



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



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January 11, 2019

Welcome Back!

Ohhh the holidays, the most wonderful time of the year! But like everything, it must come to an end...until next year that is. Lucky for us, the second most wonderful time of the year has finally arrived – that is getting to come back to our Pitt and Chevron family and further our education here at one of the best universities in the world!

A new year comes with both reflection and new goal setting. So many people come up with a New Years Resolution as just some vague concept in their mind and that's what makes it so hard to work towards. In reality, a year is a long time and its hard to keep a goal held out throughout that entire time. But if you identify the goals well and remind yourself of them, they are much more manageable to keep. My ACS Challenge for you: write down your goals and tape them to your desk so you see them every day of 2019. Then come the end of the year, you still remember what your goals were. Write a goal down for every aspect of your life. A year is enough time to work on more than one part of your life, work on many fronts. For example, you should have goals in all the following parts of your life (and even more): academic, family, friends, physical health, mental health, etc. For some extra motivation, write your goals out and give them to a friend, a parent, or an advisor. Then they'll be extra support for you to work towards those goals and you'll be held accountable.

Now let's discuss some effective goal setting. Your goal shouldn't be easy, but it shouldn't be something you know you won't be able to accomplish. An effective goal must be tangible and measurable. Its something that by the end of the year, you should be able to put a checkmark by and know you completed it. It doesn't have to be something bold like to "Get straight A's." It could be as simple as get a higher GPA than last semester. A goal can be anything that improves who you are today.

Don't compare yourself to others. Compare yourself to who you were yesterday, who you are today, and who you will be tomorrow. The only person you need to prove something to is yourself. Keep working and you'll improve yourself every day.

As George reminds us, kindness is the greatest thing you can have. Love thy neighbor. This influential verse applies to all. Love thy classmate. Love thy professor. Love thyself. Love ALL. Find the good in the world and help spread it. The purpose of life is to find your gift, the meaning of life is to give your gift. Be kind to everyone you influence in 2019 and find the good in people. One of my favorite quotes is from John Wooden, the late basketball player and coach. He said, "You can't live a perfect day without doing something for someone who will never be able to repay you."

So here is my call to action for you, four things that will surely makes 2019 a success:

- 1. Write out your tangible and measurable goals for many aspects of your life.*
- 2. Tape one copy to your desk and give a copy to someone who will hold you accountable.*
- 3. Only compare yourself to who you were, who you are, and who you will be.*
- 4. Be Kind.*

Looking forward to the New Year and seeing everyone accomplish their goals!

Luke Persin
ACS Newsletter Co-Editor

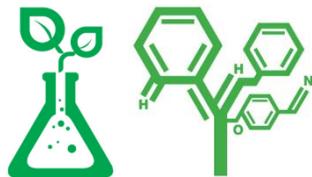
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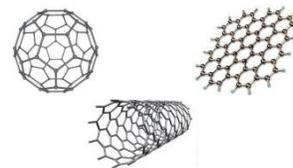
Visit us at <http://www.chem.pitt.edu/acs-sa/>

CHEM MAJOR NEWS



Green Chemistry

by: Seth Brody, *ACS-SA Topic Newsletter Editor*



The limited global-energy supply becomes increasingly strained with human population growth and its inherent economy. However, we also contribute to a more pervasive and covert resource crisis, underlying both technological *and* natural processes. Like organic fossil-fuel resources, the fundamental *chemical elements* themselves will be subjected to supply restrictions. About 37% of the global elements are considered to be unsustainable or *endangered*, by approaching supply availability (Figure 1). They are categorized as *rare-earth*, *precious-metal*, and *biologically critical* (e.g. phosphorous) elements.¹

Transmaterialization, an efficient use of renewable materials mitigating the environmental, as well as socio-economic (e.g. conflict-mineral mining) stresses of elemental consumption, represents the potential global influence of green chemistry. Research efforts have demonstrated replacement and minimization of applied endangered materials. Abundant carbon nanomaterials, as shown in the header (right), and biocatalytic bacterial enzymes have respectively substituted scarce metals through equivalent properties (i.e. conductivity, strength, structural stability) and the hydrogen/oxygen-transformation activity of metal electrocatalysis in renewable fuel cells.¹⁻³

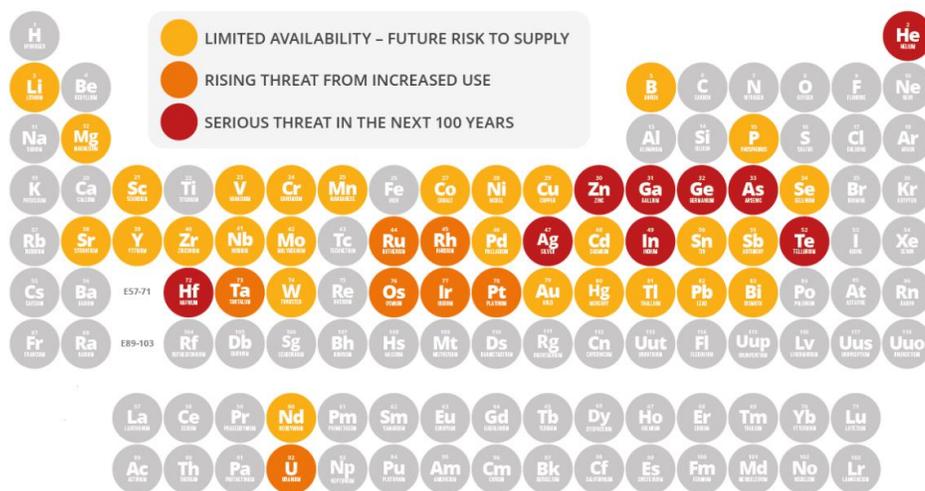


Figure 1. Periodic table of elements with estimated future supply restrictions, by degree¹

Eventual exhaustion of such elements characterizes a current adaptive challenge for living systems. As mentioned previously, *phosphorous* is integral to life and ubiquitously represented on this planet. It is commonly known that it is present in many cellular systems, such as nucleic-acid structure, ATP energy transportation, and phospholipid membranes. Human metabolic deficiencies of phosphate therefore cause tissue and neurological dysfunction. Based on its essential role, accessible phosphate content becomes a limiting factor for entire ecosystems.⁴

However, cellular phosphate may not always restrict biochemical processes. Prokaryotic organisms have shown phosphate independence, by synthesizing the *arsenate* (As^{V}) analog. Microbial oxidation of arsenite (As^{III}) to arsenate is regulated by the phosphate starvation response. Arsenate extends bacterial growth, to exclude phosphorus from lipids for functional replacement in biomolecules, sparing phosphate for critical nucleic acid production.⁵ This *long-term* natural transmaterialization continues to be mitigated by selection of responsible resources.

1. ACS. Endangered Elements. <https://www.acs.org/content/acs/en/greenchemistry/research-innovation/endangered-elements.html> (accessed December 31, 2018).

2. Arvidsson, R. et al. *J. Clean Prod.* **2017**, *156*, 253-261.

3. ScienceDaily. Electricity Production: When Enzymes Rival Platinum. <https://www.sciencedaily.com/releases/2017/08/170830-101929.htm> (accessed December 31, 2018).

4. Wikipedia. Phosphate. <https://en.wikipedia.org/wiki/Phosphorus> (accessed January 6, 2019).

5. Wang, Q. et al. *Environ. Microbiol.* **2018**, *20*, 1782-1793.



*The University of Pittsburgh
Department of Chemistry*

is proud to announce

*The McKeever Summer
Undergraduate
Research Fellowship*

- **T**he Undergraduate Research Fellowship will be awarded this Summer 2019.
- **T**his Fellowship will provide a Summer stipend of \$3,500.00 to the recipient for work carried out in the research lab of our faculty member.
- **P**lease submit a letter of recommendation from a Faculty Mentor which includes your qualifications and details of the planned research project (1-2 pages) and a **one page** personal statement of your future goals to **Dr. George C. Bandik in Room 107 Chevron Science Center by February 18, 2019**. All nominations will be reviewed by our Undergraduate Curriculum Committee and the recipient will be recognized at our Undergraduate Spring Term Awards Ceremony within the University of Pittsburgh, Department of Chemistry.

Deadline to receive all materials for this Fellowship is February 18, 2019.

PITTSBURGH CHEMISTRY

by: Max Bair, Class of 2018

University of Pittsburgh

Fourth in a series

Happy New Year! I'm back for the fourth article in the series on the Pittsburgh chemical industry. Today I'm going to tell you about Allegheny Technologies Inc., also known as ATI. This company has facilities all throughout the US, as well as presence in at least 15 countries internationally. In its last year, ATI boasted revenue of \$3.6 billion. ATI is working to ensure its success by commitment to continuous innovation, sustainability, and improvement to the community and employees.

ATI specializes in the development and production of advanced, game-changing alloys. Given the endless number of uses for the different types of alloys, ATI has been able to penetrate many very profitable industrial markets including aerospace, defense, electrical energy, fossil fuels, medicine, automotive and more. Fortunately for us, ATI has many locations in Pennsylvania where various types of work occur. The company has technical centers in Pittsburgh and Natrona Heights, as well as manufacturing centers in Brackenridge, Natrona Heights, Washington, and various other locations.

ATI employs about 8,600 people worldwide. The benefits offered by ATI are standout, as their 401k contributions are some of the best I have come across in my research. They provide large, non-discretionary contributions in addition to matching a portion of personal contributions. They offer competitive paid time off and acceptable health insurance. The jobs offered by ATI lean more on the side of engineering, but also include chemistry-related positions in the manufacturing and quality control sectors. The accessibility of these jobs varies from no experience to high levels of experience.

Allegheny Technologies not only cares about profit, they also care about the environment and local communities. The company has steady goals to reduce pollution and energy usage in the coming decades. ATI also supports a United Way campaign and started the ATI Veteran's Network. Many scholarship programs and opportunities are offered by the company throughout the United States.

Thanks for reading everyone, and good luck with the new semester and New Year! Keep an eye out for my next article, coming in February.



Hail to Pitt!

Max Bair



2019 January ACS-SA Schedule

January 2019

- 11** **Welcome Back**
First Meeting of the Term
- 18** **Mr. Kevin Romagnoli**
Valspar Corporation
- 25** **Winter Birthday Bash**



I Need a Job!

It's that time of year! Time to begin the search for a summer position. There are several opportunities for summer opportunities available to Chemistry majors.

The first place to look is the Chem Major News area of the first floor hallway. Here you will find the current Research Experiences for Undergraduate (REU) listings. They are from all over the country.

You may also want to visit Career Services (2nd floor WPU).

Ms. Emily Bennett can help you with opportunities available through their Office.

Finally, don't forget the Arts and Sciences Office of Experiential Learning (B-4, Thaw Hall). Mr. Patrick Mullen can assist you there.

With all of these opportunities available, it should be an exciting and productive summer for everyone. Good Luck!



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 January 11, 2019 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 (make checks payable to the University of Pittsburgh). 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.



Chemistry Up The Hill

by: Jack McAuliffe

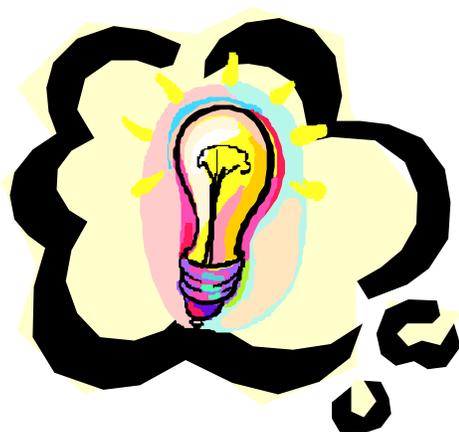


My name is Jack McAuliffe and I am an undergraduate junior minoring in chemistry on the pre-dental track. I am very thankful that the chemistry department provided me directed study credit for my 51 hours of research at the Dental Registry and DNA Repository (DNA) at the University of Pittsburgh Dental School in the fall 2018 semester. This research in craniofacial genetics, led by Dr. Vieira, uses saliva samples provided by patients in the dental clinics. These samples are then run for DNA sequencing, and genes are connected to patient's dental records. The DRDR already has 6,000 DNA samples in its database from which correlations between genes and dental conditions can be used to develop better treatments. Specifically, my role was patient recruitment through explaining the program, obtaining signed consent forms, and collecting saliva samples for DNA sequencing. I also learned the axiUm software for dental records and medical history data entry at the dental school. Additionally, I received permission from Dr. Vieira to collect saliva samples in the Center for Patients with Special Needs. Saliva samples in the CPSN are taken either with a funnel apparatus or with monoject syringes for patients that go under general anesthesia. My time within the Center for Patients with Special Needs has sparked an interest in being a general dentist with a focus on patients with special needs or becoming a dental anesthesiologist. Overall, this was a very unique opportunity as I was able to interact with patients and their families, get to know dental instructors and students, and work on my professional work demeanor. Through this experience, I have become even more confident that a career in dental medicine is one that I wish to continue pursuing.





2019
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 chemistry or chemical biology research project, including stipend & supplies, in the summer of 2019 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, 2019 to Desirae Crocker, CHVRN 757.

- The Award will be presented at the Undergraduate Award Ceremony in April 2019.
- The Awardee and Faculty Sponsor(s) are strongly encouraged to present a poster on their research at Science 2019 in Pittsburgh in the fall of 2019, and/or actively participate in an equivalent departmental, regional or national scientific conference.