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!

Welcome back, welcome back, welcome back everyone! With a blink of the eye summer has passed and school is, once again, upon us. Leave behind your beach bum days, and gather up your pencils, notebooks and TI-84s. I hope you're all ready and excited for another semester of panic filled cram sessions, midnight existential crises, and above all, chemistry!

To all you bright eyed, green behind the ears freshmen, I hope Pitt becomes a second home. Dive in, and embrace the endless possibilities. Don't fall behind in your classes, but make time for self-care. Join a student organization or two. Talk to professors about their research. Explore all the things to do and eat in Pittsburgh, the 19th most liveable city in the US! (I recommend Noodlehead on Highland Ave for a cheap and delicious bite.) Don't limit yourself, and make your college years the best years of your life.

Sophomores and juniors, keep on keeping on! To those of you already know what you want to do and how you're going to get there, good for you! Commit to your major(s), get more involved in your clubs, and find research, if you haven't already. To those of you that don't quite know what you're doing yet, you've still got time! Take an interesting class in a field you know nothing about, join a new club, and get a feel for what really suits you and your strengths. Before you know it, you'll be walking at graduation and wondering where the time has gone.

To my fellow seniors, we've done it! We've survived! We're almost there! Graduation is impending and soon we'll be released into big scary adult life. In another year we'll be off on our separate ways, scattered across the world, and our time here at Pitt will simply fade into fond memories. Whether the next step is grad school, living with your parents, or your dream job, do what you can to prepare. But first, we have to make it through this last stretch. Savor the last few classes, the last few exams, and the last few parties. After all, all good things must come to an end.

If you've made it this far into this cheese-tastic letter, I'm impressed. Hopefully that doggedness will carry over into your classes this semester! It will soon be fall in Pittsburgh, one of the most beautiful times of year, with the leaves wearing their warm, radiant colors. Soon enough, pumpkin everything will descend upon us, along with soul crushing midterm grades, UGG boots, and the bitter cold. If you're interested in chemistry (or just science in general!) and are looking for a great student organization to get involved with, learn more about the American Chemical Society in this newsletter or in 107 Chevron Science Center. It's a great opportunity to give back to the community, educate others about science, and get to know your fellow chemists/scientists here at Pitt! To all of you that will (or won't!) read this letter, I hope this next year is the best one yet.

Cheers,

Stephanie Liu, Newsletter Co-Editor

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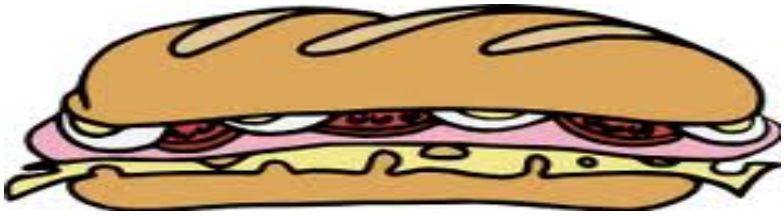
Visit us at http://www.chem.pitt.edu/acs-sa/

A Physical Chemistry Word Search

BRACKET DEGENERACY EIGENFUNCTION EIGENVALUE ENERGY HAMILTONIAN
HERMITE OPERATOR PLANCK ROTATIONAL SCHRODINGER SPIN
TRANSLATIONAL VIBRATIONAL WAVEFUNCTION WEIN

B T U P V H P B R A C K E T A J S N D
T W R Y T G H M H E R M I T E U G A E
R E G N I D O R H C S T G T S K M I G
A B N I E W M E N F E N E R G Y L N E
N G S P P K I E U L A V N E G I E O N
S T E S Z W M X X V J P F V R E F T E
L A N O I T A R B I V T U M C X C L R
A A W B D I O L D T U A N C N O O I A
T G N X C I Y Y P L A N C K F S K M C
I B P Z O C L L A N O I T A T O R A Y
O V J I V V T N J F Z M I M X D K H J
N H V J B L I V M B Q R O T A R E P O
A J L W D X N P A U N K N M A J S X U
L R A V W A V E F U N C T I O N Q Z Y
M X A Y G X S C I K I V N V J K E Q U
E T U R I V Q J B V Y A G A O J C R X
D J T H X D L W M U M J P L T K H M Q
K V Z K J M M I Q D N C B B X I J A M
G C A G Q J X Z G G I M Z G N J F G Q

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**-*Green Chemistry Editor*

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

Green chemistry is 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 weeks, I will write articles detailing the progress and ingenious applications of the Principles of Green Chemistry towards sustainable solutions!

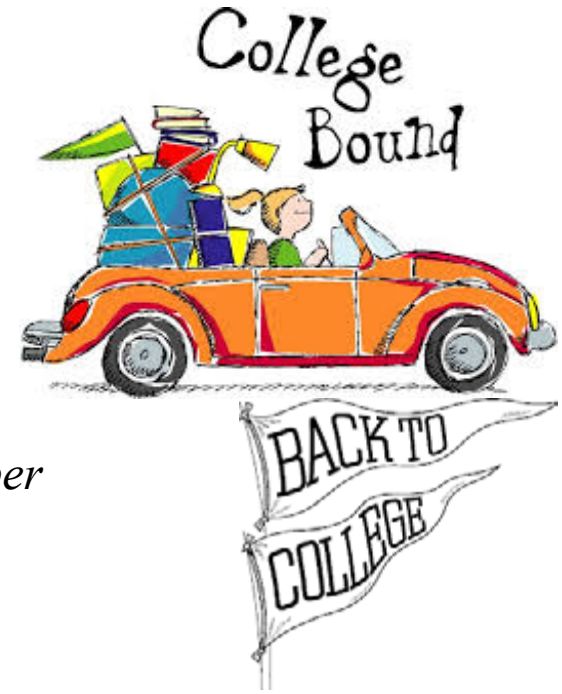
The Twelve Principles of Green Chemistry[3]

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. *History of Green Chemistry. https://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/history-of-green-chemistry.html (accessed August 11, 2016).*
2. *Green Chemistry Definition. http://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/definition.html (accessed August 11, 2016).*
3. *Principles of Green Chemistry and Green Engineering. https://www.acs.org/content/acs/en/greenchemistry/what-is-green-chemistry/principles.html (accessed August 11, 2016)*

2181 Tentative ACS Fall Schedule

September



1 2017-2018 Officer's Meeting

8 Welcome to the New Term
with Pizza

15 All About Career Services
with Ms. Emily Bennett

22 All About Graduate School
with Professor Steve Weber

29 Professor Terry Oas
from Duke University

October

6 Registration for Spring Term Birthday Celebration

13 Preparation for National Chemistry Week 2017
– Chemistry Rocks

20 Pumpkin Painting on the Patio!

27 Ryan McGlynn, Boron Specialties LLC

November

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

10 Green Chemistry

17 Fall Term Awards Ceremony

24 Thanksgiving Break

December

1 Fall Birthday Celebration and Saturday Science Wrap-up

8 Good Luck with Finals!

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 8, 2017</u> but you may join any time throughout the year.

Name: _____

School Address:_____

_____

Phone:_____

Major:_____Year in School **Fr.** **So.** **Jr.** **Sr.**

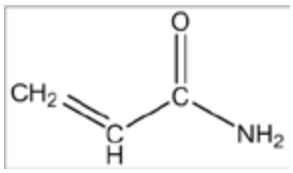
E-mail: _____

May we include your name, number and e-mail on the published phone list? **YES** **NO**

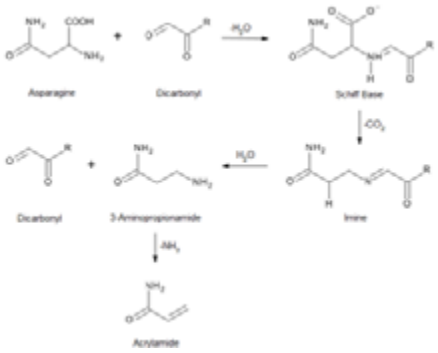
To submit this form by mail, send it to ACS-SA, Box 24, Chevron Science Center, University of Pittsburgh, Department of Chemistry, Pittsburgh, PA 15260. Be sure to include the $15.00 dues <u>(make checks payable to the University of Pittsburgh)</u>. It is possible to be active even if you can not attend the meetings. For more information, see our display case in the lobby of Chevron Science Center.

Cooking Up Acrylamide **by: Grace Rong-***Newsletter Co-Editor*

As summer comes to an end and classes begin again, many of us look to Labor Day weekend as a last summer "hurrah!" before we are thrown head-first into the semester. However, along with the joys of basking in the summer sun and gorging on food at barbeques and picnics, we should all take a moment to think about what is in our food. While chicken and burgers that are fresh off the grill are absolutely mouthwatering, especially when the plate is also piled high with some chips, chemicals that are generated during the cooking processes of these foods can lead to unfavorable outcomes.



One such molecule that can be found in our food is acrylamide. At low doses, the molecule does little harm to our bodies. However, higher doses have been linked to reproductive health issues, neurological damage, and cancer. Acrylamide is generally consumed through food and is generated from the amino acid asparagine and reducing sugars via the Maillard reaction. This reaction is what occurs during cooking that gives food its brown color and unique "burnt" flavor. While many of us love the flavor of slightly charred food, the end product can cause oxidative stress in our tissues and cells. Moreover, studies have shown that acrylamide can act as an endocrine disruptor by binding to hemoglobin in the blood.



High temperature during cooking leads to the formation of acrylamide in prepared food, while cooking methods that utilize boiling and steaming do not typically form acrylamide. The molecule is mainly found in foods made from plants, which unfortunately includes potato products, grain products, and coffee. Acrylamide is also more likely to accumulate when the cooking period is longer or at higher temperatures.

While acrylamide does occur in some of our favorite foods (e.g. potato chips, fries, cereal), that doesn't mean we need to cut them out of our diet. According to the FDA, the best way to be mindful of acrylamide consumption is to adopt a healthy eating plan that emphasizes fruits, veggies, whole grains, etc. and to limit saturated fats, *trans* fats, cholesterol, sodium, and added sugars.

Now, this isn't to lecture you guys about healthy eating and to encourage you to avoid the best forms of potatoes. Go out to your Labor Day shenanigans, stuff your face with some chips and foods fresh off the grill (because I certainly am)! But we only get one body and the best way to take care of it is to feed it well and not with toxins like acrylamide.

1. https://www.cancer.gov/about-cancer/causes-prevention/risk/diet/acrylamide-fact-sheet#q5
2. https://www.atsdr.cdc.gov/phs/phs.asp?id=1113&tid=236
3. https://www.fda.gov/Food/FoodborneIllnessContaminants/ChemicalContaminants/ucm151000.htm
4. https://www.fda.gov/Food/FoodborneIllnessContaminants/ChemicalContaminants/ucm151000.htm