CHEM MAJOR NEWS

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

Volume 24, Issue 3 **November 7, 2014**

Some Incredibly Important Dates to Know...

November 07: Deadline for undergraduates to apply for April 2015 graduation in 140 Thackeray Hall

November 26-November 30: Thanksgiving Recess-No Classes! Have a great Holiday!

Happy Thanksgiving!

Congratulations!

On Friday, November 21, 2014, the American Chemical Society-Student Affiliates at the University of Pittsburgh will host the annual Fall Term Awards Ceremony. This year's award winners include the following students:

Michael S. Mizrahi-*Undergraduate Analytical Chemistry Award*
David G. Parobek-*Undergraduate Inorganic Chemistry Award*
Tingting Dai-*Undergraduate Organic Chemistry Award*
Brian D. Griffith-*Silverman Award*

All of our awardees are ACS-SA members and we are very proud to have them in our gang. We extend our sincere congratulations to all of our awardees for a job well done!

Everyone is invited to attend the awards ceremony in Room 150 Chevron Science Center on November 21st. Come join us as we celebrate undergraduate achievements with our awardees!

2014-2015 ACS-SA Officers and Staff

Josh Casto-*Co-President*
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Anisa Mughal-*Newsletter Co-Editor*
Raissa Berry-*Green Chemistry Contributer*
Sara Obringer-*Tech Team*
Amber Peck-*Tech Team*

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

Our November Schedule

November

07 Green Polymers

14 Preparing for Saturday Science
with Drew and Chase

21 Fall Term Awards Ceremony
Join us as we celebrate academic excellence!

28 Thanksgiving Break--Enjoy!

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 above mentioned meetings.

Saturday Science Academy

Looking for something fun to do on November 22, 2014? Try Saturday Science! It is an opportunity to help ambitious area high school students learn both general and organic chemistry in the lab. With your help, the students get to make crystal gardens, do a simple thin layer chromatography experiment, witness an acid base reaction with dry ice, measure the pH of some favorite soft drinks, and synthesize slime. Volunteers will play the role of a teacher: demonstrating the experiments, helping the students perform them, and finally, answering their questions. Saturday Science is a fun and rewarding volunteer experience in chemistry. So, are you still looking for something fun to this year? Join us for the ACS-SA meeting on Friday, November 14, 2014 at NOON in 150 CHVRN to plan for this great day. If you cannot be there on Friday, e-mail Ryan, our Outreach Coordinator at rhr12@pitt.edu and let him know you're interested in helping out and then join us on Saturday, November 22, 2014 at 9:00 a.m. in the Chevron Lobby.

Comedy Corner...

Happy Thanksgiving!

Green Chemistry

by: Raissa Berry

A Fracking Controversy

Over the past decade, the process of hydraulic fracturing, otherwise known as fracking, has become a major area of controversy. Fracking is a method used for retrieving natural gas from the ground, specifically from shale rock fields. Fractures are created in the shale fields by pumping a mixture of water, sand, and chemicals into the shale rock under high pressure, and natural gas then flows through these fractures and into wells.

The mixture of fluids used for fracking operations require millions of gallons of water, typically drained from local lakes. In addition, another thousands of pounds of toxic chemicals are added to the mixture. Some operations can require up to 8,000,000 gallons of water and 320,000 lbs. of chemicals. Although some of these fluids are pumped from wells to surface holding tanks, around 20-40% linger underground. The fluids that are transferred to surface holding tanks are then transported to wastewater treatment plants.

A major location for fracking is the Catskill Mountains, located on top of two major shale rock fields (between 6,000 – 8,000 feet in size): the Marcellus Shale field and Utica Shale field. These fields run through multiple states, including Ohio, New York, and Pennsylvania. Recently, the fracking process has been under scrutiny due to the many threats it poses to the environment and in turn human health. A few of the major threats include earthquakes, endangering food supplies, air pollution, and water contamination.

Drinking water contamination has become a significant issue with the findings of present studies. Researchers have discovered that the wastewater created by fracking contains halides, which can increase levels of toxic disinfection by-products that are linked to cancer and problems with the nervous system. Some of the by-products have been found at levels that are much higher than limits set by the Environmental Protection Agency (EPA) for drinking water treatment facilities. Specifically, in the presence of disinfectants such as chlorine and chloramine, organic matters can react and create compounds like trihalomethanes and haloacetic acids. In the presence of specific halides such as bromide and iodide, even more toxic by-products can be created by these disinfectants. In a study performed at Stanford University, levels of these and other by-products in treated fracking wastewater were found to be not only higher than those found in treated, unaffected river water but also higher than EPA limits.

The Pennsylvania Department of Environmental Protection has begun to oppose the sending of fracking wastewater to municipal treatment plants in an attempt to lower contamination levels. Another possible solution that has been suggested is the idea of pretreating the wastewater to remove the dangerous halides before treating it in municipal plants.

The jury is still out on many of these issues. The best way to decide is to be a well-informed citizen. Read, listen and ask questions.

References:

http://www.catskillmountainkeeper.org/our-programs/fracking/gas-drilling-overview/

C&EN: Chemical & Engineering News – "Fracking Wastewater Could Encourage Formation of Toxic Compounds During Drinking Water Disinfection"
(http://cen.acs.org/articles/92/web/2014/09/Fracking-Wastewater-Encourage-Formation-Toxic.html)

Organic Molecules in Space

by: James Toye

In 1980, astrophysicist Carl Sagan wrote in his book Cosmos, "The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are made of starstuff." At this point in his writing, Dr. Sagan is simply discussing the creation and release of elements heavier than hydrogen and helium, both through fission processes in the cores of stars and their subsequent death, either by petering out as dwarf stars or through violent explosions as supernova. These elements go on to form everything else in the visible universe - new stars, planets, comets, water, plants, animals, and even us.

You may be thinking, "I always knew I was a star, but so what? The elements that make up everything were made in space, but the rest of making me took place here, right?" Unfortunately for your line of thought, that probably is not the case, according to new research from a collaborative scientific effort stretching over three continents. Using ALMA (Atacama Large Millimeter Array), a series of radio telescopes in Chile, scientists gathered data from the interior of the Milky Way and used spectroscopic analysis to determine the molecular composition of an interstellar cloud.

Their analysis of Sagittarius B2, 27,000 light years away, yielded a surprising result. Not only did the cloud contain propyl cyanide (C_3H_7CN), a straight-chain molecule, but it also contained the structural isomer iso-propyl cyanide. Even more impressive was that iso-propyl cyanide was in the cloud in abundance, with about 2 iso-propyl cyanide molecules for every 5 of propyl cyanide.

Iso-propyl cyanide is the first branched carbon molecule that has been detected in the interstellar medium. The importance of this cannot be understated, as it provides feasibility to the idea that the chemistry that occurs in space could yield more complex organic molecules, essential to life as we know it, like amino acids. It seems likely that there are even larger organic compounds in space, but they are in amounts that, for the time being, we are unable to detect.

The chance that these larger, more intricate molecules may be formed in the interstellar medium leads to a larger spectrum of possibilities. It opens the door to the idea that it is possible for planets, like Earth, to have been seeded with some of these more complex molecules, providing building blocks for life. Future research will help discover the unknowns with these compounds, whether it is possible that they are being formed in the interstellar medium, and what the limit is to these reactions taking place in the space between the stars.

References: Sagan, Carl. "The Lives of Stars." Cosmos. New York: Random House, 1980. 180. Print.

Belloche, A., Garrod, R. T., Muller, H. S. P., Menten, K. M., "Detection of a branched alkyl molecule in the interstellar medium: iso-propyl cyanide" Science. 345 1584-1587 (2014).

Setting the Record Straight about Turkey Torpor

by: *Trevor Hyland, Newsletter Co-Editor*

Here we are again, more than a month removed from the first days of autumn. Though we are still experiencing some mildly warm and sunny days, the leaves have officially stopped making chlorophyll. What little green they have left is being gradually degraded, revealing the beautiful shades of red, orange and yellow that we associate with fall, brisk air and the one day of the year that we formally dedicate to giving thanks for the myriad blessings in our lives. Of course, just like the pilgrims back in 1621, we celebrate Thanksgiving Day by preparing a feast and sharing it with friends and loved ones. And after we finish feasting, most of us spend the remainder of the day grazing the leftovers and watching football or any of the numerous films that are best enjoyed on Thanksgiving night.

Even so, another universal thread seems to run through most of our Harvest Festival celebrations; I am of course referring to that feeling of drowsiness that first shows up as you finish your second helping of dinner and begin to tuck into your first slice of pumpkin pie. As you admire the lopsided mountain of whipped cream you've just dressed your pie with, you may find yourself echoing a familiar refrain ("I need a nap"); but where in the world does that feeling of lethargy come from? Ask anyone at random about the source of that after-dinner sleepy feeling and more often than not, they'll tell you, "there's tryptophan in the turkey and that's what makes me feel tired." But is that really the whole truth? What is tryptophan and what role does it actually play?

Tryptophan is a large amino acid that cannot be manufactured by the body; therefore, it must be obtained through food. Using a two-step chemical process, tryptophan helps the body to produce serotonin, a neurotransmitter shown to have calming effects on the brain and an important role in sleep. So then doesn't that mean that if I eat enough turkey, I will feel relaxed and will probably want to have a nap? This line of reasoning is only partially correct because it turns out that in order for the tryptophan in turkey to induce drowsiness, it requires one or more saccharide sidekicks, plenty of which are available in the average Thanksgiving spread. For example, potential accomplices might include bread stuffing, mashed potatoes, or even the crust of that pumpkin pie you're eating for dessert. These carb-heavy foods stimulate the pancreas to secrete insulin, which has the effect of lowering the quantity of all large amino acids in the blood, with the notable exception of tryptophan. Therefore, the concentration of tryptophan in the blood increases and more serotonin is manufactured, which can then contribute to sleepiness.

Of course, as I subtly implied earlier, it's important to note that the Thanksgiving feast generally involves overindulgent consumption of high-calorie foods; so then, putting your digestive system through somewhat more strain than normal is also likely to be a significant contributor to the lethargy you feel after eating. In any case, it seems apparent that several elements are at work beyond simple addition of tryptophan to your blood stream via consumption of turkey. So when you've cleaned that first plateful of Thanksgiving dinner later this month and you're beginning to feel a bit languid, please remember…don't be so quick to blame the bird!

Slàinte Mhath!

Source: Scientific American. Blogs.scientificamerican.com/doing-good-science/2011/11/23 (accessed October 27, 2014)