CHEM MAJOR NEWS

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

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SET DATES: REGISTRATION

October 28:	Monitored withdrawal (2171) deadline-140 Thackeray Hall
October 31:	Registration begins for Spring Term 2174 based on earned credits. You will receive your registration appointment from the Registrar.
October 31:	Add/drop begins for Spring Term 2174.
October 31:	Happy Halloween!
November 11:	April 2017 (2174) graduation applications due in 140 Thackeray Hall.
November 23-November 27:	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 17. 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 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.

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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

7 All about Undergradaute Research
with Ann-Elodie Robert

14 Preparation for National Chemistry Week
"Solving Mysteries through Chemistry"

21 Pumpkin Painting on the Front Patio

28 Chemistry Trivia Competition

Happy Halloween

Halloween Pumpkin Fest

Come join the fun this October 21, 2016 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 mnm42@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 (2174).

CHEM 1000
Mathematics for Chemists

THIS NEW 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 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!

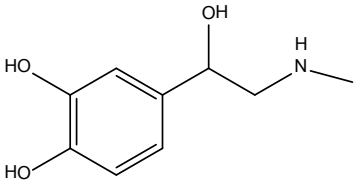
Please Don't Scare Me!!

by: Stephanie Liu
Co-Editor

It's officially the autumn season here in Pittsburgh, and everyone and their mother are bracing themselves for the inevitable onslaught of seasonal favorites. The cooler weather brings with it midterms, pumpkin flavored everything, and the ~spookiest~ holiday of the year—Halloween!

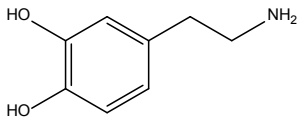
Personally, I'm not very good when it comes to scary things. Jump scares make me jump even when I realize they're coming, and trailers to horror movies sometimes keep me up at night-- I'm weak, and I know it.

On the other hand, some people love being scared; they crave the sensation of fear and the racing heart and sweaty palms that come with it. Luckily for them, these kinds of attractions are everywhere this time of year—summer may be the season for gory blockbuster flicks, but October is the month for haunted houses, sinister corn mazes, and ghostly stories around a campfire.



epinephrine

But why? What's happening in our bodies when we seek out horror and thrills? Obviously, it has a lot to do with your brain. When something scary happens, the human brain reacts by releasing a flood of epinephrine, colloquially known as adrenaline, kick starting our body's "fight or flight" response, which frequently presents with the various physiological signs of fear—sweating, a pounding heart, and heavy breathing, among other things. This rush of adrenaline is your brain preparing your body for its next move: fight, or flight?



dopamine

Still, this doesn't explain why some people actively seek out fear, and others avoid it at all costs. Some research indicates that it has a lot to do with dopamine, one of the many neurotransmitters in your brain, which is released at the same time as the epinephrine. Dopamine is traditionally associated with pleasure seeking, addiction, and desire, but it has also been closely tied to fear and dread, more specifically with retaining the memory of scary situations. Researchers found that mice injected with an increased amount of dopamine after the traumatic event would remember it for much longer than a normal mouse. Furthermore, mice with a decreased amount of dopamine would more quickly forget the event (in this case, a device that shocked the mice if they walked on it) and do it again.

A different study found that humans with fewer dopamine autoreceptors (things that tell the brain to slow down production of that particular species when there's an abundance) were more likely to like being scared. They overproduce dopamine in their brains, and thus, experience more pleasure. These two studies seem to be contradictory, but one thing is certain— dopamine plays a large part in your response to dread inducing stimuli.

So if you're one of these fear seeking adrenaline junkies, this is a great time of year to get your fix! Check out The ScareHouse or Phantom Fright Nights at Kennywood all throughout October, go on a ghost tour of the city, curl up for a classic horror movie in the comfort of your own home, or (the scariest of all) take an organic chemistry exam you are completely unprepared for. Happy Halloween!

References:

https://www.washingtonpost.com/news/speaking-of-science/wp/2016/05/10/the-science-of-fear-why-do-i-like-being-scared/

http://www.cnn.com/2015/10/29/health/science-of-fear/

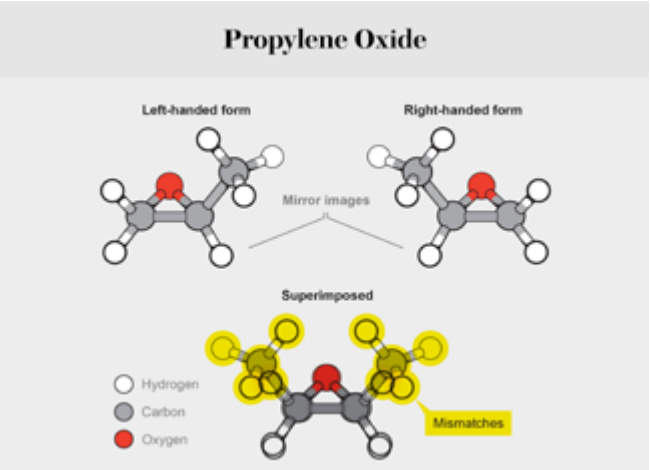
http://io9.gizmodo.com/5341495/the-secret-connec-

Happy Halloween!

Interstellar Chiral Molecules

Juli Buchwald, *Co-Editor*

You read that correctly. Throughout many walks of life, there seems to be a handedness that is preferred. No, I am not talking about the fact that you can throw a football with your left hand or build a molecular model of benzene with solely your right hand. Instead, I am talking about the handedness that is organically derived and is ever-present in nature. This sounds like a mystifying, law-bending phenomenon, right?



https://www.scientificamerican.com/chemistry/

This idea of handedness that exists naturally is given a name that we chemists like to call "chirality." Something that is chiral implies that it is handed – that is, mirror images that are non-superimposable. Despite this seeming like a far off concept only pertinent to organic chemistry students, it is actually present all around us! For example, nearly all amino acids are what we could call left-handed, while DNA has a clockwise twist that resembles a right-handed screw[1]. This sounds pretty enchanting, but why would nature prefer possessing a single hand in most of its belongings?

Perhaps Brett McGuire, an astrochemist at the National Radio Astronomy Observatory, said it best by stating simply, "It's pretty well established that once an excess [of one chirality] is present, life is going to go with it[1]." This makes sense considering that DNA only has one hand – if it were ambidextrous, life would not exist because no two strands could fit together!

Although it is common to find chiral molecules on this very earth, *Science* has recently reported that McGuire and his colleagues have discovered such handed molecules in interstellar space. The National Science Foundation's Green Bank Telescope led this project. Seems far off, right? Perhaps. If you are like me, you have probably never spent time pondering the question of whether chiral space molecules exist. But, it has been confirmed that the compound is called propylene oxide (CH_3CHOCH_2) and is present in Sagittarius B2 – a dust and cloud gas centered in the galaxy of our very own solar system, the Milky Way[1].

Nearly 180 molecules have been detected in space to date by observing the unique spectral lines that are mostly present in the radio spectrum[2]. However, larger, more intricate molecules require a finer detection method. Such was the case with propylene oxide, where two distinctive lines were observed while the third was initially undetectable due to the interference of satellite radios[2]. The Parkes telescope was then employed to identify the remaining spectral line that led them to verify the molecule.

As Brandon Carroll from the California Institute of Technology in Pasadena stated, "Propylene oxide is among the most complex and structurally intricate molecules detected so far in space. Detecting this molecule opens the door for further experiments determining how and where molecular handedness emerges and why one form may be slightly more abundant than the other[2]."

References:

1. Collins, Nathan. Astrochemists Detect Chiral Molecules in Interstellar Space for the First Time. *Scientific American,* September 2016.
2. National Radio Astronomy Observatory. Life's First Handshake: Chiral Molecule Detected in Interstellar Space. https://public.nrao.edu/news/pressreleases/2016-chiral-gbt (accessed Sep. 26, 2016).

Green Chemistry

by: Andrew Warburton
Green Chemistry Contributer

Take a Breather

Ah, it's that time again. The leaves are starting to change color, the days are shorter, and the temperature has cooled down to a comfortable level. It must be fall! Not only is the weather changing, but the student body is transitioning from the perky post-summer persona to a more lackluster attitude. Homework assignments are harder, sleep becomes a luxury item, and the first exams have hit you with a force that even Isaac Newton couldn't express.

Even with the difficulty of university, many of us choose to be "greener" people by reducing our carbon emissions. If you remember back to middle school science class (seems like a long time ago doesn't it?), carbon dioxide is a greenhouse gas that traps infrared radiation from the sun and warms the planet. Ever since the Industrial Revolution, human-based carbon emissions have skyrocketed, causing a gradual increase in atmospheric and surface temperatures of the Earth.[1] Today, the concentration of carbon dioxide in the atmosphere has passed 400 parts per million (ppm). Although that may not seem very significant, this high concentration causes many problems ranging from increased temperatures, violent storms, and acidification of the ocean.[2]

Remember, no article for ACS would be complete without a chemical reaction! Carbon dioxide (CO_2) forms an equilibrium with water forming carbonic acid (a weak acid with a pKa of ~ 6.35) and this resulting equation:[3]

$$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow HCO_3^- + H^+ \leftrightarrow CO_3^{2-} + H^+$$

This may be a review for most of you, but as you can see, by Le Chatelier's Principle, and increase in CO_2 will results in an equal increase of H_2CO_3 and therefore, an increase in H^+. Acidification of water is a huge problem for marine life, especially coral. Even a slight decrease in pH leads to the bleaching of coral and destruction of their ecosystems, ruining the homes for many sea creatures alike.[4] Over 25% of the coral worldwide has been bleached or destroyed by human means ☹.

Whoa! That was a lot! Let's take a breather here from the sad monotony of human-caused destruction of Earth and talk about what you can do to help prevent the progression of climate change. Since the weather has become more tolerable in the last week, you can probably turn off your air conditioner and help reduce your CO_2 footprint.[5] Try to avoid printing so much, and download an e-copy! That's what your laptop is for anyway! By reducing your carbon footprint, you can help preserve our environment for your kids and grandkids and help make their future a little cooler.

Works Cited

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4. http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F
5. http://www.livescience.com/919-increased-air-conditioners-produce-greenhouse-gas.html