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

Volume 29, Issue 5 February 5, 2021

CHEM MAJOR NEWS

IMPORTANT DATES FOR REGISTRATION

February 15	Summer Term Registration (2207) begins for all degree students.
March 19	Deadline for August 2021 (2217) graduation applications in 140 Thackeray Hall.
March 22	Fall Term (2221) registration begins and your on-line registration appointment will be sent to you based on credits earned.

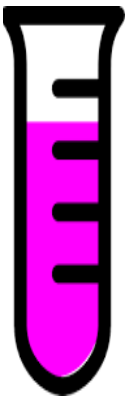
Advisees who already have a permanent advisor should make their Summer registration appointments with their advisor on or after February 7th for Summer Term (2217).

Advisees who will be asked to select their permanent advisors (via an email to be sent February 5th) should do that after February 5th. Please follow directions in the email.

New advisees who have declared chemistry as their major within A&S should make an appointment with Dr. George C. Bandik, Dr. Ericka Huston for Dr. Michelle Ward after February 8th for Summer Term (2217) and March 8th for Fall Term (2221) via email.

2019-2020 ACS-SA Officers and Staff

Noah Bright- *Co-President*
Anna Audley- *Co-President*
Mary Morcos- *Vice-President*
Lydia Chlpka- *Secretary*
John Majewski- *Treasurer*
Neerja Garikipati- *Outreach Coordinator*
Michael Kane- *Outreach Coordinator*



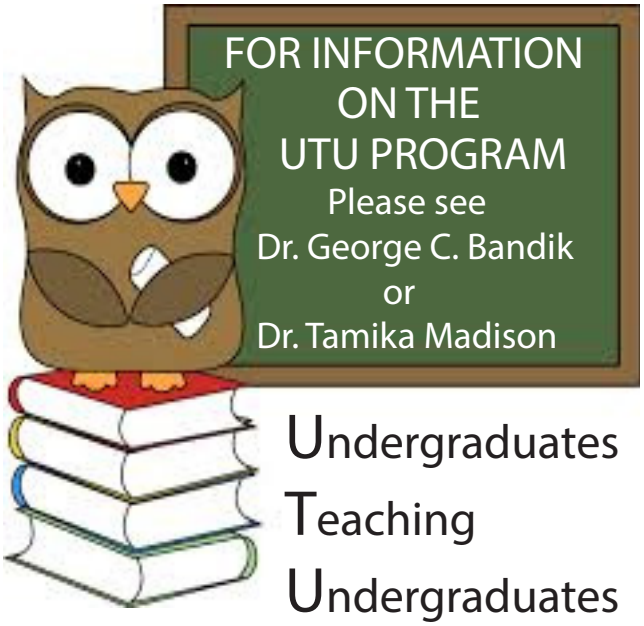
Logan Newman- *Outreach Coordinator*
Christopher Manko- *Newsletter Co-Editor*
Michael Kane- *Green Chemistry*
Ari Freedman- *Technical Wizard*

ACS-SA Spring Term Schedule
FEBRUARY

February **07** *Pitt 2 Pitt with Rashee Ferguson*

26 ***All About Registration with George***

Ever wonder what it is like on the other side of the podium? Becoming a UTU is great way to find out. As a UTU, you get the chance to teach General, Organic or Analytical Chemistry. It is a great experience, no matter what your career path is!



The Kenneth P. Detrch School of Arts & Scences

Summer Undergraduate Research Awards

The Summer Undergraduate Research Awards provide a $3,500 stipend to conduct independent research over the course of the summer. Titles of recent SURA topics range from Internet Memes and Popular Culture to The Mirror and the Mind: Medieval Literary Mirrors and the Neuroscience of the Mirror Response. SURA recipients also enroll in a 12-week summer SURA course to learn how to communicate their research findings to a general audience.

As part of the summer awards program, all SURA recipients participate in an ethics workshop where ethics case studies are discussed with Dietrich School faculty and staff members from the Academic Resource Center and OUR. Because ethical concerns are inherent in every kind of research, the ethics workshop provides students, faculty, and staff with a meaningful opportunity to reflect on the kinds of ethical concerns that will guide young scholars far into the future.

Speak with your departmental advisor to learn how to apply for a SURA or call the OUR at 412-624-6828.

Application:

https://www.asundergrad.pitt.edu/research

Deadline: February 26, 2021

A Look into Soap and its Chemistry – By: Christopher Manko, ***editor chem major news***

One useful tool that we find so very often in our daily lives is soap. Scrubbing our hands before eating, we do not typically think of how soap really works on a molecular level. Using some general and organic chemistry concepts however, we can begin to see how this amazing tool works so well in our daily lives.

Soap is an amphiphilic molecule. This means that it has both hydrophobic and hydrophilic parts. This is an important property for the function of soap. Oils are hydrophobic in nature, while water of course is hydrophilic. This means that oil does not readily mix well with water due to their differing natures. This is why it can be difficult to wash away oils on our skin using just water. Soap is able to get around this through its amphiphilic nature.

By being amphiphilic, soap can act as a chemical surfactant. What this means is that soap reduces the surface tension between the water and oil by helping to mix one in the other. The hydrophobic part of soap can mix with the oils on our hands, while the hydrophilic part mixes with water. These soap molecules can form micelles (which are small balls made of the amphiphilic molecule) which can then be washed away. You can picture a micelle ball forming with the hydrophilic part sticking outward in the presence of water, and the hydrophobic part tucked inside the ball away from the water environment.

How is soap typically made? Soap can be produced by mixing a triglyceride with an alkali salt. This reaction is called saponification (an example is given to illustrate it). This type of triglyceride used can affect the properties found in the product produced. Some examples of

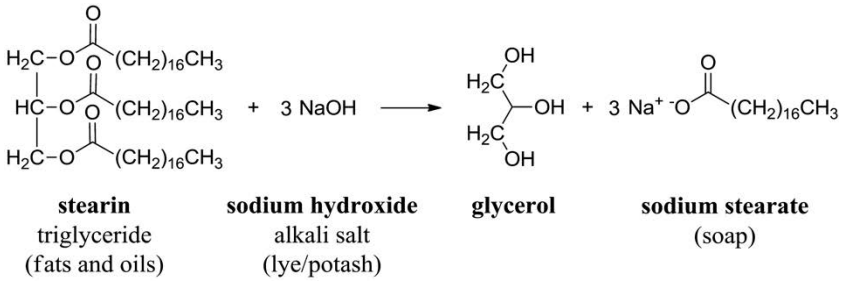


Image taken from Konkol and Rasmussen Article Linked Below

triglycerides that can be used include coconut oil, olive oil, tallow, and lard. Depending on the structure of the oil, it may be found as a solid or liquid at room temperature. The type of alkali salt used can also be important. Examples of alkali salts that can be used include NaOH K_2CO_3, and Na_2CO_3. Through the mixture of these two reactants, we get our desired product along with a glycerol molecule.

Overall, using the concepts of hydrophilicity, lipid chemistry, and salts we can produce this cleaning agent. What a remarkable thing!

Reference:
https://pubs.acs.org/doi/10.1021/bk-2015-1211.ch009

The Chemistry of Chocolate

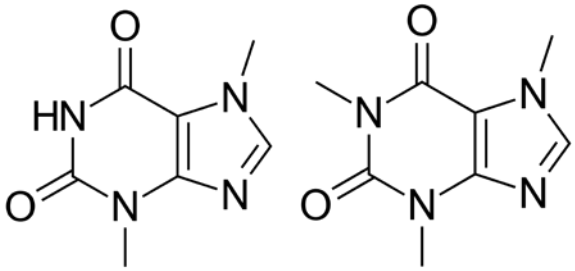
Well we're back in the spring semester once again! Welcome back! This month, I wanted to talk to you guys about something we all know and love. Chocolate! Why? Well, in case you forgot, it's almost Valentine's Day. Remember it's on February 14th so save the date if you need a reminder to get a gift for your significant other. Anyways, I wanted to discuss why chocolate makes you feel good. This requires talking about something we all can appreciate: chemistry.

To simplify things, chocolate is made from cocoa and cocoa is essentially the ground up fermented fruit from *Theobroma cacao* (i.e. the cocoa tree). Within this substance, there are many different compounds that contribute to the lovey-dovey feelings we get from chocolate. Two common molecules found here are anandamide and phenylethylamine. Anandamide assists in opening synapses in the brain while phenylethylamine targets "pleasure centers" of the brain. In combination, these two substrates can lead to an increase in one's mood.

Theobromine is another compound common in cocoa. It is also found in coffee and tea. Interestingly, theobromine differs from caffeine only in that it contains an additional methyl group. Thus, they demonstrate similar physiological properties. Specifically, both act as stimulants on the human brain. Further, theobromine also acts a vasodilator so it causes blood vessels to relax and blood to move more freely. Some men might even experience a viagra-like effect and this could be why chocolate is labeled as an aphrodisiac. Maybe this is why we associate it with the day of love!

Feel free to check out the article sourced for more information about chocolate. I hope everyone is starting off the semester well and enjoying themselves. Until next time, stay warm!

Theobromine vs. Caffeine



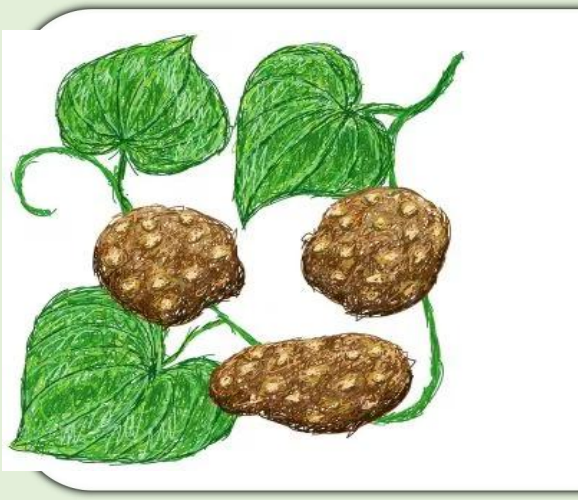
Dale Erikson

Source: https://www.science.org.au/curious/everything-else/chocolate

Finding A Use For The

"Air Potato"

By Michael Kane, Green Chemistry Contributor



I'm going to rip this band aid of immediately, because I don't intend to get anyone's hopes up for this article just to let them down. The use is **not** to boil them, mash them, or stick them in a stew. In fact, it is not any sort of meal made from potatoes, because wild "air potatoes" are inedible. They are bitter and contain a variety of toxic compounds, making them low on my list of things to eat. If that is not enough, they look pretty weird too. Second band aid to rip off- they are not potatoes either. They are actually a type of suspended yam that grows from vines, known to grow in many areas of Africa and Asia. Some areas have cultivated edible varieties of this plant through selective breeding; however, the wild version occurs as aggressive weeds and are known to be invasive in many environments.

The peel of an air potato is brown with a rugged texture, sometimes containing dots like above. The twining vines of air potatoes can grow up to 80 feet vertically, usually originating from a buried tuber dropped from an adjacent vine.

Source: https://www.inaturalist.org/guide_taxa/355108
https://www.projectnoah.org/spottings/7294787

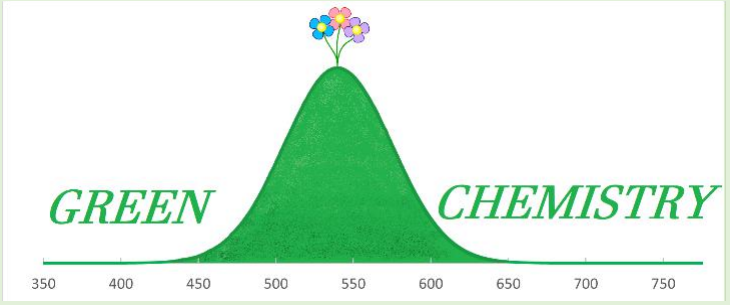
Florida has been battling air potato growth since it was brought in many years ago, even introducing a type of beetle in 2011 that consumes air potato leaves and leaves native plants alone to protect their environment. As for air potatoes, being inedible and unwanted makes for a sad life, however this also means the air potatoes are a cheap, available in large quantities, renewable, and can positively affect environments when removed.

For these reasons, researchers have begun to investigate air potatoes as a new source of cellulose and cellulose derivatives. Previously, natural cellulose has shown promise in recovering heavy metal ions and dyes from liquids[1]. However, it was discovered that adding a carboxylic group functionality to cellulose revealed an even greater ability as a sorbent. Recent literature noted a dearth of information on cellulose content able to be derived from air potatoes and began to investigate if this could help us achieve a greener future. To do this, sample bulbs were collected from three different areas in Nigeria and were peeled and thinly sliced (some unfortunate soul drew that task), then the biomass content was extracted and tested for various cellulose contents. They found promising results in this area, with cellulose contents higher than or similar to other agricultural waste like almond shells, corn stalk, and bagasse (the pulpy residue extracted from sugar cane).[1] The cellulose contents were also high enough to meet the requirements to be considered as pulp and paper industrial raw material, another potential use for these bulbs. An interesting result from this inquiry was the deviation between the cellulose content of the bulbs from different areas. Although they all showed high values of cellulose, the variance between cellulose contents was surprisingly large, which may need to be taken into consideration in further studies. Although this was an initial study to look at these bulbs for cellulose, air potatoes show great promise as a biodegradable, and earth conscious option for much greener chemistry in the future.

"air potatoes show great promise as a ***biodegradable***, and ***earth conscious*** option for much greener chemistry in the future."

Read more about this study:

Ogunjobi, J.K., Balogun, O.M. Isolation, modification and characterisation of cellulose from wild Dioscorea bulbifera. Sci Rep 11, 1025 (2021). https://doi.org/10.1038/s41598-020-78533-6



REGISTER FOR >>>

Summer SESSIONS

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Reach your academic goals this summer!

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- Focus on one class at a time.
- Enroll in classes that fill quickly during the school year.
- Connect with professors and peers in small classes.
- Choose the session that works around your summer plans.

* The majority of Dietrich School courses will take place online only and will not have an in-person option. Go to **summer.pitt.edu** for the most up-to-date information.

Registration opens February 15, 2021.
Visit summer.pitt.edu.

University of Pittsburgh