CHEM MAJOR NEWS

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

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REGISTRATION

SET DATES:

October 24: Monitored withdrawal (2151) deadline-140 Thackeray Hall

October 27: Registration begins for Spring Term 2154 based on earned credits. You will receive your registration appointment from the Registrar.

October 27: Add/drop begins for Spring Term 2154.

October 31: Happy Halloween!

November 03: April 2015 (2154) graduation applications due in 140 Thackeray Hall.

November 26- November 30: Thanksgiving Recess. **NO CLASSES!!** **Have a great Holiday!**

IMPORTANT: WHEN SHOULD YOU SEE YOUR ADVISOR?

Advisees who already have a permanent advisor should make their registration appointments with that advisor on or after October 15. Remember to bring a copy of your academic record with you to this meeting.

Advisees who (via an email to be sent October 03) were asked to select their permanent advisors should do so after October 06. See George Bandik or Regina Mahouski in 107 Chevron Science Center.

New advisees (those who have NOT registered with the Chemistry Department before) should make an appointment with George (Room 107 Chevron), Dr. Huston or Dr. Ward after October 13.

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

Our October Schedule

Everyone is welcome to attend our weekly ACS-SA meetings. Every Friday at noon we get together in 135 Chevron Science Center to hear interesting talks, learn more about science and enjoy each other's company. Come join us for all of the following meetings.

October

03 All About Graduate School with Dr. Steve Weber

10 Spring Term Registration (2154)

17 Preparation for National Chemistry Week 2014
The Sweet Side of Chemistry: Candy

24 Pumpkin Paiting on the Front Patio

Happy Halloween

Halloween Pumpkin Fest

Come join the fun this October 24, 2014 as we drink apple cider and paint pumpkins on the patio in front of Chevron. Bring candles, dress up or do other Fall like things as the mood strikes you. BYOB (bring your own **blankets**...preferably flannel since we have a theme going and all). Come to a meeting or see George with suggestions or for more details. **Also if you have any other useful suggestions e-mail us at klc117@pitt.edu.**

Who's This BEN Guy, Anyway??!!

Benzoyl Peroxide the Free Radical Man (affectionately known as Ben) is our ACS-SA mascot. You have probably seen him around the chemistry department and on our yearly ACS-SA T-shirt. From now on when you see Ben, think of the ACS-SA. Why not come to a meeting to learn more about what we are all about. Fridays at Noon in 150 CHVRN.

SOME COURSES JUST FOR YOU...

If you are looking for something new and different this term, why not try one of the following courses being offered this coming Spring Term (2154).

CHEM 1000
Mathematics for Chemists

THIS NEW COURSE OFFERED THROUGH THE CHEMISTRY DEPARTMENT IS RECOMMENDED IN PLACE OF MATH 240-CALCULUS 3. WE HOPE TO OFFER IT BOTH FALL AND SPRING TERMS. PLEASE NOTE THAT IF YOU CAN NOT FIT CHEM 1000 INTO YOUR SCHEDULE YOU MAY TAKE MATH 240. IF YOU HAVE ALREADY TAKEN MATH 240 YOU HAVE MET THE MATH REQUIREMENT FOR THE MAJOR.

Mathematical methods, in particular linear algebra and differential equations, are important in many areas of chemistry. This course provides a background in those and other mathematical methods that will be used in subsequent Physical Chemistry courses. The course will begin with a brief look at topics currently covered in Math 240-Calculus 3 that are important for chemists. It will them move on to linear algebra and look at topics such as systems of linear equations, matrices, determinants, eigenvalue problems and basis sets. The course will finish with a look at important types of differential equations (DEs), including first order DEs, linear systems of DEs, higher order DEs. The material covered in this course will better prepare our majors for their advanced work in physical chemistry.

CHEM 1600
The Synthesis and Characterization of Polymers

What makes really long molecules behave differently from short ones? How can it be that everything from your socks to your laptop is made from polymers? What changes must you make in a polymer to go from making bullet-proof vests to making teddy bear fur? Did you know that every time you paint a wall or use super-glue you are doing polymer chemistry? In this course you will get an overview of all aspects of polymer science including synthesis (you need 99.9% yields to make polymers!); purification (you can't, so you have to make them right the first time); characterization (how can you figure out if your polymer weighs 10,000 or 1,000,000 g/mol?), thermal properties (you need to know that your plastic flip flops won't melt on hot pavement) and mechanical properties (elastic polymers make skinny jeans; rigid ones make motorcycle helmets—you don't want to mix them up!). Bonus: When you make a polymer in lab, you get to play with it!

A Few Important Reminders:

Chem 1140-Preparative Inorganic Chemistry is our advanced inorganic laboratory course offered each Spring Term. **Chem 1130-**Inorganic Chemistry is a pre or co-requisite for this course. If you are working towards an ACS-Certified degree, this course is a degree requirement.

If you have wondered about what goes on the upper floors of our building you might want to consider registering for **Chem 1700**. This one credit seminar course allows two different faculty members each week to speak on their own research interests. Over 80% of our graduating seniors in Chemistry participate in our undergraduate research program and this course is a great way to learn more about your options and your department.

Finally, if you are interested in pursuing an honors degree in Chemistry the requirements students must have are:

(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!

Green Chemistry

by: Valerie Alstadt, Green Chemistry Contributor

Green: It's a nice color, but why go green?

Last time here in the Green Chemistry column, we discussed the twelve principles of organic chemistry, in terms of concepts that should be applied when designing experiments in order to reduce our impact on the environment. That is all great, but the experiments we all perform every day, in organic lab, in general chemistry lab, or in analytical lab, are a rather miniscule part of the overall number of experiments run every day, in addition to all of the production facilities in industrial settings. Thus, the question is, what is the incentive for companies to go green? What are the benefits?

Of course, good press is quite a good benefit of going green, BP probably realizes that now, but why do companies make the decision to go green? Companies usually go green, because of a love for the environment, new environmental protection rules, and yes, most importantly, that other green substance we all love, money. However, Ivan Amato discusses in "Green Chemistry Proves It Pays; Companies find new ways to show that preventing pollution makes more sense than cleaning up afterward" sometimes companies use common sense and green chemistry and everyone wins. Two great examples of this are 3M and Dow.

3M, or Minnesota Mining & Manufacturing, the beloved maker of post-it notes started efforts to modernize in the 1970s.[1] By 2000, 3M had managed to save $827 million, and has had a major impact.

Perfluorooctanyl sulfonate was voluntarily phased out from use in Scotchguard, because of the company's concerns of its continued presence in tissue, reduced the use of organic solvents like heptane and toluene, and not approving new products that need these solvents. This has forced the company to invest in research and development, and 3M has applied Principe 3: Less Hazardous Chemical Syntheses and Principle 5: Safer Solvents and Auxiliaries quite well.

Lastly, Dow Chemical Company has also made some strides in illustrating the principles of Green Chemistry. The company saves $5.4 million a year and has doing such things as reducing waste. Chloromethane gas was generated from the production of resins, along with formaldehyde which was released as waste, because it could not be recovered. Dow changed the amount of starting ingredient, the catalyst, as well as the reaction conditions to reduce and elimate waste. These actions are a great example of quite a few green chemistry principles!

Overall though, we can see the adaption of green principles not only in our weekly lab sessions, but also in corporate America at large.

[1]Information from:

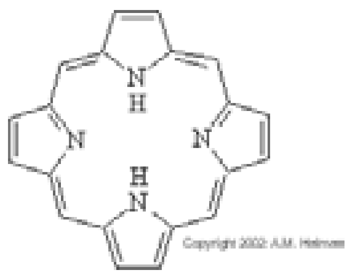
Amato, Ivan. "Green Chemistry Proves It Pays: Companies Find New Ways to Show That Preventing Pollution-Makes More Sense than Cleaning up Afterward.." *CNNMoney*. CNN. 24 July 2000. Web. 24 Sept. 2010.

Falling Colors—Autumn Chemistry

Anisa Mughal-Newlsetter Co-Editor

As much as I hate to admit it, summer is coming to an end. It's my favorite month of the year, not only because there is no school (well, for most of us, right?) but also because of the travel opportunities. At least we can say that summer blends into another beautiful month filled with fiery orange and golden yellow—Autumn.

I have always been a nature girl, but it wasn't until my first science class in college that I asked myself how leaves change color. After all, it's not like there's an Autumn Monster that paints leaves of trees at night so that we can progress to winter—no, it's much cooler than that! So I did a little digging and discovered the chemistry behind one of the most dynamic and beautiful seasons of the year.



Porphyrin Ring

There are three classes of pigments that make up the color of leaves called porphyrins, carotenoids and flavonoids[1]. Porphyrins have a ring structure that is present in all types of chlorophyll, a green pigment. As you may recall, there are many different types of chlorophyll (such as chlorophyll a and chlorophyll b) that reflect different wavelengths of light and therefore appear to be different colors. Chlorophyll is produced in response to sunlight, so as plants receive more or less sunlight, the amount of chlorophyll produced changes. The rate of degradation of chlorophyll remains constant despite changing rate of production, so as less sunlight is present in the fall, more chlorophyll is degraded than produced and the color of the leaves appear less green.

Carotenoids are another class of pigments that are fat-soluble and range in color from red to yellow. They include xanthophyll (yellow)as well as lycopene, which appears red (you may have heard that lycopene is found in tomatoes, giving them some of their red color). Carotenoids do not need light to be produced, and are therefore seen more and more as the chlorophyll is degraded.

diphenylpropene

Flavonoids are pigments with a diphenylpropene subunit[2]. This includes flavone and flavol, which appear yellow and anthocyanins which range in color from red, blue or purple. Anthocyanin production is light and carbohydrate dependent. They are also dependent on pH, so soil acidity can affect their production.

As autumn approaches, the amount of sunlight decreases and therefore the amount of chlorophyll decreases. There is no longer a large amount of green pigment to mask the carotenoids and flavonoids, and red, orange and yellow colors can be seen. Depending on the amount of carotenoids and flavonoids present in a leaf, a more red or yellow color is seen. For example, a higher anthocyanin concentration means a more red color, whereas little anthocyanin gives a more yellow color.

As the fall season approaches, enjoy the awesome variety of colors you can see in Schenley Park and trees on campus or maybe simply spend some time studying outside. But as you see the variety of colors on each leaf and tree, remember the chemistry and complexity involved for the creation of such a beatiful spectrum.

1 *Why Do Leaves Change Color in the Fall*, Dr. Anne Marie Helmenstine

2 Anthocyanin structure, about.com

Looking Ahead: 3D Printing

By: Keith Kennedy, Monthly Contributor

There has been a lot of buzz about recent advancements in 3D printing and some of the opportunities that it could create in the future. In 3D printing a virtual blueprint must first be programed into a computer. These modeling programs take the 3D blueprint and separate it into cross-sections. The printer is then able to begin the additive process of creating the 3D object. The printer does this by either spraying or squeezing one of many materials onto the printer platform, layer by layer, until the object visualized is created. These printers have been able to accurately create layers as thin as 16 microns. Many materials have been used in 3D printers, some of which include: paper, plastics, rubber, polyurethane, and metals.

There are many exciting things about this type of printing. First and foremost is the fact that the same printer can be used to make many different objects and the only change that needs to be made is in the object blueprint program. 3D printers have been used to make a variety of objects including hearing aids, personalized leg braces, and even a titanium jaw. NASA has even tested printers that will be used on space missions so that astronauts can print themselves things, as needed, during space travel.

The most exciting things about these 3D printers are the potential that they have in the future. Due to the fact that a 3D printer can be engineered to use almost any material for printing, a very wide of objects can be made. For example, people have already created a printer that is able to 3D print meats. This could help the worldwide need for protein.

Engineers in Amsterdam have created a printer called the KamerMaker large enough to print fully functioning rooms out of a plastic material. These same engineers are hoping to eventually print a complete house and believe it could revolutionize housing construction in the future.

Some scientists have theorized that in the future this 3D printing method could be used to make fully functioning organs that people could use as an alternative to transplants. This type of biomedical engineering using 3D printing could greatly reduce the cost and waiting period for transplant operations.

The major issue with 3D printing is the its cost. Professional models of 3D printers can cost as much as $60,000 and advanced 3D printers cost as much as $600,000. The cost of these printers as well as the materials that they use can result in a very expensive process. Plastic liquid costs about $800/gallon. Before 3D printers can be used for widespread and personal tasks, this cost must be lowered.

Expect to continue to hear about 3D printing in the future and even see them in your homes and offices. Will 3D printing be the next big technological advancement that revolutionized the world? We will have to wait and see.

References

http://mashable.com/2013/03/28/3d-printing-explained/