



IT'S THAT TIME!

**IMPORTANT DATES
FOR REGISTRATION**

- February 11** Summer Term Registration (2197) begins for all degree students.
- March 10-17** Spring Break!
- March 22** Deadline for August 2019 (2197) graduation applications in 140 Thackeray Hall.
- March 25** Fall Term (2201) 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 8th for Summer Term (2197).

Advisees who will be asked to select their permanent advisors (via an email to be sent February 4th) should do that after February 6th. See Dr. George C. Bandik or Regina Mahouski in 107 Chevron Science Center.

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 6th for Summer Term (2197) and March 11 for Fall Term (2201) in 107 Chevron Science Center.

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PITTSBURGH CHEMISTRY

by: Max Bair, Class of 2018

University of Pittsburgh

Fifth in a series

Hello there everybody! I'm back for the fifth article in the series on the Pittsburgh chemical industry. The company I have chosen for today is Leidos. This company has a strong global presence, with over 400 locations in 30 countries. Last year, Leidos pulled in a revenue of over \$10 billion. With that much revenue, it's no surprise that Leidos is making its way up the Fortune 500, as it was listed #381 in 2017 and moved to #292 in 2018. Their mission is to make the world safer, healthier, and more efficient through information technology, engineering and science.

Leidos helps ensure its success through involvement in many growing and profitable markets. These include aviation, defense, energy, government, healthcare, homeland security, science, space, and surface transportation. With such a large portfolio comes a wealth of opportunity for college graduates to explore research, innovation, and technical problem solving in fields they may have never thought of pursuing. Fortunately for those who plan to stay in Pennsylvania, Leidos has locations in Pittsburgh, Philadelphia and King of Prussia.

Leidos employs over 31,000 people globally, and the benefits they provide to their employees are notable. Leidos offers above average 401k contribution matching with a 3-year vesting schedule. They have a wide range of health insurance options, including multiple providers, HSA options and more. Leidos also offers a respectable amount of paid time off for new employees. Opportunities at Leidos aren't restricted to chemistry majors, as they also have ample need for engineers and computer scientists. Positions in all of these fields range from entry level to PhD level.

Thanks for reading everybody! Make sure to bundle up and stay warm out there. Check back in March for my coverage of another company.



Hail to Pitt!
Max Bair




ACS-SA Spring Term Schedule FEBRUARY

February



- 01** *The Medical Examiners Office
with Ms. Michelle Kotsajoelos, BS, Pitt*
- 08** *Preparing for our Valentine's for Veterans
Outreach Effort*
- 15** *Winter Celebration
RESERVATIONS REQUIRED*
- 22** *Our Friends at PPG Industries*

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!



FOR INFORMATION
ON THE
UTU PROGRAM
Please see
Dr. George C. Bandik
or
Dr. Tamika Madison

Undergraduates
Teaching
Undergraduates

The Kenneth P. Dietrich School of Arts & Sciences 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.

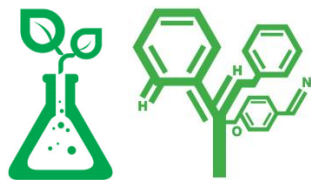
As part of the summer awards program, all SURA recipients participate in an ethics workshop where ethics case studies are discussed with Dietrich School faculty and staff members from the Academic Resource Center and OUR. Because ethical concerns are inherent in every kind of research, the ethics workshop 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:

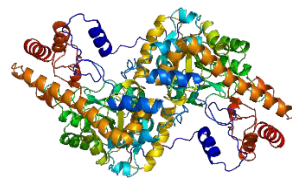
<https://www.asundergrad.pitt.edu/suraapp>

Deadline: February 18, 2019



Green Chemistry

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



Conventional chemical syntheses are conducted under *stoichiometric* mass conservation, but require thermally favorable activation, and ambivalently generate derivative byproducts (e.g. inorganic salts), through statistical collision-kinetics and orientation agreement between reagents. Unfortunately, this inefficient reactive process does not agree with the green principles of energy conservation and resource economy. However, *catalytic* conditions provide a selective synthetic pathway, through an energetically favorable reagent-catalyst intermediate complex (i.e. *transition state* or TS) for increased reaction rate, and without consumption of the catalyst itself, for recovered economy.^{1,2}

Enzymes act as *biological* catalysts, and employ multiple *catalytic mechanisms*, including acid-base, covalent, metal-ion, electrostatic, oriented-proximity, and TS binding processes. These enzyme-substrate (i.e. catalyst-reagent) mechanisms are respectively characterized by partial proton transfer, nucleophilic bond formation, stabilized redox, nonpolar site-charge stabilization, site-group arrangement, and preferred enzyme-TS geometry, all promoting TS stability.^{3,4} The inherent robustness of enzymatic activity facilitates applications to green syntheses.

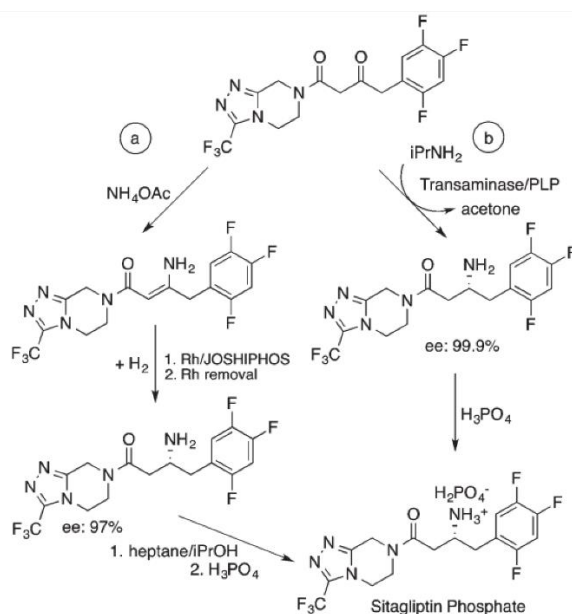


Figure 1. Chemocatalytic (a) and biocatalytic (b) syntheses of Sitagliptin⁵

Natural biocatalysis has motivated modern production of biologically active chiral compounds, as demanded by the pharmaceutical industry. Use of engineered enzymes, introduced to artificial biocatalytic transformations, has optimized this practice. *Merck's* green process to manufacture *Sitagliptin*, a treatment for type 2 diabetes, via transaminase-based (header, right) asymmetric synthesis of chiral amines, is more environmentally favorable (+12% yield) and industrially viable (+50% productivity) by eliminating the chemocatalytic, pressurized hydrogenation step (Figure 1).⁵ In conclusion, artificial products may be met by optimizing natural synthetic routes.

1. ACS. Catalysis. <https://www.acs.org/content/acs/en/greenchemistry/research-innovation/catalysis.html> (accessed January 23, 2019).
2. Siyavula. Mechanism of Reaction and Catalysis. <https://intl.siyavula.com/read/science/grade-12/rate-and-extent-of-reaction/07-rate-and-extent-of-reaction-04> (accessed January 27, 2019).
3. Southern Illinois University. Catalytic Mechanisms. http://www.siumed.edu/~eniederhoffer/bmb_courses/mbmb451b/lectures/mbmb451b_enzcat.pdf (accessed January 27, 2019).
4. Southern Methodist University. Mechanisms of Catalysis. <http://faculty.smu.edu/svik/5310/5310lectures/lect14.html> (accessed January 27, 2019).
5. Naray-Szaboa, G. et al. *Green Chem.* **2018**, *20*, 2171.

Just What Can You Do With That Chemistry Degree?

by: Kaila Simcoviak, Part 4 in a series

A Bachelor of Science degree in Chemistry can take you anywhere you want to go! This includes a dream of going to law school! Lawyers act as advocates and advisors representing both the interests of their clients and their own. Law school offers a variety of opportunities for attorneys to specialize in science and chemistry. So are you passionate about your beliefs and you love your chemistry degree, maybe law school is the option for you!

Opportunities for law school with a chemistry degree include three main divisions: environmental law, in-house counsel, and patent law. Lawyers specializing in chemical and environmental law represent manufacturers or special interest groups including: waste disposal companies or construction firms in their dealings with the United States Environmental Protection Agency and other federal and state agencies. For in-house counsel, lawyers with a chemistry background work for chemical and life sciences companies. Lawyers of this type tend to have a more regular schedule. As a "house counsel" they advise the company concerning legal issues related to its business activities including patents, government relations, contracts, and property interests. Lastly, patent law; which is where a majority of interests with a chemistry background exist. This division employs patent attorneys who have special qualifications for obtaining patents. For example, during the developing of a new drug, a patent attorney studies the patents owned by other companies and advises the client of these, so that the new drug development works to avoid infringing on valid patents of other companies.

A chemistry major has proven to prepare students well for law school and chemistry ranked in the top five majors with the highest acceptance rates into law school. Law schools are looking for a student that took a competitive major. For example, law schools believe that a student with a degree in chemistry was more challenged than one with a degree in theatre, so if the LSAT and GPA of the two students are close, the chemistry degree will get an edge into being accepted into that particular law school.

The American Bar Association published a list of pre-law educational objectives: problem solving, critical reading, writing, oral communication, research, basic understanding of political and legal institutions, economics, and mathematical skills. Most of these skills, including problem solving, critical reading, writing, research, and oral communication are enhanced through a chemistry degree! Considering pairing your chemistry major with a minor in political science or economics to enhance your degree!

Becoming an attorney usually takes seven years, four years as an undergraduate, followed by three years of law school. Acceptance into law school depends on one's GPA, the Law School Admission Test (LSAT), prior work experience, and personal interview. After the completion of law school, one must pass the bar exam and take a patent certification test, for example if they chose to become a patent attorney.

The median annual salary as of 2016 for an attorney of any type was \$118,160. The range of salary for a patent attorney for example can range from a starting salary of \$80,000 all the way to \$210,000 and because of the complexity of patent law and the scientific edge it requires, patent attorneys are among the highest earning 10% of lawyers.

If becoming a lawyer is your calling, then a degree in chemistry can help you achieve the path to your success! The law field has numerous opportunities, and opportunities to move up the ladder. If working in offices, law libraries, courtroom, or traveling sounds like your dream, then considering becoming the new patent lawyer!

Sources:

<https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/chemistry-law.html>
<http://lawschoolnumbers.com/application-prep/choosing-your-major-for-prelaw>
<https://www.bls.gov/careeroutlook/2009/fall/art03.pdf>
<https://www.patenteducationseries.com/patent-bar/salary-ranges.html>
<https://www.bls.gov/ooh/legal/lawyers.htm>

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.

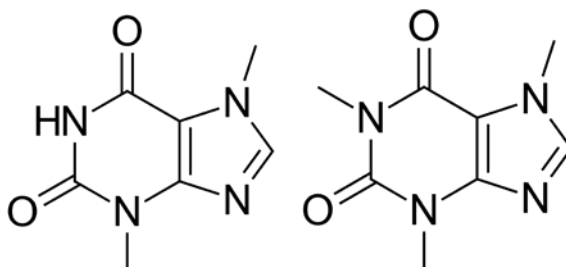
Theobromine is another compound common in cocoa. It is also found in coffee and tea. Interestingly, theobromine differs from caffeine only in that it contains an additional methyl group. Thus, they demonstrate similar physiological properties. Specifically, both act as stimulants on the human brain. Further, theobromine also acts as 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>

FOLLOW YOUR CURIOSITY

Office of Undergraduate Research, Scholarship,
and Creative Activity

Summer Undergraduate Research Award

The Kenneth P. Dietrich School of Arts & Sciences seeks applicants to join a diverse community of undergraduate scholars and researchers from the **humanities, natural sciences, and social sciences**. Awardees receive **\$4,000** to support summer term independent research. Additionally, awardees share their research with others in bi-weekly meetings as part of ARTSC 0125: SURA Research Seminar.

Applications will be accepted from any Dietrich School undergraduate who:

- is interested in joining a community of scholars.
- Has a faculty sponsor within the project discipline.
- Is interested in conducting self-directed research.

Application Deadline: Monday, February 18

Online Application: asundergrad.pitt.edu/research