can be lowered via chemical treatment after water removal, and it can be planted over.

In October 2010, however, a settling pond in Hungary ruptured flooding numerous towns. This flood of red mud injured over 100 people, killing 10. After this disaster, the issue of red mud pollution and disposal became more publicly known. As a result, many waste-management companies have spent time trying to develop different methods of dealing with the red mud that could not only lower its environmental hazard but also repurpose it.

Joseph Iannicelli, president of Aquafine corp. in Georgia, has invented a technique to transform the red mud into a product that he calls Azorb. He does so by treating it with sulfur compounds such as Na_2S, $(NH_4)_2S$ and H_2S, with mild heating. During the reaction, sulfur atoms prevent the leaching of metals by binding to open areas on the metal skeleton. The sulfidation process of the red mud also increases its sorbent capacity.

Using Azorb, Iannicelli and his colleagues have removed over 90% of most metals from aqueous solutions, and over 99% of metals such as cadmium, chromium, lead and mercury. By mixing Azorb with unsulfidized red mud, he believes that it can be used to better remove arsenic, manganese and strontium as well. Iannicelli has also used Azorb to remove discolored compounds from river water and to treat wastewater by removing phosphorous and fecal coliform bacteria to levels below detection.

Other chemists have also been developing techniques to deal with red mud. Virotec, an Australia-based waste-management company, found a way to neutralize the mud using seawater. The neutralized red mud is then used as a brick filler, to remediate mining sites, and also for removing metals and treating wastewater. Alcoa, an aluminum producer, has created a procedure to carbonate red mud with CO_2. The product is a "red sand" that is used for cement and road construction.

Lastly, Justin Hargreaves and other chemists at the University of Glasgow have treated red mud with methane. The red mud decomposes the methane to form hydrogen and iron-carbon composite, which they believe to be able to remove arsenic, chromate, and other impurities from drinking water.

Some chemists are still uncertain of red mud's beneficial use. They remain concerned about the stability of the treated red mud and question whether or not the water treated with it will be fit for release into the environment. However, many are emphasizing the need to continue funding red mud research. Chemists such as Iannicelli believe that it may not only provide a solution for dealing with bauxite residue environmental pollution but also create a more inexpensive sorbent, helping to solve more than one major environmental problem.

References:

http://bauxite.world-aluminium.org/refining/process.html
http://cen.acs.org/articles/92/i8/Making-Red-Mud.html

A Krate for Karagwe

Brian Griffith (bdg26@pitt.edu)

This past summer, I studied abroad at a rural hospital in the Karagwe District of northwest Tanzania, and it was easily the best experience of my life. The people of Karagwe opened their doors and welcomed us into their lives. We were included various community events and introduced to their vibrant way of life. The majority of our time abroad was spent assisting the physicians and nurses of the Nyakahanga Designated District Hospital. Students and faculty alike were amazed with both the dedication and skill of the hospital staff we met while abroad. However, we witnessed on a daily basis the challenges faced by the staff due to limited access to adequate medical supplies. Shortages of essential items (everything from gloves, scalpels, and syringes to surgical tables, ultrasound machines, and hospital beds) limits the potential of patient care at the hospital and restricts the staff's ability to save lives.

The Brother's Brother Foundation, a prominent non-profit organization out of Pittsburgh that is dedicated to promoting international health and education, has very graciously agreed to provide specifically requested medical supplies to fill a 40' shipping container to help the people of Karagwe. We impassioned students and faculty here at Pitt are working with numerous student organizations to raise the funds in tax-deductible donations to cover the shipping costs, estimated to be $20,000.

Supply distribution will largely support the Nyakahanga Designated District Hospital, tasked with providing curative, preventive, and supportive care for a population of over 600,000 people. This entails, on average, about 62,000 outpatients, 13,000 inpatients, and 4,000 newborn deliveries each year. Supplies will aim to alleviate surgical, obstetrical, infrastructural, and ophthalmological shortages, among other general supply needs. Supplies will also support the Karagwe Community Based Rehabilitation Program, a small non-governmental organization that provides rehabilitation, educational opportunities, rights advocacy for people with disabilities and people in vulnerable groups across 31 villages in the area. Supplies requested include devices for location-disabled, visually impaired, and hearing impaired patients, as well as items necessary for care of members of the albino population.

If you would like further information or are interested in getting involved, please feel free to contact me! Information can also be found on the Brother's Brother Foundation's website (http://www.brothersbrother.org). If you are interested in making a donation that would directly touch the lives of the people of Karagwe, online donations can be made at https://brothersbrother.org/donateform.htm, with "Krate for Karagwe" listed in the comment box. Thank you so much for your consideration!

"In These Years"

by: Mark Mazza, *Co-Editor*

As the semester quickly comes to a close (Yes! The end is much closer than it may seem!), I have found this as the perfect opportunity to momentarily take our minds off the stress of midterms and consider our current academic and social lives. Presented below is a poem that I have adored since high school. The poem, by Adrienne Rich, is entitled "In Those Years." Following the reading, I have provided a short reflection in which I do my absolute best in explaining my personal interpretation of this deeply heartfelt poem. With that being said, let's get started!

In Those Years
by: Adrienne Rich

In those years, people will say, we lost track
of the meaning of we, of you
we found ourselves
reduced to I
and the whole thing became
silly, ironic, terrible:
we were trying to live a personal life
and, yes, that was the only life
we could bear witness to
But the great dark birds of history screamed and plunged
into our personal weather
They were headed somewhere else but their beaks and pinions drove
along the shore, through rages of fog
where we stood, saying I

Upon my initial reading of the poem, I am greatly compelled to reminisce upon my college career. As the graduation date of April 27, 2014 slowly, but surely, approaches, I am beginning to recollect my past more than ever. As I think of my previous years, I am continually struck with the question, "Now what am I to do?" Although I have already applied to various medical schools and continue to wait for interviews, and hopefully gain acceptance to one of my top schools, I ask myself one question, "Now what?" Maybe I ask myself this question for the simple fact that I feel rather awkward in journeying over to the world of medicine. Then again, as I now think of it, 'awkward' is a horrible word to describe my feelings upon my future academic career; a better word to describe my feelings would be…'anxious.' Yes, that is the word! Anxious! I am anxious to begin with my future academic career. I am anxious to journey over to a lifestyle of unpredictability. And, most of all, I am anxious to contribute and donate to the world in a much different way.

Now that my college career has, for the most part, come to an end, I feel that a special transition must be made; one in which my schoolwork and my social life must enter into a new atmosphere of light. Thus, after reading the poem, "In Those Years," I felt it necessary to present the fact that my college social life has come to an end. No longer will I be associating with the same group of classmates I have grown so close with; I will now be associating with extremely diverse and enthusiastic individuals who share a similar passion! Thus, I will be forced to reconstruct my list of friends and reconstruct the way in which I live my life. As Adrienne Rich writes, "In those years, people will say, we lost track/of the meaning of we, of you…" As I interpret these words, I wonder to myself, "Will I continue to keep in touch with my closest college friends; or will I simply grow apart from them? After college, will my college friends and I still share the same feelings; or will we simply travel different paths and embark upon completely different ways of life? And, most importantly, how will I approach the many new people I meet while attending a different school?" I suppose the only true way to react to my new lifestyle is to act in the same manner that I have for the past 22 years. I will approach these people with a sense of care and respect. I will greet each and every person with the same type of attitude that I wish to be treated with. By creating a positive personality, I am sure to make friends within my new surroundings. Now that I think of it, I suppose my new lifestyle will be something to cherish; something I will grow into for the remainder of my life. After all, the opportunity to attend medical school is something that does not appeal to everyone.

In my previous years, including both my college years and my high school years, I believe I have made the special transition from that of a young boy to that of a maturing adult. Although I have made many mistakes throughout the years, I feel that I have successfully learned from these wrongdoings. And by learning from these wrongdoings, I believe I will be better prepared when entering my new surroundings. I have come to the conclusion that if I make my mistakes at an earlier age, I am less prone to making those same blunders as an older, and more mature, individual.