CHEM MAJOR NEWS

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

Volume 27, Issue 3 November 3, 2017

Some Incredibly Important Dates to Know...

November 9 Deadline for undergraduates to apply for April 2018 graduation in 140 Thackeray Hall

November 23-November 26: Thanksgiving Recess-No Classes! Have a great Holiday!

Congratulations!

On Friday, November 17, 2017, 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:

Caitlyn Choe	*Undergraduate Analytical Chemistry Award*
Brandi Williams	*Undergraduate Inorganic Chemistry Award*
Brock M. Nelson	*Undergraduate Organic Chemistry Award*
Kyle J. Oswald	*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 17th. Come join us as we celebrate undergraduate achievements with our awardees!

2017-2018 ACS-SA Officers and Staff

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Mariah N. Mascara-*Co-President*
Ryan Gilbert-*Co-Vice-President*
Alex Gerber-*Co-Vice-President*
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Caitlyn Choe-*Senior Affairs Committee*
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Coleman Pinkerton-*Senior Affairs Committee*
Brandi Williams-*Senior Affairs Committee*

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

Our November Schedule

November

3 Towne Meeting

10 Preparation for Saturday Science *to be held on December 2, 2017*

17 Fall Term Awards Ceremony

24 Thanksgiving Break

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 December 2, 2017? 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 10, 2017 at NOON in 150 CHVRN to plan for this great day. If you cannot be there on Friday, e-mail Kyle Oswald (kjo31@pitt.edu), our Outreach Coordinator and let him know you're interested in helping out and then join us on Saturday, December 2, 2017 at 9:00 a.m. in the Chevron Lobby.

Happy Thanksgiving!!

Green Chemistry

by: Andrew Warburton-*Newsletter Co-Editor*

Advice from Smokey Bear

Hello everyone! It's starting to get cold outside which means that winter is coming. If you ask George, he would say "Good riddance" to the warm weather and only "two months until Christmas!"

I would first like to extend my thoughts and prayers to the families in California who are affected by the prolific wildfires. Over 3,500 homes and businesses have been destroyed in Northern California and at least 40 people have died. The combined damage estimates hit over $3 billion. To put that in more digestible terms, you could buy over 600 million cups of coffee from Starbucks![1]

So, perhaps we should talk about how fires start, how they spread, and what they can do to the environment. I'm sure many people reading this have at least some experiences with fires, whether it's lighting a match, or fighting fires in a burning building. Fires are the results of rapid oxidation resulting in an extremely exothermic process on a combustible material – which basically means flammable materials get hot and combusts.

Forest fires start in one of two ways – naturally or human caused. Natural fires are started when lightening hits a very dry surface in an equally dry forest (such as a pile of leaves). These are extremely rare and usually do not happen. The other more frequent cause of forest fires is human-based, when someone doesn't completely extinguish a camp fire, leaves a smoldering cigarette butt, etc. This carelessness can lead to unexpected damage to the ecosystems and communities.

Fires need three elements to propagate: heat, oxygen, and fuel.[2] The dry California summer created the perfect conditions for fire; dry air and the blistering sun dried out all the plant life, creating millions of tons of fuel for a fire. It didn't take much to ignite the dried forest and start a wildfire.

So, what does a burning forest do to the environment. There immediate effects are obvious and what we see in California today: huge forest fires destroying everything in its path, leaving only ashes in its wake. However, there is a more clandestine threat to a burning forest. Trees sequester carbon dioxide from the atmosphere and convert it to biological carbon sources such as glucose and nitrogenous bases. When trees are burned, all their sequestered carbon is burned and is released back into the atmosphere as carbon dioxide. These burning trees can release up to 8 million metric tons of carbon dioxide back into the atmosphere!

It is hard to predict forest fires and even harder to recover from them. The grape vines that have matured for nearly 100 years in Napa Valley have been devastated, slashing the wine industry of northern California's wine industry. No amount of money can replace history.

Like Smokey Bear said it's up to you to prevent forest fires. If you're out camping or even walking through a park, be on the lookout for erroneous fires and smoldering ashes. If you camp overnight and start a fire, make sure that you have a bucket of water close by to quickly extinguish it in case it gets out of control. Try to keep the fire small and avoid building the fire near dried leaves and low-hanging foliage. Make sure to completely extinguish your fire once you are finished and douse it with your bucket of water.

Like all my articles, try to be more conscious about your carbon footprint. Every day is a new day to help make the Earth a little bit greener, and together can we make a change. Not only can you prevent forest fires, but you can preserve forests for future generations to enjoy!

References:

1. http://fortune.com/2017/10/16/california-wildfires-damage-estimates/
2. http://www.borealforest.org/world/innova/forest_fire.htm
3. https://www.livescience.com/1981-wildfires-release-cars.html

Electrospray Ionization

by: Andrea Detlefsen

As we burst from the end of that smothering tunnel;
Though now freed from the duct, we're contained in a bubble.

It is all I can do but to blink hard and stare,
As I begin to grasp that there's something more there.

I can glimpse through the dome of this bead, although warped,
There are boxes that tower, other things of that sort.

It is arctic in here and the air is a-hum,
Lights are flashing, my heartbeat pounds fast like a drum.

I am blinded and dazed as we soar through midair,
I feel claustrophobic, like I'm trapped in a snare.

There's a pressure that's building, a tension in here,
This small droplet contains far too many, too near.

In reaction we all start to rush to the border,
Only to find more chaos and disorder.

At the moment of breaking, to bits we are blown,
Again and again until I am alone.

Now a bit of liquid's my only protection,
So thin it's not even enough for convection.

I can see that my time in the light will soon end:
An entrance approaches, a black void impends

Then into the vacuum with great speed I hurtle
Through my veins, courses fear, and my blood, it does curdle.

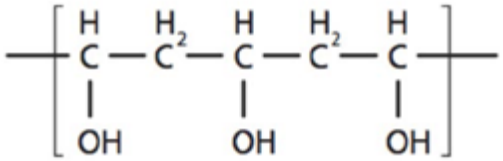
A force sucks me in like a great beast's air tract,
Consciousness starts to fade, and then things go black...

Having a Great Slime: Keeping Up

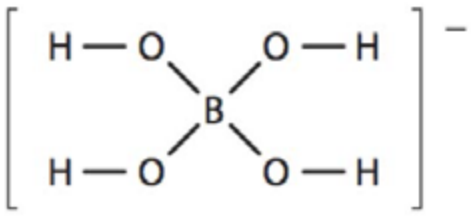
by: Stephanie Liu-*Newsletter Co-Editor*

Kids love their fads. This is an undeniable fact. From the Tamagotchi and slap bracelets of the late 90s/early 00s, to today's fidget spinners and dabbing, the youths have always obsessively popularized one thing only to drop it for the next as quickly as they picked it up. One of the trendiest things right now among middle to high schoolers is something that was pretty popular a decade or two ago as well—slime, or specifically, slime making videos! These typically show the process of slime making from beginning to end- separate ingredients being mixed until they come together to form a pile of putty, which is then further kneaded and stretched. Kids have made businesses out of their slime Instagrams with massive followings, opening web stores to sell their different colors and textures of slime. To be honest, I watch more of them than I care to admit, and now my Instagram explore page only consists of fresh memes and slime making tutorials. There's something intrinsically satisfying in watching some faceless teenager knead, pull, twist, and pinch some stretchy, colorful slime. Fortunately for all of you at home scratching your head, wondering what the appeal is, I'm here to explain to you un-hip old geezers exactly how this works so you too, can hang with the cool kids.

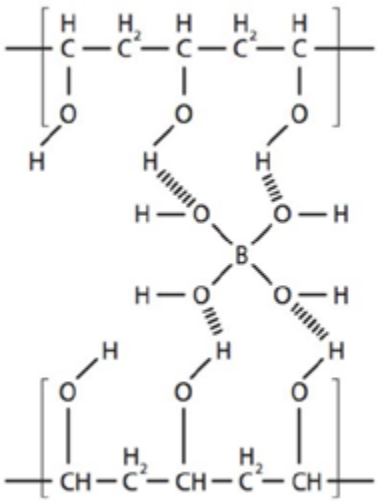
The two most ingredients in slime making are glue, specifically some type that contains polyvinyl alcohol (PVA), and borax. Polyvinyl alcohol, also known as polyethanol is a linear polymer that is present in many household products as a thickener, stabilizer, and binder. Its weight fluctuates depending on exactly how long the chain is, which also in turn can affect the physical properties of the solution it is in. The other player, borax, is actually sodium tetraborate decahydrate ($Na_2B_4O_7 \bullet 10H_2O$). It's often found in laundry detergents and cleaning products. In slime-making circles it has become known as the "activator," as the addition of borax solution is what causes the slime to begin forming. In water, the borax forms both boric acid and borate ion. This borate ion will interact with the alcohol functional groups present in the PVA, undergoing something called crosslinking. The borate ion will interact with multiple chains of PVA polymer via hydrogen bonding, as seen in the structural figure to the right, weakly connecting them and forming a network of polymer chains that make the slime so soft and stretchy. This bit of polymer chemistry is the core concept behind this massive trend amongst kids these days. People will also experiment with other ingredients, like lotion, shaving cream, and foaming hand soap, developing "recipes" for their favorite slimes. Hopefully you learned something here, whether it was about the kids of today or polymer chemistry, but in any case, you now have another tidbit of information you can bore your family with at Thanksgiving!



Polyvinyl alcohol



Borate ion



Crosslinking to form slime!

Until next time, Stephanie ☺

References:

1. http://www.rsc.org/learn-chemistry/content/filerepository/CMP/00/000/835/cfns%20experiment%2076%20-%20pva%20polymer%20slime.pdf
2. https://eic.rsc.org/exhibition-chemistry/a-crossed-link-polymer/2020035.article

Department of Chemistry

2018 Undergraduate Summer Research Fellowships in Organic & Biological Chemistry

- We are pleased to offer Undergraduate Summer Research Fellowships for Pitt students sponsored by *the Organic and Biological Chemistry Divisions*.
- These Fellowships are intended to support a 10-week full-time organic or biological chemistry research project, including stipend & supplies, in the summer of 2018 at the Department of Chemistry in Pittsburgh.

Please submit applications consisting of a current resume, course records, and a letter of recommendation by a suitable Faculty Sponsor with details of the planned research project (not exceeding 1 page) by

February 20, 2018 to Desirae Crocker, CHVRN 757.

- The Award will be presented at the Undergraduate Award Ceremony in April 2018.
- The Awardee and Faculty Sponsor(s) are strongly encouraged to present a poster on their research at Science 2018 in Pittsburgh in the fall of 2018, and/or actively participate in an equivalent departmental, regional or national scientific conference.

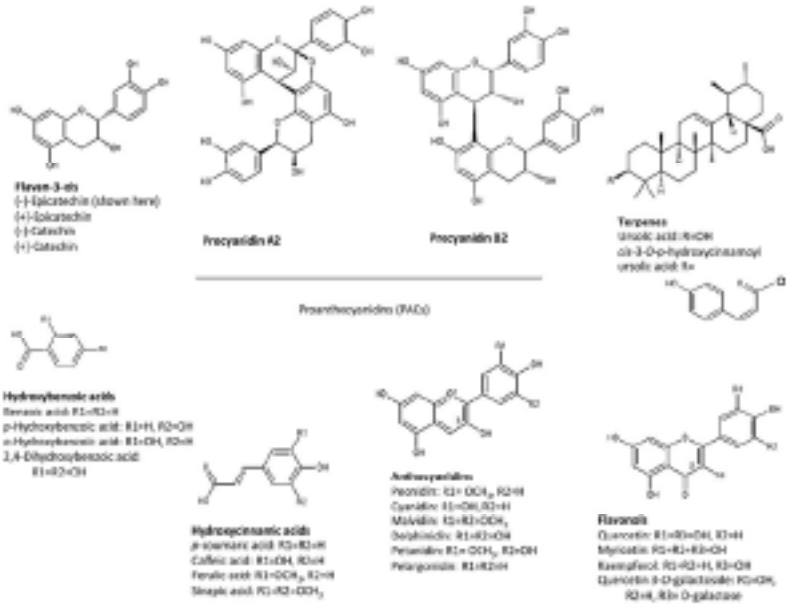
Why cranberry sauce matters at the Thanksgiving table

by: **Grace Rong**-*Newsletter Co-Editor*

When November comes, Thanksgiving is one of the first things that pops into our minds. Along with that, comes thoughts of turkey, mashed potatoes, pumpkin pie, and so much more. However, there is one part of Thanksgiving dinner that people tend to overlook, and that is cranberry sauce. While the condiment may seem a bit out of place in comparison to the rest of the mouthwatering dishes at the table, it has quite the health benefits.

Cranberry sauce, unsurprisingly, was not part of the First Thanksgiving. The sauce would have required large of amounts of sugar, which was considered a luxury good back then. However, cranberries are native to North America, so it may have made an appearance. Native Americans often used cranberries in pemmican, which is a concentrated mixture of fat and protein. The fried fruit would be pounded into a powder and then added to the mixture. With the use of cranberries alongside meat, it's a wonder on how the combination came about.

Studies have shown that the American cranberry is particularly rich in (poly)phenols, which have been associated antibacterial, antiviral, antimutagentic, anticarcinogenic, anti-inflammatory, and antioxidant properties. Many of us may have heard that cranberry juice is good to combat urinary tract infections, and it has been shown that cranberry juice does have such an effect. The chemicals in cranberries, specifically proanthocyanidins (PACs), have been found to disrupt the development of E. coli and prevent it from adhering to cells in the body. Moreover, it has also been found that cranberry juice inhibits quorum sensing in E. coli by inhibiting the production of a molecule called IAA. Quorum sensing is a way for bacteria to sense that their population is large enough to initiate infection, or to form a biofilm. The inhibition on the production of IAA prevents the bacteria from causing serious infections.



Given the antibacterial and antiviral benefits of cranberries, the incorporation of cranberries into the Thanksgiving meal may have come as a way of preventing sickness from eating possibly contaminated meat. This would also explain the use of dried fruit in pemmican since bacteria may grow in the rich fat and protein mixture. With the wide extent of the beneficial health properties of cranberries, it may be worth to no skimp out on the sauce this Thanksgiving.

References

1. http://advances.nutrition.org/content/4/6/618.full#sec-2
2. https://www.sciencedaily.com/releases/2007/11/071113132240.htm