



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



Volume 28, Issue 1

September 7, 2018

### THE WELCOME BACK EDITION

Welcome back everyone! After being at Pitt for two summers in a row, it fills my heart with joy to see the city start to fill up with students again. Every year seems to be better than the one before, bringing even more opportunities and excitement. As we progress through our years at university, it's nice to take a step back every once in a while to appreciate where we came from. Remember when you barely knew anyone here? Or when you didn't know the difference between Forbes and Fifth? What's a Cathy? Who's George? Sure, these may be silly examples of stuff that's obvious now but I encourage you to take a minute for yourself to appreciate the progress you've made in your own life. I myself came from a small town where I wasn't accepted for who I was and every day felt like a struggle for me to be me. Looking back, I never would have guessed that I would be here doing the things I do today while being surrounded by such loving and supportive friends.

To those of you who will be here for the first time, Pitt is a great place to be and I hope you will feel at home. With each new class of students, there are thousands who are trying to find their place on campus. My advice to you all is to embrace your differences and find your passions. Put yourself out there and try new things. It's your time. Try your hardest in your classes but don't overwhelm yourself. You come first and should make sure to care for yourself, both physically and emotionally. There will be ups and downs, but through this next year, you will grow way more than you thought you ever would. Follow your heart. Harness the power of your imagination and infuse it into your work. Love what you do and seize the opportunities that will come knocking throughout this next year.

Speaking of new opportunities, many students at the beginning of the school year are looking for organizations to join. If you are interested in science, community outreach, or just being part of a cohesive group of amazing people, I recommend you check out the American Chemical Society (ACS). I'm not a chemistry major but I've found tremendous amounts of love and support in this organization. Through ACS, we have been able to reach out into the community to show the power of science to high school youth, put together some fantastic Valentines Day goodies for veterans, and even more! Look further inside this newsletter or go to Chevron Science Center 107 for more information about the great things this group has been up to. Everyone and anyone is welcome to join!

Best of luck this semester!

*Dale Erikson, Newsletter Co-Editor*

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

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## Part 1: Introduction

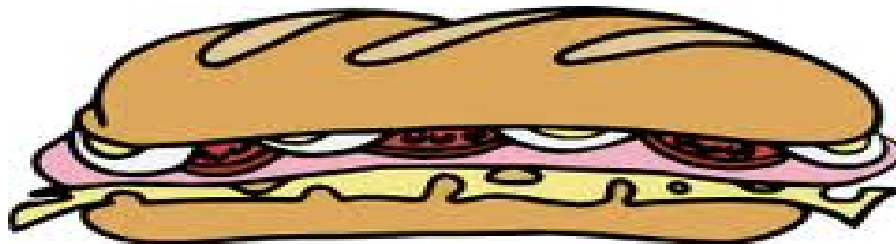
Sometimes, as you wade through one difficult subject to the next, it can start to feel like you are spinning your wheels. Is properly identifying the symmetry of an inorganic complex, or memorizing pKa values, really ever going to be helpful to you beyond your next experiment or exam? As someone who has recently steered away from academia for the past few years and spent some time in various forms of employment, I can tell you without a doubt the answer to all of these questions is yes.

Towards the end of my degree, which I will complete in August, I have taken time off to explore some unique employment opportunities that I wasn't sure I would ever get a chance to pursue otherwise. Initially I moved to North Carolina learn the ropes of the commercial fishing industry and have since transitioned into golf course maintenance. In the past few years I have gone from catching more seafood than you could fit in a lecture hall to mowing eighteen greens at daybreak. It has been a pretty eye-opening journey and along the way I have tried to apply the skills I developed learning chemistry to better understand the work I was doing. Now don't get me wrong, my scientific knowledge did not give me a huge leg up, or unfair advantage. Explaining to the crabs that it was more entropically favorable for them to be outside of the crab pot was not an effective technique for removing them; vigorous shaking worked much better.

My background did however give me the ability to take seemingly unfamiliar subjects and break them down into something usable. The tools I used to [try to] pass an exam or do research are strikingly similar to the ones I needed to learn some of the intricacies of the handling seafood or to help maintain a golf course. Even though I can't remember exactly what pH certain functional groups deprotonate at, I can remember exactly where to find out and what that information means. Anybody can type a phrase into a search bar, but it takes a certain skillset to turn that search into an effective understanding. As time went by I encountered and tackled more tangential topics, and eventually I started to resemble someone who might know what they are talking about. Some of these topics include seafood analysis, aquaculture system design, or herbicide modes of action. Most of these topics are things I had never considered before they were staring me in the face, but now I feel comfortable with them. Over the course of the next few newsletters I would like to share a selection of those topics that I found to be most interesting from a chemist's perspective. If that sounds interesting to you stay tuned for the next installment from the Fisher-Chemist-Golfer Guy.



*The ACS-SA will be selling hoagies every Tuesday at lunchtime in the lobby of Chevron Science Center. This year they will be from Uncle Sam's! Details are coming soon...Please support our ACS-SA. Thank you!*





# Green Chemistry

by: Andrew Warburton-Green Chemistry Editor, 2017-2018



Beginning next month, our new Green Chemistry contributor, Seth Brody, will be sharing the latest advances in this important area of science with you. This month we just want to remind you of the principles of green chemistry as shared by last year's writer-Drew Warburton.

Green chemistry is a heavily studied and funded field in science ever since our very own Pittsburgher, Rachel Carson published her extremely successful and influential book *Silent Spring*, changing the way communities and industries view their impact on the environment for the following decades.<sup>1</sup> Green chemists and engineers are working to take their research and innovations out of the lab and into the board room through the creation of viable industrial products that can be embraced by today's industry leaders including but not limited to, reducing waste, improving energy efficiency, replacing hazardous substances, switching to renewable feedstocks, and designing products which degrade into innocuous chemicals after they have fulfilled their role; however, even with such great advancements in technology and discovery, more than 98% of all organic chemicals are still derived from petroleum.<sup>2</sup>

## The Twelve Principles of Green Chemistry<sup>3</sup>

1. **Prevention**—It is better to prevent waste than to treat or clean up waste after it has been created.
2. **Atom Economy**—Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
3. **Less Hazardous Chemical Syntheses**—Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
4. **Designing Safer Chemicals**—Chemical products should be designed to affect their desired function while minimizing their toxicity.
5. **Safer Solvents and Auxiliaries**—The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.
6. **Design for Energy Efficiency**—Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.
7. **Use of Renewable Feedstocks**—A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.
8. **Reduce Derivatives**—Unnecessary derivatization (use of blocking groups, protection/ deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.
9. **Catalysis**—Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
10. **Design for Degradation**—Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.
11. **Real-time analysis for Pollution Prevention**—Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
12. **Inherently Safer Chemistry for Accident Prevention**—Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

1. *History of Green Chemistry.* <https://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/history-of-green-chemistry.html> (accessed August 11, 2016).
2. *Green Chemistry Definition.* <http://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/definition.html> (accessed August 11, 2016).
3. *Principles of Green Chemistry and Green Engineering.* <https://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/principles.html> (accessed August 11, 2016)

# 2191 Tentative ACS Fall Schedule



## August

**31** 2018-2019 Officer's Meeting

## September

**7** Welcome to the New Term – *with Pizza*

**14** Introduction to the Career Center – *with Ms. Emily Bennett*

**21** Hello from Pre-Professional Advising – *with Ms. Andrea Abt*

**28** Thinking about Graduate School – *with Professor Steve Weber*

## October

**5** All About Registration – *with Dr. George Bandik*

**12** Meet Our New Faculty – *with Professor Raúl Hernández Sánchez*

**19** National Chemistry Week Preparation

**26** Pumpkin Painting on the Patio!

## November

**2** Green Chemistry

**9** Saturday Science Preparation

**16** Fall Term Awards

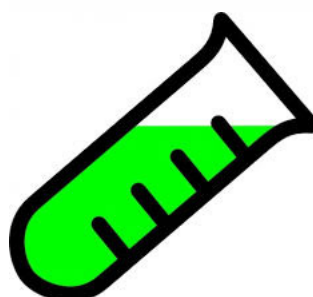
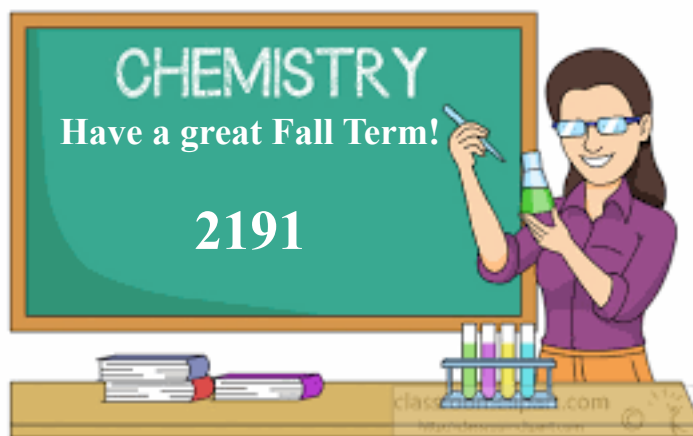
**23** Thanksgiving Break

**30** Open Meeting – *with Pizza*

## December

**7** Fall Term Birthdays

**14** Have A Great Break!





# American Chemical Society

## Student Affiliates, University of Pittsburgh

### Membership Application

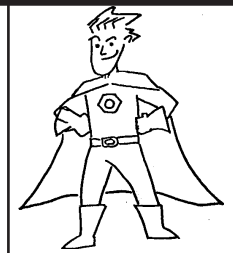
This is a powerful professional organization for the benefit of individuals interested in chemistry and related fields. Our organization offers exciting extracurricular activities and many outstanding opportunities for our members, including:

- 1 WEEKLY MEETINGS**-to plan activities, provide interesting speakers, discuss ideas, and keep students aware of what is happening in the scientific community.
- 2 ANNUAL TRIPS**-Each year we sponsor (a) trip(s), to external chemistry environments, as well as for social enjoyment. Significantly reduced rates are available to active members. In the past few years we have traveled to New Orleans, Atlanta and New York.
- 3 PROFESSIONAL NETWORKING**-Our organization has many opportunities to make contacts with professionals in both the scientific industry and academia. Student affiliates also have the opportunity to join the National ACS.
- 4 SOCIAL ACTIVITIES**-We sponsor many activities throughout the year just for fun.

*Our meetings are held every Friday at 12:00 noon in Room 150 Chevron Science Center. To join, complete the application form below and come to one of our meetings. Our first meeting will be September 7, 2018 but you may join any time throughout the year.*

|   |
|---|
| Name: _____   |
| School Address: _____<br>_____  |
| Phone: _____  |
| Major: _____ Year in School    Fr.    So.    Jr.    Sr.                               |
| E-mail: _____   |
| May we include your name, number and e-mail on the published phone list?    YES    NO |

To submit this form by mail, send it to ACS-SA, Box 24, Chevron Science Center, University of Pittsburgh, Department of Chemistry, Pittsburgh, PA 15260. Be sure to include the \$15.00 dues (make checks payable to the University of Pittsburgh). It is possible to be active even if you can not attend the meetings. For more information, see our display case in the lobby of Chevron Science Center.





# Just What Can You Do With That Chemistry Degree?

by: Kaila Simcoviak

Dreams of going to medical school? You can do that with a bachelor's degree in Chemistry! Chemistry is often referred to as the "central science" because it connects the physical, the life, and the applied sciences together as one. A chemistry degree will provide a student with a diverse background, that fulfills the requirements needed for Medical School and allows one to achieve high scores on the MCAT standardized testing.

Physicians are the ones we call when the contractions start coming every five minutes. They are the ones we rush to for broken arms, coughs, fevers, memory loss, headaches, chest pain, and so much more! There are two main types of physicians: Medical Doctors and Doctors of Osteopathic Medicine. If you think being a physician is your calling, a degree in chemistry can help you to achieve your end goal!

Prerequisites for admission into Medical School, for example at the University of Pittsburgh for the 2019 academic year include one full year of biology and lab, one full year of general/inorganic chemistry and lab, one full year of organic chemistry and lab, one full year of physics and lab, one half year of biochemistry, one half year of statistics, and one full year of an intensive writing course. Many of these requirements are all met through a chemistry degree at the University of Pittsburgh! A starting salary for a medical doctor varies for each specialty, for example according to "profiles database" family physicians typically start around \$138,000 while orthopedic surgeons typically start at \$315,000. Meanwhile, according to the Bureau of Labor Statistics the median salary for a physician is \$196,380 with a projection of 107,070 job openings to come between 2016 and 2026.

Prerequisites for admission into Osteopathic Medical School, for example at Western University also include courses that can be completed by a degree in chemistry! Adding the bioscience option is also a great addition to beef up that resume and obtain the required courses! The courses include English, biological sciences and lab, organic chemistry and lab, physics with lab. In addition, biochemistry, microbiology, genetics, are all some recommended courses, but they would be included with a chemistry degree and bioscience option! Some statistics for a doctor of osteopathic medicine include a five star rating on job satisfaction – extremely satisfied! Also 45% of DO doctors are female and 55% of them are male. A salary for a doctor of osteopathic medicine (DO) ranges by job but in general the range lies between \$162,355 to \$349,211.

If all of this sounds exciting to you, a bachelor's degree in chemistry can help you to achieve your goals! Become the next physician that patients go to for their broken bones, coughs, and sneezes!

## References:

<https://money.usnews.com/careers/best-jobs/physician>

[https://www.payscale.com/research/US/Degree=Doctor\\_of\\_Osteopathic\\_Medicine\\_\(DO\)/Salary](https://www.payscale.com/research/US/Degree=Doctor_of_Osteopathic_Medicine_(DO)/Salary)

