

# The Chemical Bulletin

<http://chicagoacs.org>

FEBRUARY • 2016

## CHICAGO SECTION AMERICAN CHEMICAL SOCIETY MONTHLY MEETING THURSDAY, FEBRUARY 18, 2016

**Zhivago's Restaurant**  
9925 Gross Point Rd  
Skokie, IL 60076

### DIRECTIONS TO THE MEETING

#### From Chicago:

Take I-94 West to Exit 35, Old Orchard Rd, and turn right to Gross Point Rd and take a right to Zhivago's Restaurant on the left.

#### From I-294 North/South:

Take I-294 north or south to Golf Rd going east. Travel past I 94 to Gross Point Rd and turn left going north to the restaurant.

#### From I-88:

Travel to 294 and follow instructions above.

**PARKING:** Free

**SOCIAL HOUR:**  
Cash Bar

5:30 - 6:30 P.M.

**DINNER**

6:30 - 7:30 P.M.

**GENERAL MEETING**

7:30 P.M.



**Margaret E. Schott, PhD**

The Story of Elemental Sulfur – A Natural (and Unnatural) Resource

**Abstract:** The story of elemental sulfur, which has also been called brimstone since biblical times, is a fascinating one. And yet beyond volcanic brimstone how many of us know, or were taught, the origins of this solid yellow substance ( $S_8$ ) which has become such a key element for modern day applications? Thanks to the ubiquity of sulfur in today's world, one expert has even dubbed the period of time in which we are living 'the sulfur age'. The talk, in addition to bringing to light some of the curious characteristics of sulfur in its many phases and forms, will provide an overview of where elemental sulfur comes from, current methods for safely shipping sulfur over land and sea, some of the major end-uses in commercial products, and new applications emerging from research

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laboratories.

We will begin with a look at sulfur and its presence and activity in the universe at large and on the surface of Io, Jupiter's innermost moon, known for its yellow color and fiery flows. On our own planet there are two natural processes, namely volcanogenic and biogenic, for the formation of elemental sulfur in Earth's geologic history. We will examine the methods, traditionally employed over the past several hundred years, for the extraction of sulfur from Earth's crust, including the famous (and now mostly historical) Frasch process where superheated water is used to melt underground sulfur, providing a liquid form that can be pumped to the surface.

Sulfur, which falls under oxygen on the periodic table of elements, has a remarkable number of allotropes beyond its stable cyclo-octa structure, in which eight S atoms form a crown-like ring. We will consider the structure and properties of sulfur's linear and cyclic allotropes, ranging from  $S_2$  in the gas phase all the way up to polycatena  $S_n$  (where  $n > 1000$  atoms in a chain)! The viscosity of heated sulfur is especially unique. We'll have a brief look at the methods used nowadays for the industrial scale preparation of "unnatural" or synthetic  $S_8$  derived from the multitude of organosulfur components present in unrefined fossil fuels. In fact, so much sulfur has been produced in recent times that the market is experiencing an over-capacity, with enormous piles of solid  $S_8$  being stored in football field sized lots at refineries across the globe.

In order to get the raw material to its manufacturing destination, cargo ships and railcars have to be specially outfitted with heated containers for the long-distance transport of molten sulfur which gets pumped out at the end of its journey. Nowadays, sulfur is used in the large-scale manufacture of products including vulcanized rubber, sulfuric acid, paving and construction materials, matches, black gunpowder and fireworks. Are we living in the sulfur age? The audience will get to decide.

## BIOGRAPHY

**Margaret (Peggy) Schott** has been a member of the staff in the Department of Chemistry at Northwestern University for the past eight years. In that capacity she oversees all aspects of the running of a large group (30+) of graduate students and postdocs studying synthetic organic chemistry and nanotechnology under the mentorship of Professor Sir Fraser Stoddart ([stoddart.northwestern.edu](http://stoddart.northwestern.edu)). She also participates as a member of the department's Faculty Honors Committee.

Previous work experiences included research stints at Dow Chemical, the National Institutes of Health / National Cancer Institute and the Lombardi Cancer Center at Georgetown University. She has numerous publications on topics ranging from the chemical modification of antibodies to the cellular immunology of peptide vaccines for cancer, in addition to coursework in immunology and mass spectrometry. In the Chicago area Peggy has taught undergraduate chemistry at Dominican University and the College of DuPage, with courses including general and organic chemistry, chemistry and society, and a seminar on cultural anthropology.

During more than 35 years of continuous membership in ACS, Peggy has taken part in various Divisions including Organic Chemistry, Chemical Education, and most recently the History of Chemistry. She has served in the Chicago ACS Section as Director and Secretary.

Peggy earned a BS in chemistry at The College of William & Mary in Virginia and a PhD in organic chemistry at Northwestern University. There she worked on the chemical synthesis of oligonucleotides 'before automation'. She also has an MA in Theology from Aquinas Institute in Saint Louis and, in her spare time, does research, writing and speaking in this field as well as participating in the science and religion dialogue through annual conferences. Among the awards Peggy has received are the Dow Chemical Inventor of the Year and selection as a Northwestern University Employee of the Year Finalist.

## Menu

Choice of

- Chicken Kiev
- Salmon
- Potato-stuffed Pierogis with Vegetables

- Soup
- Dessert

Cash Bar

The cost is \$35 to Section members who have paid their local section dues, members' families, and visiting ACS members. The cost to members who have NOT paid their local section dues and to non-members is \$37. The cost to students and unemployed members is \$20.

Dinner reservations are required and should be received in the Section Office via phone (847-391-9091), email ([chicagoacs@ameritech.net](mailto:chicagoacs@ameritech.net)) or website (<http://chicagoacs.org/meetinginfo.php?id=102&ts=1447857852>) by noon on Monday, January 18. PLEASE HONOR YOUR RESERVATIONS. The Section must pay for all dinner orders. No-shows will be billed.

## IN MEMORY OF CONSTANCE LOUISE CHURCHILL

**BUFFALO GROVE - Constance Louise Churchill**, 74, passed away on January 8, 2016. She was born and grew up, in Los Angeles, CA, where she was active in her high school, community, and church. She graduated with a PhD in Chemistry from Baylor University in Texas and became a lifelong educator working as a energetic administrator of several colleges and passionate teacher of chemistry. In addition to Dakota State in Madison, South Dakota, and Burlington County College in New Jersey, Connie was Dean of Science and Allied Health at Oakton Community College in Des Plaines for more than ten years. She was a devoted mother to her only son, Tony, and a loving sister to Judy Bowman of Waco Texas. She believed in hard work, preparation, and the inherent goodness in people. Services took place on Friday, January 15 at G.L. Hills Funeral Home in Des Plaines. Donations were made to the Oakton Educational Foundation, 1600 E. Golf Rd., Des Plaines, IL 60016.

Published in Chicago Suburban Daily Herald on Jan. 12, 2016.



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## "CHEM SHORTS" For Kids

### Colorful Valentine's Day Flowers

Kids, Valentine's day is right around the corner and the people who sell flowers look forward to this day all year long. If you think about the colors of flowers you think of red, yellow, orange, pink, and white but other colors of the rainbow are not prevalent like green and blue. Here is a way to make some of those colors appear in a flower.

You will need some white flowers and carnations work well – really any stemmed plant will work.

First, trim the flowers at the stalks. Fill a vase or jar with water and add some food coloring of your choice (green or blue?). Put your flowers in the water and wait. Usually you can see effects within a few hours!

#### The science:

The reason this happens is because of something called the transpiration stream. This is the movement of water up the stem of a plant from root to leaf when water is lost from the plant due to evaporation occurring at the leaves. Firstly water is absorbed by the root and moves through root hair cells via the process of osmosis. It then moves into the xylem vessel which is the tube that carries the water up the plant. Plants are not like us with pumping mechanism that pushes our blood around, so water moves up the vessel by adhesion (being attracted to the side of the vessel) and cohesion (water molecules being attracted to each other – think of water molecules as people who are holding hands and as one person climbs up the side of a wall, they pull another along with them). Therefore when water evaporates from the top of the leaves it changes the pressure in the vessel and pulls up the column of water to replace the water lost.

The best way to consider this is to imagine you have a thick shake – the straw can't carry the shake up, but if you withdraw air from the top, you change the pressure and force the liquid shake up the straw where there is less pressure. It moves in a column because the molecules are attracted to each other.

This is similar to a [ChemShorts article from August 1993](#).

Reference:

<http://www.science-sparks.com/2011/09/26/changing-colour-flow-ers-with-transpiration/>

Paul Brandt

## YOU BE THE CHEMIST CHALLENGE

The You Be The Chemist Challenge® is an interactive academic contest that encourages students in grades 5-8 to explore chemistry concepts and their real-world applications. The Challenge provides a unique opportunity for a variety of individuals and organizations—including schools, members of the chemical industry, educators, and other community partners—to come together and show their support for STEM education.

The Challenge is an individual competition that starts at the school level and continues with Local, State, and National Challenge competitions. The Challenge begins with students completing the Challenge Qualifier, a short multiple choice test provided by the Chemical Education Foundation (CEF) and administered by educators and/or organizers. Based on student participation in a local Challenge site and/or state, a select number of students will advance to the next level of competition. The top participant from each state then advances to the [National Challenge](#) in June! Students from Illinois have won half of the National Championships since its inception in 2005.

CEF also provides [free study materials](#) to help students prepare for the Challenge. For more information about the Challenge and participation requirements, please see the [Challenge Official Rules](#).


For more information on local Challenge sites, contact [Molly Snyder](#) the CEF contact for Illinois, or [Doug Nafis](#) (Honeywell) or [Lisa Frede](#) (Chemical Industry Council of Illinois) who are the Illinois State Coordinators.

February, 2016 Vol. 103, No. 2. Published by the Chicago Section of The American Chemical Society, Editorial Staff: Paul Brandt, Editor; Kari Stone, Proofreader. Address: 1400 Renaissance Dr., Suite 312, Park Ridge, Illinois 60068; 847/391-9091. Subscription rates: \$15 per year. Frequency: monthly-September through June.

## WASHINGTON UNIVERSITY CHEMISTRY TOURNAMENT

The Washington University Chemistry Tournament (WUCT) is a new competition for high school students. WUCT is set to have its inaugural event on Saturday, April 2, 2016 at the Washington University undergraduate campus in St. Louis, MO, and it will be held annually each spring. Each team will consist of six high school students accompanied by one adult coach. No incomplete teams will be allowed to compete. The format will consist of a series of written examinations in individual and team formats. The exam will be geared towards high school chemistry concepts and will be an expansion of concepts covered on the ACS National Chemistry Olympiad. Registration can take place on the WUCT website, <http://wuct.axe.wustl.edu/>. Registration will be based on a first-come basis and will close on February 5th. The registration fee is \$60 per team (\$10 per student). Breakfast, lunch, and snacks will be provided, but teams will be responsible for transportation and lodging costs.

For questions and more information, please e-mail the WUCT Co-Directors, Harshath Gupta and Abhishek Sethi, at mail to: [wuct.washu@gmail.com](mailto:wuct.washu@gmail.com).



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The official newsletter of the Chicago Section American Chemical Society, *The Chemical Bulletin*, publishes news and information of interest to the Section's 4100 members, who are professional chemists and others in related professions in industry, academia and government throughout greater Chicago. The mission of the Chicago Section is to encourage the advancement of chemical sciences and their practitioners.

## 2016 AD RATES

| SIZE                    | DIMENSIONS             | STANDARD RATE |
|-------------------------|------------------------|---------------|
| Full Page               | 7.5" wide x 10" deep   | \$700         |
| 2/3 Page<br>(2 columns) | 4.917" wide x 10" deep | \$530         |
| ½ Page                  | 3.75" wide x 10" deep  | \$500         |
| 1/3 Page<br>(1 column)  | 2.333" wide x 10" deep | \$360         |
| ½ Column                | 2.333" wide x 5" deep  | \$190         |
| Business Card           | 3.5" wide x 2" deep    | \$95          |

**We accept ads sent in jpg, tif, Indesign, Photo Shop, or pdf formats.**

## 2015 EDITORIAL CALENDAR

| ISSUE     | COPY DEADLINE | MEETING DATE |
|-----------|---------------|--------------|
| February  | January 15    | Feb. 18      |
| March     | February 15   | Mar. 18      |
| April     | March 15      | Apr. 21      |
| May       | April 15      | May 20       |
| June      | May 15        | June 17      |
| September | August 15     | Sept. 16     |
| October   | September 15  | Oct. 21      |
| November  | October 15    | Nov. 17      |
| December  | November 15   | Dec. 9       |

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## SOMEONE YOU SHOULD KNOW



This month, I chose Ken Fivizzani to interview. I first met Ken when I worked at Nalco Chemical Company in Naperville. Ken is a patient and kind individual who always brings a special energy to whatever he is involved in. He has one of those laughs that are contagious. Ken has had a very active role in the Chicago Section as the Chair of Environmental and Safety Committee as well as being Chair of the Section twice. He is that person that you go to when you have a question about the Bylaws or Policy of the Section. Ken also has represented the Section as a councilor and recently ran for Director of District V.

Ken is a native to Chicago. He was born in Chicago but raised in Evanston. His father was a short-order cook and his mother was a homemaker but worked as a bookkeeper for some of the restaurants where his father was employed. She was also very active in their church and also did bookkeeping for some of the church organizations. Ken is the youngest of four children but not the first to go into science. His older brother is a retired biology professor.

It is not widely known is that Ken studied for ten and half years to be a Catholic priest. He attended Quigley North, a high school seminary in Chicago and then went on to Loyola, a college seminary followed by Mundelein which is a major seminary. Ken was fascinated with a statement that his brother made that scientist and theologians thought differently about things. His first and only science class during high school was chemistry during his senior year. Ken never had a chemistry set as a child but chose to major in chemistry when he

went to college.

Ken earned a bachelor's degree from Loyola University in Chicago. His college within Loyola was Niles College, a seminary of the Archdiocese of Chicago. After graduation, he studied theology at St. Mary of the Lake Seminary in Mundelein. Ken worked part-time on his M.S. in chemistry at Loyola while receiving his bachelor's degree in theology. He met his future wife, Mary, in a chemistry lab at Loyola. He left the seminary and completed his M.S. in inorganic chemistry under Stephen Pavkovic synthesizing copper-amine complexes. Ken earned his Ph.D. at the University of Wisconsin at Madison under Paul Treichel. His research in inorganic/organometallic chemistry involved the synthesis and characterization of acenaphthene and arylfluorene complexes of chromium and manganese. Ken interviewed for both academic and industrial positions after receiving his Ph.D.

Ken's first job was in Corpus Christi, Texas but the position was eliminated after ten months. His wife, Mary, was in pharmacy school in Madison so Ken moved back and took advantage of the Chemistry Department Placement Office in Madison. He was given an instructor's position for the academic year. During this time, Ken interviewed with several companies and was hired by Nalco Chemical Company in Naperville. Nalco does industrial water treatment and support for energy services. He started out doing research in boiler water and cooling water technology where he developed corrosion and deposit inhibitors. Ken is the co-inventor of five U.S. patents. In 1990, the OSHA Lab Standard was issued and Ken became Nalco's Chemical Hygiene Officer which led to his nineteen year career in chemical health and safety. He states that his favorite part of the job was the opportunity to work with all of the Nalco researchers worldwide. Nalco had facilities in Naperville, IL and Sugar Land, TX as well as labs in Leiden (Netherlands), Singapore, Fawley (Great Britain), Botany (Australia), and Helsinki (Finland). Safety is one area where companies are willing to share best practices and one of Nalco's research vice presidents signed Ken up in the Industrial Research Institute's Environmental and Safety Directors Network which met twice a year.

Ken joined the ACS in 1975 as soon as he knew that chemistry would be his profession. He joined the ACS Division of Chemical Health and Safety (CHAS) without having any formal training in safety. He started attending regular meetings and eventually became CHAS chair three times. Ken has presented

many papers at ACS meetings and was a columnist for the *Journal of Chemical Health and Safety*. He was appointed to the ACS Committee on Chemical Safety (CCS) as a member and also became chair. One of his favorite ACS roles was as chair of the Chicago Section and informing outstanding scientists that they were selected to receive the Willard Gibbs Medal.

Ken and Mary will celebrate their 40th wedding anniversary in July, a tribute to the good chemistry between them, beginning in that Loyola lab long ago. They enjoy traveling and have visited many places in this country and around the world. In addition to his ACS activities, Ken also teaches adult religious education at their church.

Ken's final words of wisdom to us are "Be open to opportunities that may be outside of your comfort zone"

Fran Kravitz

## DR. WILLIE MAY TO RECEIVE THE 2016 CHICAGO SECTION PUBLIC AFFAIRS AWARD

We are pleased to announce that **Dr. Willie May, Under Secretary of Commerce for Standards and Technology & Director, National Institute of Standards and Technology**, has been selected to receive the 2016 Chicago Section Public Affairs. Dr. May is an active member of the American Chemical Society with a strong commitment to the Society and our nation. The Under Secretary of Commerce for Standards and Technology is a high-ranking official in the United States Department of Commerce and the principal advisor to the United States Secretary of Commerce on the technological development. The Under Secretary is dual hatted as the Director of the National Institute of Standards and Technology within the Commerce Department. The Under Secretary is appointed by the President of the United States with the consent of the United States Senate to serve at the pleasure of the President. Dr. May will deliver an address at the March 17, 2016 meeting of the Section. Information regarding this meeting can be found at [www.chicagoacs.org](http://www.chicagoacs.org).

Mike Koehler



Register ONLINE for  
Chicago Section  
monthly meetings



<http://www.chicagoacs.net/register.php>

## A COMPANY YOU SHOULD KNOW

Recently I had been writing articles about the explosion of new chemical companies in the province of Ontario and in particular the Sarnia region. I would like to spend some time now highlighting a number of chemical companies in the Chicagoland region. Given my location it makes sense to begin with a company that I have some familiarity with, Nalco – at least that's how the public in Naperville refer to it.

In 1928, the National Aluminate Corporation was founded - a union of the Chicago Chemical Company and Aluminate Sales Corporation. In 1959 this company was renamed the more familiar Nalco Chemical Company – a company known for its water treatment worldwide. In 1983 Nalco found its way to its current location in Naperville and was renamed Odeco Nalco in 2001 followed by a merging with Ecolab in 2011.

Ecolab is the global leader in water, hygiene and energy technologies and services. Around the world, businesses in the food-service, food processing, hospitality, healthcare, industrial, and oil and gas markets use Ecolab to keep them operating efficiently.

Located in Naperville, Illinois is Ecolab's Water and Process Services Division (WPS). This site has both a Process Services, serving the pulp and paper industries and mining industries, and Water Services, which focuses on customers across various industrial and institutional markets. In both segments, Ecolab provides water, air and process applications that combine environmental benefits with economic gains for customers, typically, water and energy savings, maintenance and capital expenditure avoidance, along with product quality improvements. Innovative treatment of boiler water, cooling water, influent, and wastewater, as well as practical solutions for process improvements and pollutant control, allow Ecolab's customers to capture many benefits.

The WPS Division of Ecolab in Naperville supports 1000 employees of which over 600 are chemists, engineers, microbiologists, metallurgists and analytical experts. The site has 330 PhDs, 1800+ patents, and over \$80 million invested in R&D. Ecolab had 2014 revenues of approximately \$14B, and had 44,000 employees worldwide in the 170 countries where it does business.

The demand for fresh water is expected to surpass supply by 40 percent within the next two decades – placing urgent pressure on businesses to rethink the way water is managed, for their own good and for the good of their customers and communities. To address these challenges, businesses around the world are setting ambitious water goals. Ecolab helps customers do more, using less water – improving the heating and cooling, industrial processing, wastewater treatment, and cleaning and sanitizing processes.

As evidence of this, in 1999, Nalco was recognized with a Green Chemistry Challenge Award for a polymer used as a process aid for water treatment without introducing oil and surfactant into the environment as they are manufactured in water-based salt solutions, saving five million pounds of oil going into the environment annually. Additionally, the manufacturing process utilizes a waste by-product (ammonium sulfate) from another industrial process. In 2008, Nalco again won the award, this time in the category of greener reaction conditions. This technology monitors the condition of cooling water continuously and adds appropriate chemicals when needed, saving water and energy while using appropriate chemicals only when needed.

Nalco and Ecolab are leaders in the world on many fronts. Some of their awards and recognitions come from *EHS Today* magazine naming Nalco one of America's Safest Companies in 2011 and their European operations received a similar International Fleet Safety Award from *Fleet Europe* magazine in 2011 as well. Nalco has been honored nine times with the Illinois Governor's Pollution Prevention Awards by successfully reducing the generation of solid, liquid, and gaseous waste. Most recently, in January the 80 acre Naperville campus was LEED (Leadership in Energy and Environmental Design) Gold recertified by the U.S. Green Building Council. *Newsweek* ranked Ecolab #7 in the U.S. and #12 in the world for World's Greenest Companies. *Fortune* magazine lists Ecolab #2 in the chemical industry for World's Most Admired Companies and for the 9th consecutive year, the Ethisphere Institute lists them as one of the World's most Ethical Companies. *Forbes* ranked them #78 in the World's Most Innovative Companies category and Chief Executive magazine lists them as #36 in Best Companies for Leaders while *Corporate Responsibility* magazine ranks them #9 for Best Corporate Citizens.

Because of WPS's interdisciplinary expertise, the company has been able to focus on finding solutions to customers' problem holistically. Ultimately, Ecolab's unique strength lies in the ability to integrate mechanical, operational, and chemical variables with control concepts that minimize process variability and offer sustainable solutions for customers and the environment employing innovative technologies, real-time data and monitoring, water management software tools, services and chemistries to help customers use less water, re-use and recycle water, manage water to increase operational efficiency and reduce cost of operation, treat water to meet environmental discharge standards, treat for health and safety and protect and extend asset life.

After nearly ninety years, Nalco has become one of the most recognized names in water treatment, green chemistry technologies, and employee safety. We look forward to the next ninety years.





## CALENDAR

**February 9:** At 6 pm, a free AACT Webinar: Incorporating PhET Simulations in Your Classroom Activities. To register, see: <https://attendee.gotowebinar.com/register/1467506446195266050>

**February 23:** At 6 pm, a free AACT Webinar: Making Topic-Specific Videos that Will Engage & Educate. To register, see: <https://attendee.gotowebinar.com/register/3687440214370805506>

**February 27:** 32nd Annual Engineers Week Expo at the Illinois Institute of Technology - Rice Campus at 201 East Loop Drive, Wheaton (10:30 – 3:30) "Engineering New Horizons" <http://appliedtech.iit.edu/engineersweek>

**March 6-10:** Pittcon 2016 will be in Atlanta, GA. <http://pittcon.org/>

**March 13-17:** The 251st National ACS Meeting in San Diego. The theme will be "Computers in Chemistry." See details at <http://www.acs.org/content/acs/en/meetings.html>

**March 16:** The 11th Annual ChemWest Big Meeting at North Central College, <http://chemwest.org/>

**March 31 – April 3:** NSTA National Conference in Nashville, <http://www.nsta.org/conferences/national.aspx>

**April 2:** The Marie S. Curie Girl Scout Chemistry Day program at North Central College.

**April 2:** Washington University Chemistry Tournament for HS students. See details in this issue.

**April 9:** The Marie S. Curie Girl Scout Chemistry Day program at Valparaiso University.

**April 16:** You Be The Chemist Illinois State Challenge

**May 7:** The Marie S. Curie Girl Scout Chemistry Day program at College of Lake County, Grayslake.

The mission of the Chicago Section of the ACS is to encourage the advancement of chemical sciences and their practitioners.

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