



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



Volume 28, Issue 2

October 4, 2019

SET DATES:

REGISTRATION

- October 25: Monitored withdrawal (2201) deadline-140 Thackeray Hall
- October 28: Registration begins for Spring Term 2204 based on earned credits. You will receive your registration appointment from the Registrar.
- October 28: Add/drop begins for Spring Term 2204.
- October 31: Happy Halloween!
- November 7: April 2020 (2204) graduation applications due in 140 Thackeray Hall.
- November 24-December 01: 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 01) were asked to select their permanent advisors should do so after October 07. 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 on or after October 14.

2019-2020 ACS-SA Officers and Staff

- James Barber-Co-President
- Anna Audley-Co-President
- Noah Bright-Co-Vice-President
- Mary Morcos-Co-Vice-President
- Lydia Chlpka-Co-Secretary
- Haley Lindberg-Co-Secretary
- Rachel Levy -Co-Treasurer
- Cassandra Vu -Co-Treasurer
- Neerja Garikipati-Outreach Coordinator
- Michael Kane-Outreach Coordinator
- Logan Newman-Outreach Coordinator



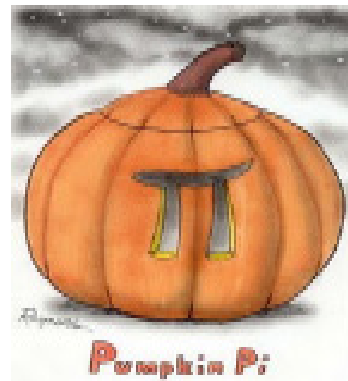
- Dale Erikson-Newsletter Co-Editor
- Luke Persin-Newsletter Co-Editor
- Caitlin Giron-Green Chemistry
- Sasha Chernenkoff -Technical Wizard
- Margaret Brennen-Senior Affairs Committee
- Matthew Carnevali-Senior Affairs Committee
- Gina D'Incau-Senior Affairs Committee
- Adelle Hamilton-Senior Affairs Committee
- Madison Keating-Senior Affairs Committee
- Bridget Murray-Senior Affairs Committee

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

CHEM MAJOR NEWS

Our October Schedule

Everyone is welcome to attend our weekly ACS-SA meetings. Every Friday at noon we get together in 150 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



- 4 Fall Term Birthday Celebration
- 11 National Chemistry Week Preparation
"Chemistry Is Out of This World"
- 18 All About Registration – with Dr. George Bandik
- 25 Pumpkin Painting on the Patio!



Halloween Pumpkin Fest

Come join the fun this October 25, 2019 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 luke.persin@pitt.edu or dje23@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 (2204).

CHEM 1000

Mathematics for Chemists

THIS COURSE OFFERED THROUGH THE CHEMISTRY DEPARTMENT IS RECOMMENDED IN PLACE OF MATH 240-CALCULUS 3. IT WILL BE OFFERED BOTH FALL AND SPRING TERMS. PLEASE NOTE THAT IF YOU CANNOT 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 then 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 do-



ing 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 70% 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!

There is Chemistry in Pittsburgh

*University of Pittsburgh
Department of Chemistry
by: Trevor F. Reinhardt*



Pitt Chemistry Students,

Comedian Chris Rock said it best, “wealth is not about having a lot of money; it’s about having a lot of options.” Let’s be honest here, money has its benefits. What money cannot buy are the future doors that have or will open due to all of your hard work and dedication while studying here at the University of Pittsburgh. That hard work has, no doubt, led each and every one of you on a path to a successful career. While many of you may be well on your way to becoming the next successful heart surgeon, chemistry professor or multimillionaire CEO, you all had to make various choices along the way. Those choices were based around your personal interests, experiences and even dreams that you had as a child. I am not here to tell you that you have chosen incorrectly or are making a bad decision. I am here to try and help those students who are like me: undecided and wondering WHAT’S NEXT?

Before I go any further, I probably should introduce myself. My name is Trevor and I am a senior student here in the Department of Chemistry. After long, grueling years of hard work, stressful all-nighters and a lighter wallet, I finally expect to graduate this December. In fact, this past March I joined a phenomenal company and began working downtown as a Personal Banker with Northwest Bank. I am sure you are thinking “why did he take a job in finance if he spent so much time, and let’s be honest MONEY, on a degree in Chemistry?” The truth is that when I enrolled in classes the fall of my freshman year here at Pitt, I had ZERO clue what I wanted to do the rest of my life. And if I am being super honest with you all, I still don’t. But what I do have is options and that has been the goal all along. I came to school not knowing exactly what career field or path I wanted to follow the rest of my life, but I expected to leave school with a plethora of career paths to choose from. While I am currently working full-time and love the job I have now, that does not mean my chemistry degree I will have earned will be all for naught. Having options to choose from is never a bad thing.

After talking with Dr. Bandik, we decided to create a project based around giving you, the student, options. Over the next six months, I will be writing a monthly article centered on a chemistry related business in the greater Pittsburgh area. With each article, I plan to provide you with some history, current projects, recruiting or hiring information, facts and tidbits that I hope you find as interesting and informative as I do. I hope you walk away with a better understanding of what career paths this amazing city and surrounding area have to offer. Ultimately, I hope these articles give you options.

Be on the look-out November 1st for the debut of the Pittsburgh Chemical Update.

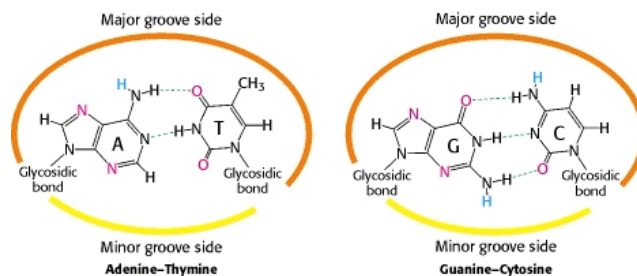
Good Luck to all students this year and always, Hail to Pitt!!

- Trevor

If there is anything you specifically want to hear about or have any general comments or questions, please do not hesitate to contact me at tfr2@pitt.edu.

by: Luke Persin, *Co-Editor*

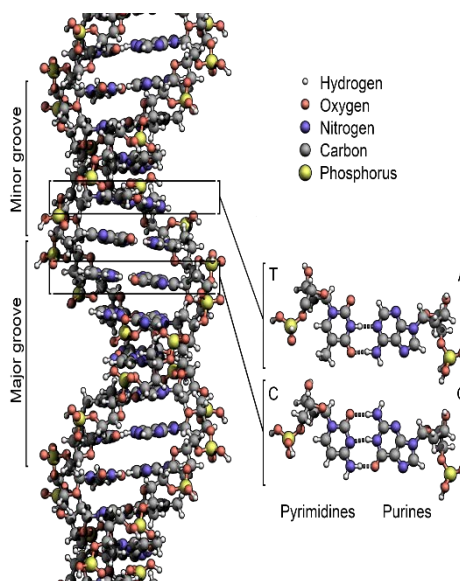
GETTING IN THE GROOVE EDITION



Welcome to the month of October: the land of midterms, pumpkin spice, and of course, more chemistry! As autumn has descended upon us, we continue our trek through the semester, prepare for yet another brutal Pittsburgh winter, and keep growing our love for Chevron. While it's still early in the academic year, it's a perfect time to get into the *Groove* of things to make your semester a great one! Today we're going to focus on how to balance all parts of your course work and extracurricular activities to set you on the path of success with Pitt's chapter of ACS right by your side.

Whether you're dreaming about the aromatic stability of melatonin (N-[2-(5-methoxy-1H-indol-3-yl)ethyl]) or you're having a sip of a nice caffeinated beverage in the morning and thinking about the beautiful cyclic structure of caffeine (1,3,7-Trimethylpurine-2,6-dione), chemistry is a huge part of your daily life! The beautiful thing about studying chemistry is how once you learn it, you can begin to see connections in everyday life and truly understand the mechanisms (literally) behind everything. Even though we are surrounded by chemistry every day, it can still be hard to work chemistry and all your other studies into your schedule.

The best way to plan your studies into your busy schedule is simply to schedule the time to study! If you don't have a calendar, get one! If you do have one, instead of just scheduling in all your events and exams, also schedule in what times you plan to study for certain exams. Instead of studying 6 hours one day for a class, spread it out and study 1 hour every day for 6 days. Once you begin doing this and managing your time correctly, if you still need extra help with your academics there are many resources for you to utilize. There are plenty of opportunities for free tutoring on campus, even right here in Chevron with our ACS Tutoring on the Balcony. Go to office hours, reach out to your TAs, or even ask a random person at the library with an Organic Chemistry book for some help. Don't be afraid to reach out for help, everyone here in the Pitt community (and especially the Chemistry Department) wants you to be successful and will help you get to where you want to be!





Polyurethane Foam Blowing Agents

Rigid polyurethane foam is used in many household material science applications, such as water heaters, refrigerators, and wall insulation. About 50% to 70% of the energy used in the American home is for heating and cooling, so having a high-quality insulation foam is essential for reducing energy consumption.¹ In order to make polyurethane foam, a blowing agent is used to produce the cells within it. The blowing agent, in the gas phase, is trapped within the foam cells and is responsible for the foam's insulating properties.² During the foam's production, certain blowing agents are chosen to enhance insulation.

Over the past few decades, the type of blowing agent used in foam production has changed multiple times due to the increasing concern for their effect on the environment. In the 1960s, chlorofluorocarbons (CFCs) were the most widely used blowing agent and provided the best insulating foam. However, the concern for blowing agents' ozone-depletion potential (ODP) began in the 1980s, and scientists discovered that CFCs and other blowing agents were depleting the ozone layer at a rapid rate.³ While CFC is in the atmosphere, it can be broken down into chlorine by UV light from the sun. It was found that one chlorine molecule can then break down more than 100,000 ozone molecules.⁴ In the Montreal Protocol, it was agreed that the use of the most popular blowing agents, CFCs and HCFCs, needed to be phased out in order to protect the planet.⁵

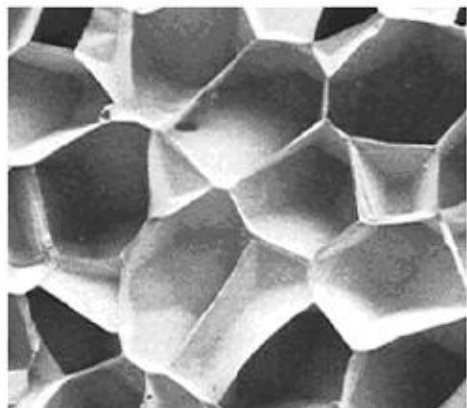


Figure 1: An electron microscope image of polyurethane insulation foam cells.

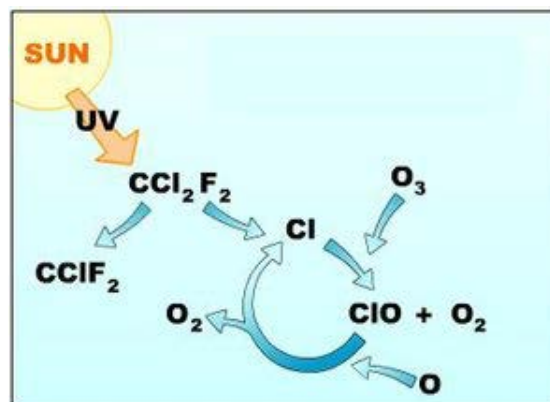


Figure 2: The destruction of ozone by a CFC molecule. CFC breaks down ozone into O_2 .

CFCs and HCFCs were replaced with hydrofluorocarbons (HFCs) because they have a low ODP. Compared to CFCs, HFCs have a reduced thermal efficiency though. Until recently, there hasn't been much of an issue with using HFCs, but there is now a new concern for its global warming potential (GWP). Therefore, the insulation industry has had to transition to using a blowing agent that has a low ODP, low GWP, and still provides good insulating properties for energy efficiency. The current blowing agent options are hydrofluoroolefins (HFOs) or hydrocarbons.⁵

Hydrocarbons and HFOs both have a low ODP and GWP and are relatively environmentally friendly. Another benefit to using HFOs is that they provide better insulating properties than HFCs. However, they are very costly to use on an industrial scale. The hydrocarbons used as a blowing agent are n-pentane, isopentane, and cyclopentane, and they unfortunately don't insulate as well as HFOs. Hydrocarbons are cheaper than HFOs, but they are very flammable and require a large investment for companies to make their production sites suitable to handle flammable chemicals.³ It is now up to the chemists at material science and insulation companies to choose which blowing agent to use and discover a way to make the highest-quality insulation that is energy efficient and uses environmentally friendly chemicals.

Chlorine in the atmosphere has destroyed the Antarctic ozone layer by up to 65% and by about 20% in other regions of the world. The amount of chlorine in the atmosphere is decreasing now due to the CFC ban and transition to safer blowing agents. However, it is still going to take another 50 years for the chlorine levels in the atmosphere to return to normal.⁵

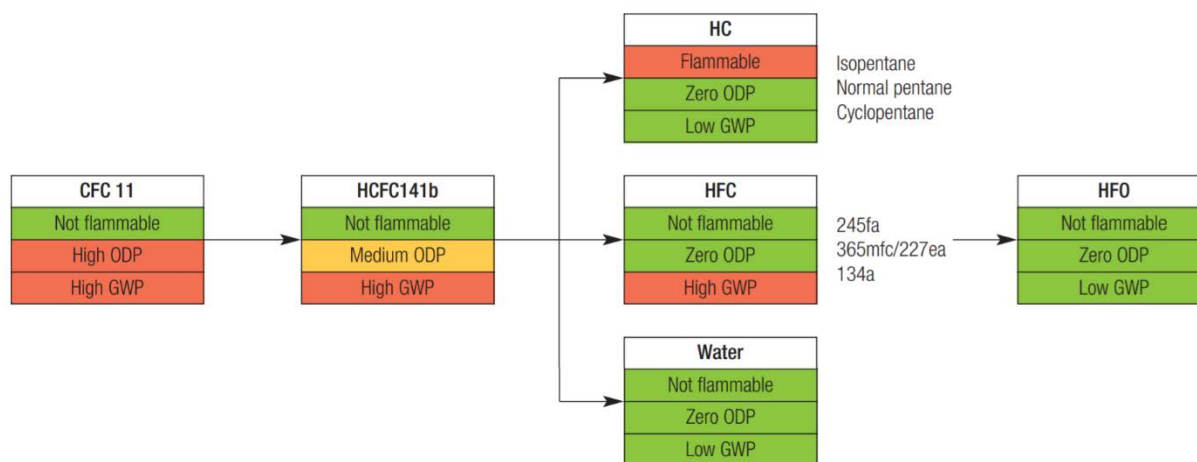


Figure 3: The transition of blowing agent use and the ODP, GWP, and flammability of each molecule. In each transition, the ODP and GWP have improved.⁵

1. Introduction to Polyurethanes: Rigid Polyurethane Foam. American Chemistry Council. https://polyurethane.americanchemistry.com/Polyurethanes_Pages/Intro_to_Polyurethanes/Rigid_Polyurethane_Foam/ (accessed January 25, 2019).
2. Robinson, Simon. Blowing Agents. Urethanes Technology International, December 17, 2013. https://utech-polyurethane.com/post_glossary/blowing-agents/ (accessed January 25, 2019).
3. Wagman, David. Polyurethane Blowing Agents Can be Environmentally Friendly and Still Offer Superior Insulating Properties. IEEE Glob Spec, July 19, 2018. <https://foamsupplies.com/wp-content/uploads/2018/08/Engineering-360-Blowing-Agent-Article.pdf> (accessed January 25, 2019).
4. Ozone Depletion. National Geographic, November 14, 2018. <https://www.nationalgeographic.com/environment/global-warming/ozone-depletion/> (accessed January 25, 2019).
5. Blowing Agent Options for Insulation Foam After HCFC Phase Out. Huntsman. https://www.huntsman.com/polyurethanes/Media%20Library/a_MC1CD1F5AB7BB1738E040EBCD2B6B01F1/Products_MC1CD1F5AB7081738E040EBCD2B6B01F1/Insulation_ME4E93A022E848990E040EBCD2C6B1951/files/Blowing%20agent%20options%20for%20insulation%20foam%20after%20HCFC%20phase%20out.pdf (accessed January 25, 2019).