CHEM MAJOR NEWS

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

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THE WELCOME BACK EDITION

Welcome back everyone! The fall semester has officially begun meaning you have successfully escaped the comfortable accolades of home to come to University and of course, chemistry. Right around this time, you experience a world-wide phenomenon known as the "freshman face," where eager members of the class of 2020 will wonder aimlessly around campus in the hopes of being able to fit-in, but inevitably, embarrass themselves as they ask ridiculous questions such as "who is Cathy" and "why don't my Dining Dollars work everywhere?" Luckily for the upperclassmen, we've already had out fill out self-embarrassment and are looking to get back into the swing of things from a long summer!

The Fall Semester is important for everyone, regardless of year, experience, or street cred. You are excited to once again reunite with your friends and meet new ones along the way. There are so many new clubs, activities, and parties that so quickly fill your schedule and if it wasn't for those gosh darn classes, college would be such a breeze! However, as you've probably heard from your parents, advisors, and peers, classes are actually very important! Don't get me wrong, you should absolutely make time to enjoy yourself and let off some steam from the stress of classes, but a balance between work and play is paramount to your success in university.

If you're a freshman at Pitt, congratulations and welcome aboard! You have plenty of time to make friends, make mistakes, and remake yourself if you so choose. My sagely advice would be to really put yourself out there and do things that you couldn't have done in high school. Take the time to learn about Pitt, about what it offers, and most importantly, learn about yourself. Although you still have four (ish) years here, those years will fly by and you don't want to be a freshman forever right?

To my fellow sophomores and juniors, we're in a slightly different boat. Of course, the advice for freshman can apply to us as we continue to discover things about Pitt and ourselves that we didn't know about in years prior, but we have a better understanding of how college works. You know the extracurricular activities you like, the classes you need to take, and maybe even the job you hold on campus and for that, I applaud you! You've worked so hard to get all of that to finally fall into place, so don't slack off now!

To those seniors in the crowd, you're almost there. You just have to finish out this year strong and then you're in the real world. Isn't that spooky? Whether it's employment, graduate school, or taking time to travel, what you do now still have an impact. It's important to finish this year strong and to also develop a plan for future so you can reassure your parents and that one aunt who manages to call you every week to bug you about your future. Worst comes to worst, just smile and nod for the next eight months! You guys got this!

That's just my two cents. Feel free to take it, leave it, or put it in a tip jar. Last but certainly not least, if you enjoy chemistry (who doesn't?) and desire greater involvement in community outreach, consider becoming a member of the University of Pittsburgh chapter of the American Chemical Society (ACS). More information about the rewarding opportunities provided through membership in ACS can be found in the main office of Chevron Science Center. Again, welcome back everyone and good luck this semester!

Cheers!
Andrew Warburton, *Newsletter Co-Editor*

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

Chemistry Protects All of Us!

Stephanie Liu-*Newsletter Co-Editor*

The start of the school year signals the beginning of the transition into fall, and we trade in long days of lazing on the beach and baking under the blazing summer sun for equally long days sitting in fluorescently lit lecture halls. A lot of people think that means we can stop slathering ourselves in sunscreen, but think again—UVA rays, which scientists have recently found to be responsible for skin aging, wrinkling, and even various skin cancers, are present in similarly intense levels throughout the year. These rays make up 95% of the radiation that reaches the earth's surface; the other 5% is made up of UVB rays, which are more intense than UVA rays and are the direct cause of sunburn and skin cancer. Applying sunscreen daily can protect your skin from sun damage no matter what time of year.

So what makes sunscreens work? That depends—on whether it's a physical or a chemical sunscreen. Physical sunscreens, composed of titanium dioxide (TiO_2) and/or zinc oxide (ZnO), prevent damage to the skin by physically reflecting or scattering UV rays. ZnO protects your skin from UVA1, UVA2, and UVB rays, whereas TiO_2 will only protect against UVB and UVA2 rays. They are photostable and less irritating than their chemical counterparts, but in the past these sunscreens were thick, greasy, and gave off a heavy white cast, due to their reflective properties. Physical sunscreen producers nowadays are able to limit these negative effects thanks to ZnO and TiO_2 nanoparticles, which are able to sit on the skin more thinly without compromising any of their protective attributes. However, this is a relatively new technology, and not much is known about how much the skin absorbs these nanoparticles or if they will have a harmful effect in the long run.

The other kind of sunscreen is a chemical sunscreen, which works when the active ingredients in the product actually absorb the light rays, rather than reflecting them. There are many, different organic compounds that can act as chemical UV filters, a lot of which are not yet approved by the FDA—sunscreens tend to be a lot less advanced in the US when compared with many parts of Europe and Asia. They can vary wildly in structure, from the dibenzoylmethane derivative avobenzone, to dioxybenzone and sulisobenzone, two derivatives of benzophenone (which should be a familiar compound to anybody who has recently taken the OChem 2 lab!). These tend to be more unstable than physical UV blockers, and can be irritating to the skin and cause breakouts for some people, although they do tend to be thinner and runnier than physical sunscreens, making them a more cosmetically comfortable product. Due to their instability, a lot of chemical UV filters have to be combined with other compounds—the aforementioned avobenzone is frequently combined with ethylhexyl methoxycrylene to enhance its UV filtration abilities. There is research constantly being done in this field, much of it overseas, and many older ingredients have now been found to have harmful properties. Aminobenzoic acid and its derivative padimate O were some of the first chemicals used in sunscreens, but they are now known to cause damage to skin cells and DNA. Potential UV filters are being tested all the time, but the search is still on for something with the perfect balance between the range and stability of a physical sunblock and the comfort of a chemical sunscreen.

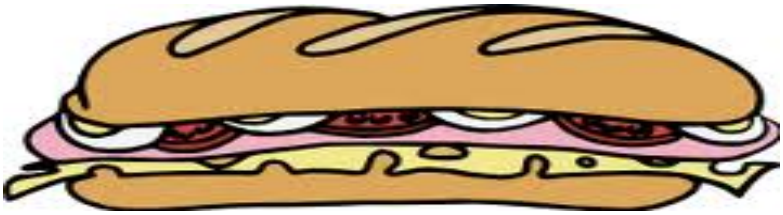
In any case, you should be applying sunscreen if you plan on being in the sun for any longer than 20 minutes, and you should be applying a lot of it; you need approximately ¼ of a tablespoon of sunscreen just for your face (it doesn't sound like a lot, but I promise—it's a lot) to get the full strength advertised on the bottle.

So go find your trusty Coppertone or Neutrogena, and see if you can tell if it's physical, chemical, or a combination of the two! And maybe, before you head to class, put some on. After all, your skin is the largest organ in your body. If you don't do your part to protect it, who will?

References:

http://www.skinacea.com/sunscreen/physical-vs-chemical-sunscreen.html#.V7Vi_ZMrKRv
http://www.skinacea.com/sunscreen/uv-filters-chart.html#.V7TqSpMrKRu
http://www.skinacea.com/faq/sunscreen/s14-nanoparticles-and-sunscreen.html#.V7UGbJMrKRs

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**-*Newsletter Co-Editor*

Hello all! My name is Andrew Warburton. I am a sophomore chemistry major planning to pursue graduate studies in medicine. This year, I am excited to be writing the Green Chemistry column for the ACS newsletter.

Green chemistry has become 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.[1] 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.[2]

In short, we still have a lot of room for improvement. The task ahead of us is challenging and requires a combination of analytical and creative thinking as well as an awareness of the Twelve Principles of Green Chemistry – as outlined in this article. In the coming months, I will write articles detailing the progress and ingenious applications of the Principles of Green Chemistry towards sustainable solutions!

The Twelve Principles of Green Chemistry

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]Green Chemistry Definition. http://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/definition.html (accessed August 15, 2015).

2171 Tentative ACS Fall Schedule

September

2 2016-2017 Officer's Meeting

9 Welcome to the New Term
with Pizza

16 All About Career Services
with Ms. Emily Bennett

23 The Hows and Whys of Graduate School
with Professor Steve Weber

30 The Pre-Professional Timeline
with Andrea Abt

October

7 Green Chemistry
with Professor Bob Enick, Chemical Engineering

14 Preparation for National Chemistry Week

21 Pumpkin Painting

28 Chemistry Trivia Competition

November

4 Towne Meeting

11 Fall Term Birthday Celebration and Saturday Science Prep

18 Fall Term Awards Ceremony

25 Thanksgiving Break

December

2 Preparing for Saturday Science

9 End of Term Meeting

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 <u>September 9, 2016</u> but you may join any time throughout the year.

Name: _____

School Address:_____

_____

Permanent Address: _____

_____

School Phone:_____Home 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 <u>(make checks payable to the University of Pittsburgh)</u>. 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.