

# THE VORTEX

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MARCH 2011



Dr. Tomoko Komada, April Speaker

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Volume LXXII

March 2011

Number 3

## *Chair's Message*

Bryan Balazs

### *A Lack Of Public Appreciation For Science?*

I've heard many people bemoan the disinterest by the general public in all things scientific and

the lack of a broad public appreciation of science and its contributions. But are these laments really true? A recent NSF/Pew Foundation survey found that 84% of the public respondents had a positive view of the impact of science on their lives, and 87% felt that science was a prestigious occupation. The bad news? Most respondents said that they couldn't understand scientists when they spoke, and most could not name a living scientist. When asked to name some of the nation's greatest achievements, only about one quarter mentioned a scientific advance, which is down substantially from the one half of such responses in a similar survey a decade ago. From the survey, it appears that Americans are knowledgeable about basic scientific facts that affect their health and daily lives, but are less well informed



about other science topics. Why perhaps might this be?

In a recent editorial in *Nature* in celebration of the International Year of Chemistry in 2011 (see <http://nature.com/chemistry2011>), the writer asked, "...perhaps chemistry has less a problem of public image than a lack of desire to assert itself." Can we be more assertive in promoting chemistry? I believe we can, and I believe we have. I have noticed a trend in the last decade or so towards an increase in public events connected to science. In the Bay area alone, there are often a dozen events per evening on various topics of science, from anthropology to genetics to environmental issues to, yes, even chemistry. See the website [bayareascience.org](http://bayareascience.org) if you want to see what's going on. Also in the Bay Area, we have the Lawrence Hall of Science, the Exploratorium, the Chabot Space and Science Center, and the Tech Museum in San Jose, all of which are often packed with members of the general public. If you want to see the Body Visible display at the San Jose Tech Museum, you need reservations as the flow of patrons is metered in to control the crowds.

What about nationally? Well, the self-proclaimed description for the newspaper *USA Today* states, "Breaking news on

*(continued on page 9)*

*Women Chemists Committee  
American Chemical Society, California Section  
Spring 2011 Meeting*

Topic: Understanding organic matter recycling in ocean sediments:

A radiocarbon perspective

Speaker Dr. Tomoko Komada, Associate Professor, Dept. of Chemistry and Biochemistry, San Francisco State University

Date: Saturday, April 9, 2011

Time: 11:30 am Check-in and Social; 12:00 noon Lunch; 12:30 pm Talk and Discussion

Place: Thornton Hall, Room 327, San Francisco State University, 1600 Holloway Avenue, San Francisco

Cost: \$17 for lunch (Deli Box Lunch, beverages); students half price

Reservations: RSVP by Friday, April 1, to the Section office by e-mail at [office@calacs.org](mailto:office@calacs.org), or call (510) 351-9922.

*Abstract:*

Recycling and preservation (burial) of organic matter in ocean sediments are important processes that are linked to global climate over geological time. The majority of organic matter reaching the seafloor is recycled into its inorganic building blocks through biologically-driven degradation and oxidation, but a small fraction is left "intact" for preservation. While recycling of organic matter supports a net return flow of carbon dioxide to the atmosphere, burial of organic matter results in net sequestration of carbon dioxide over geological time.

Over the past few decades, significant advances have been made in understanding the controls on the rate and extent of organic matter degradation. However, key uncertainties still remain, including the composition of the organic matter that is recycled and preserved. Organic matter reaching the seafloor has undergone substantial degradation and alteration since the death of the organism, hence characterization of sedimentary organic matter at the molecular level remains a major challenge. One means of overcoming this difficulty is to utilize the ratios of natural carbon isotopes ( $^{14}\text{C}/^{12}\text{C}$  and  $^{13}\text{C}/^{12}\text{C}$ ) as proxies for the age and provenance (terrestrial or marine) of the organic matter undergoing degradation. In particular, when applied to dissolved organic carbon – a key intermediate in the microbial degradation of organic

matter – carbon isotopic ratios offer powerful insight into the possible linkages between reactivity and organic matter composition. Findings from an organic-rich, anaerobic site in the center of the Santa Monica Basin, California Borderland, will be presented and discussed.

*Biography:*

Dr. Komada is an Associate Professor at the Romberg Tiburon Center, and the Dept. of Chemistry and Biochemistry at San Francisco State University (SFSU). She obtained a Ph.D. in Oceanography in 2002 from Rutgers University, where she conducted research at the Institute for Marine and Coastal Sciences looking at the effects of benthic resuspension on organic matter cycling in estuarine and shelf sediments. She continued on as a Dreyfus Post Doctoral Fellow in Environmental Chemistry at the Dept. of Earth System Science, Univ. of Calif., Irvine, where she used radiocarbon to investigate the composition of organic matter exported from land to oceans along active margins. Dr. Komada has established a research laboratory at SFSU that has the capability of processing environmental samples for determination of natural carbon isotope ratios. Her research program centers on understanding the transformations of non-living organic matter in benthic systems.



*ACS California Section  
in conjunction with the  
Berkeley Center for Green Chemistry (BCGC)*

Topic: "Interdisciplinary Green Chemistry: A Catalyst for Change"

Speaker: Prof. John Arnold Director, Berkeley Center For Green Chemistry, and Professor, UC Berkeley College of Chemistry

Date: Wednesday, March 16, 2011

Time: 5:30 – 6:30 pm social, 6:30 – 7:30 pm dinner, 7:30 – 8:30 pm presentation

Location: Pyramid Ale House, 901 Gilman Street, Berkeley

Cost: \$28 for dinner (free if attending only the presentation). Dinner will be buffet style, with a selection of fish, meat, and vegetarian entrees.

Reservations: Please register (for both dinner or talk-only) by email to office@calacs.org, or call the office at (510) 351-9922. When mailing a check in advance, please made out to "California Section ACS" and send to the Cal Section office, 2950 Merced St. #225, San Leandro CA 94577, postmarked no later than Thursday, March 10<sup>th</sup>. Registration will be limited by the capacity of the facility. Dinner reservations at the door can not be accepted.

**Abstract:**

In keeping with the first-quarter theme of "Environment" for the 2011 International Year of Chemistry, and as a preview of the March 24<sup>th</sup> conference being organized by the BCGC on "Green Chemistry: Collaborative Approaches & New Solutions" (described below), the Director of the BCGC will present an overview of the BCGC's approach and the center's initiatives. Topics will include the development of new catalysts for alternative energy applications, the impact of the California Green Chemistry Initiative, and the role of sustainability in chemistry education.

**Biography:**

Dr. John Arnold is a Professor of Chemistry at the University of California, Berkeley. Work in Professor Arnold's research group is directed toward the synthesis and study of new and unusual molecular inorganic and organometallic compounds of the d- and p- block, and lanthanide elements. The emphasis is on preparing compounds that exhibit novel reactivity and/or catalytic behavior (both homogeneously and heterogeneously). Prior to coming to UCB, Professor Arnold

was a Postdoctoral Fellow at Imperial College from 1987-88, a Royal Society University Research Fellow from 1988-89, and a Faculty Associate Scientist, Lawrence Berkeley National Laboratory, Chemical Sciences Division, Sloan Fellow from 1993-97.

The Berkeley Center for Green Chemistry's Mission is to bring about a generational transformation in society's production and use of chemicals and materials. Embedding the principles of green chemistry into science,



a

markets, and public policy will provide the foundation for safeguarding human health and ecosystems well into the future, and it will provide cornerstone for a sustainable, clean energy economy.

Professor John Arnold





## ELK-N-ACS Tungsten

This article is a continuation of the works surrounding the invention and production of incandescent lamps. While Edison concentrated on the fabrication of adequate carbon filaments, in some other areas experimentation with higher temperature melting, ductile metals took its course. The main obstacle was the obtention of a high vacuum, since oxygen as well as nitrogen reacted with some refractory materials. The first metal selected for experimentation was platinum (M.P. 1770 C). When it came to select a material with a higher melting point, also osmium (M.P. 2700 C) was considered, although it easily reacts with oxygen. Once the hurdle of production of a high vacuum was passed, the field was open for the selection of other non-volatile, strong and less expensive metals. Thus, W was selected (see Table below).

Tungsten is produced in nuclear neutron

*Table I*

Common elements melting above 1500°C

B	2300	Re	3100
C	3500	Rh	2000
Cr	1890	Ru	2400
Co	1500	Th	1840
Fe	1530	Ti	1800
Mo	2620	W	3370
Nb	2500	V	1700
Os	2700	Zr	1860
Pt	1770	Ta	3000

capture processes inside stars. Geochemically it is very similar to molybdenum and in the first parting it collected in the siderophile phase (e.g., with iron, Pt group met-

als, phosphorus) although a good portion appears to have collected in the chalcophile phase (e.g., with copper, lead, sulfur). The next phase comprises the magma which depending on its fluidity, stratified into olivine, iron sulfide, gabbro plus granite, and pegmatites. The last parting is the formation of biolithes by weathering. Tungsten appears to be carried off by runoff into the ocean where it resides about 1000 years. On land, tungsten seems to erode very slowly from acidic rocks. The content of W in rocks is about 1.5 ppm in granite, 0.4 ppm in basalt and up to 3 ppm in acid granophyres. Lunar soil contains about 0.7 ppm. These levels of W are comparable with the abundances of Mo, Cs, Tl and rare earths.

Vegetation take up and excrete W without accumulation. W may substitute for Mo in the nitrate reductase enzyme and it seems to have a physiological function in many plants. In the biosphere, W levels are 1 to 2 ppm in animal tissue (muscle = 5, bone = 0.3 ppm), 0.2 ppm in plants, 0.02 to 0.13 ppm in food.

Credit for discovery in 1781 is given to the Swedish chemist Scheele and to the Spanish brothers D'Elhuyar who announced the discovery in 1783.

The ores are tungstates of Ca, Mn or Fe, ether pure or in mixtures. Scheelite is a white Ca tungstate, wolfrate is a black Fe + Mntungstate, with shiny perfect cleavage surfaces. Tungstates are often found together with cassiterite and sulfide minerals in pegmatites and can be concentrated by gravity (density around 7) or other minin processes. The metal can be separated from its ores by alkaline fusion and water extraction.

Dissolved tungstates are acidified to yield tungstic acid. The yellowish cake is purified, washed and dried, later reduced with hydrogen in an electric furnace. The fine powder is blended (usually with a small percentage of thorium oxide) pressed and reheated in Mo molds in an hydrogen atmosphere. The fine grained bars are then separated from the molds and hammered into compact bars of about 1 square cm section and 10 to 12 cm length and its composition and crystalline structure tested.

These bars are then sintered by being

*(Continued on page 10)*

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Thursday April 14, 2011 | 2pm-3pm ET  
Me Too Drugs: R&D Innovations or Imitations?

Thursday April 21, 2011 | 2pm-3pm ET  
Is Being an Entrepreneur/Innovator Your  
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Thursday, April 28, 2011 – 2-3 p.m. EDT  
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## How Rare is Rare?(Part 1)

Bill Motzer



**Introduction:** This is not an article about how rare or well done you should grill your favorite steak. Instead this month's column is about the rare earth elements (REE) also known as the lanthanide series (note: in 1995, the International

Union of Pure and Applied Chemistry recommended that lanthanide be replaced with the term lanthanoid). REE have been much in the news lately, because they are now considered as critical and strategic metals required in today's microelectronic and green industries (see August 30, 2010 C&EN News, v. 88, n. 5, pp. 9-12). In the 18<sup>th</sup> and 19<sup>th</sup> centuries, REE were considered rare because they occurred in rather rare minerals. Additionally, REE were difficult to separate from their component oxides because of their chemical similarity and reactivities. Therefore, separation processes required to efficiently produce REE metals were not developed until the 20th century.

Like many chemists, I first became acquainted with the REE in high school chemistry, when we studied the Periodic Table: REE were somewhat dismissed as not too important elements, and the same was true in undergraduate chemistry (although the REE are the largest chemically coherent group in the periodic table). My real introduction to the REE was in graduate school when I worked with the U.S. Geological Survey in the Idaho batholith (IB), a large grey granite intrusion very similar to California's Sierra Nevada batholith. The IB also contains much younger white to pink granite intrusions with unique REE signatures that are significantly different from the IB granites. One can geochemically map the younger pink granites based solely on their REE signatures.

**Physicochemistry:** REE commonly include the 15 lanthanides (atomic number,  $Z = 57$  through 71, respectively): lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm),

europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu). Also included, because of their chemical similarity, are scandium (Sc;  $Z = 21$ ) and yttrium (Y;  $Z = 39$ ). Pm ( $Z = 61$ ) has no stable isotopes. It was considered to be an "artificial" element because it is largely a uranium fission reactor by-product. Of 36 identified Pm radioisotopes, the most stable is  $^{145}\text{Pm}$  with a half-life of 17.7 years and it occurs naturally from the spontaneous fission of  $^{238}\text{U}$  and alpha decay of  $^{151}\text{Eu}$ . Trace amounts have been found in pitchblende, but the quantities are so small that total calculated Pm equilibrium mass in the Earth's crust is only 560 g, largely from natural uranium decay with about 12 g occurring from alpha decay of  $^{151}\text{Eu}$ .

In the Periodic Table, the REE are in Group 3 and Period 6; however, Sc is in Period 3 and Y is in Period 5 with both classified as transition metals. Traditionally, the REE have been divided into two groups: "light" rare earth elements (LREEs which are La through Eu ( $Z = 57$  to 63) and "heavy" rare earth elements (HREE), Gd through Lu ( $Z = 64$  to 71). Although Y is the least dense REE, it is commonly grouped with the HREE because it is physically and chemically similar to them.

The REEs are also considered to be lithophile elements (i.e., enriched in the Earth's crust). They naturally occur together because they have similar ionic radii ( $r$ ) decreasing from LREE to HREE ( $r = 0.101$  nm for Ce to  $r = 0.093$  nm for Lu) and all are trivalent with the sometime exception of  $\text{Ce}^{4+}$  and  $\text{Eu}^{2+}$ , which can form in some geochemical environments. Therefore, an increase in atomic number does not accompany a valence change, resulting in different REE substitutions into various mineral crystal lattices with multiple REE contained within a single mineral. Such substitutions account for REE's wide dispersion in the Earth's crust and REE deposits that are generally segregated into those enriched in either LREE or HREE (including Y).

**Crustal Abundance:** Ce is the most

*(Continued on page 9)*

*(continued from page 8*

abundant of the REE, with average crustal concentrations ranging from 20 to 70 mg/kg; it is actually slightly more abundant than copper (50 to 68 mg/kg) or lead (10 to 14 mg/kg). (Note: average concentration ranges are given because various authors have published slightly different average concentrations.) Except for Pm, all of the REE have more abundant crustal average ranges than gold (0.004 to 0.0031 mg/kg), silver (0.07 to 0.08 mg/kg), and mercury (0.05 to 0.085 mg/kg). Published REE average ranges in mg/kg are: La (18 to 39), Pr (3.5 to 9), Nd (12 to 41.5), Sm (4.5 to 8), Eu (0.14 to 2), Gd (4 to 6.4), Tb (0.65 to 2.5), Dy (3 to 7.5), Ho (0.7 to 1.7), Er (2.1 to 6.5), Tm (0.2 to 1), Yt (2.7 to 8), Lu (0.35 to 1.7), Y (24 to 70), and Sc (5 to 22).

Although the average REE crustal concentrations exceed those of many mined commercial industrial metals, REE are rarely concentrated into mineable ore deposits because they are often associated with rather rare igneous rock types such as alkaline and carbonatite intrusives, residual deposits formed from deep weathering of these rocks, pegmatites, iron-oxide copper-gold deposits, marine phosphates, and placer deposits.

**Conclusions:** REE are not as rare as their name implies. However, they may soon become rare because their current demand in commercial products may exceed supply. In Part 2, I'll discuss in more detail the unique geochemistry that forms the primary REE deposits, their locations and some of their uses in modern commercial products.

*(continued from page 3*

weather, sports, world, science, financial, technology, travel, national, economy, and entertainment news..." Gee, science is listed fourth! In fact, USA today had an article (at about the same time as I'm writing this column) on the emergence of science pubs and the growing interest by the public for all things inquisitive.

Locally, our section is also working to bring the fascination and relevance of chemistry to not just our section members, but to the general public. Our Family Science Night events attract hundreds, if not close to a thousand, enthusiastic students, parents, and teachers. We have branched out into collaborations with other scientific organizations, and we participate in events such as Earth Day, Expanding Your Horizons events to showcase careers in science to young women, and Science Cafes that are open to the general public. And we have increased our recognition of individuals who are doing the same, by providing awards to exceptional teachers at both the high school and community college levels. All of our volunteers for these activities are working towards the same goal, and that is to address the "bad news" noted in the opening paragraph above. So, here's to our volunteers, and here's to Chemistry!!



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(Continued from page 6)

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In the manufacture of wires for incandescent lamps, the hammering processes and the resintering continues until the bars have elongated to a wire of 1 square millimeter section and 10 meter length. At this point, the wire is drawn through diamond dies of ever reduced sizes until reaching the proper diameter for each kind of light bulb. Needless to say, that in between each hammering or draft, the wire is annealed at a high temperature and also tested spectrographically for uniformity and crystal structure. By this working process the coarse crystals are transformed into packs of elongated crystals with high ductility. For certain applications, such as miniature lamps, tungsten wires can be fabricated as monocrystals. They have a very long life but are more difficult to fabricate.

The useful life of a light bulb depends on the quality and pressure of the filling gas. Traces of water vapor are very detrimental, may cause arching and increase the blackening speed of the inner glass surfaces. This is a cycling process. To largely eliminate or dispel this cycle, the filling gases are dried with phosphorus pentoxide. In addition, a getter (red phosphorus, metallic zircon, etc.) is introduced into the bulb before sealing. The lifetime of the wire also bears a relationship with the operational temperature. A 10% increase in voltage shortens the life to one third. Conversely, a 10% drop of voltage increases the life threefold.

These ratios are related to the recrystallization

of the bundle of crystals that resulted from the drawing process and which are existing in the wire. During recrystallization, the bundle of elongated crystals gets shorter and more compact. Once new crystals grow and traverse the wire, they become prone to break across. For instance, in a specialty lamp whose filament operates at a temperature of 3200 C (two hundred degrees under the melting point of W), the filament lasts only two hours before breaking.

The filaments in most bulbs are suspended by looped wires of molybdenum. For rough applications (in mechanical shops, for ceiling fans, etc.), the bulbs have 3 to 7 or more suspension wires, whereas for home use, they may have none or only one. This extra suspension is needed because the recrystallization process is speeded up by shaking and vibrations.

For other uses, the processes for size reduction of a wire can be terminated at different stages i.e., wires for electric furnaces, spark plugs, contact points, or billets for x-ray tubes.

Making lamps really is that simple?



### *Other Upcoming Events*

#### **March 24**

ACS Spring National Meeting  
March 21-25 Anaheim

#### **March 31**

Bay Area Science Fair 2010 Tri-Valley Science and Engineering Fair

#### **April 17**

Earth Day Celebration John Muir  
National Historic Martinez

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## *Family Science Night Comes to Marin County*

Wednesday, April 6th, 2011, 6 PM to 8 PM Hill Middle School 720 Diablo Ave. Novato

Join the fun as the California Section brings Family Science Night to Hill Middle School in Novato on April 6th, 2011. We expect a great turnout for this event, which coincides with Hill Middle School's Spring open house. The Scientific Jam Band will open the show with their message that, "Science Rocks." We'll continue with some chemistry spectacles on stage, followed by an evening of hands-on activities, with the help of volunteers from Dominican College, SF State University, UC Berkeley, Chevron, and many others. In recognition of the 2011 International Year of Chemistry, we will exhibit a set of Chemistry / Technology Milestone posters prepared by previous ACS President Attila Pavlath.

Help is needed to greet visitors, supervise activities, and hand out Earth Day souvenirs. Please call or write if you would like to volunteer.

Alex Madonik  
Councilor and National Chemistry Week  
Coordinator <[madonika@comcast.net](mailto:madonika@comcast.net)>  
510-872-0528 mobile



Matathew Heberger, speaker at the January 2011 Section Meeting

## *The Philomathia Foundation Conference 2011*

Green Chemistry: Collaborative Approaches & New Solutions

Date: Thursday, March 24th, 2011

Location: HYPERLINK "<http://www.citris-uc.org/files/driving-directions-2010.pdf>"

CITRIS Sutardja Dai Hall on the UC Berkeley\*

For more details and to register, see: <http://bcgc.berkeley.edu/greenchemconf>

### Confirmed Speakers:

Dr. John Warner, President, Warner Babcock Institute for Green Chemistry

John Balbus, M.D., M.P.H., Senior Advisor for Public Health, NIEHS

Dr. Henry Brynzda, Director - Technology, DuPont

Hon. Mike Feuer, Majority Policy Leader, California Assembly

Prof. Robert Grubbs, Chemistry, California Institute of Technology, Nobel Laureate

Gerald Poje, PhD, founding Board Member, U.S. Chemical Safety and Hazard Investigation

Hon. Joe Simitian, 11th District State Senator, California Senate

Chancellor Birgeneau, will be giving opening remarks.

Dr. Bob Peoples, Director of the ACS GCI, will be moderating the final panel discussion.

### Invited Speakers:

Administrator Lisa Jackson, Environmental Protection Agency

Representative Henry A. Waxman, 30th District of California

Green Chemistry: Collaborative Approaches & New Solutions is the Berkeley Center for Green Chemistry's first national conference. It will introduce the collaborative, interdisciplinary approaches piloted by BCGC and will feature leaders in these fields, who will speak to the role of Green Chemistry in responding to society's most pressing health, environmental and economic problems



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## *March Historical Events In Chemistry*

Leopold May

**March 2, 1886** One hundred and twenty-five years ago, H. Jermain Creighton was born on this date. He was a researcher in electro-organic chemistry and developed the industrial process for electroreduction of glucose to sorbitol and mannitol.

**March 7, 1788** One hundred and seventy-five years ago in 1836, Antoine-César B equerel, was the first to use electrolysis to recover metals from ores. He also invented an electric thermometer and was born on this date.

**March 8, 1886** One hundred and twenty-five years ago, Edward C. Kendall was born. In 1915, he isolated thyroxine and shared the Nobel Prize in Physiology or Medicine in 1950 with Philip Hench and Tadeus Reichstein for their discoveries relating to the hormones of the adrenal cortex, their structure and biological effects.

**March 12, 1824** One hundred and fifty years ago in 1661, Gustav R. Kirchhoff and Robert Bunsen discovered rubidium (Rb, 37). They invented the spectroscope in 1859 and discovered cesium (Cs, 55) in 1860. He discovered that substances that emit radiation absorb the same type of radiation when cool (Kirchhoff's Law) and was born on this date.

**March 12, 1838** One hundred and fifty years ago in 1861, William H. Perkin with B. P. Duppa synthesized tartaric acid. Also, he discovered mauve, the first aniline dye, in his home laboratory in 1856, the Perkin reaction for condensation of unsaturated aromatic acids, and coumarin. He elucidated relationship between tartaric, fumaric and maleic acids and was born on this date.

**March 22, 1788** One hundred and seventy-five years ago in 1836, Pierre J. Pelletier with Philip Walter obtained toluene by distilling pipe resin. He discovered quinine, strychnine, and other alkaloids and was born on this date.

**March 22, 1868** Twenty-five years ago in 1986, Robert A. Millikan died. He measured the charge/mass ratio of the electron and received the Nobel Prize in Physics in 1923 for his work on the elementary charge of electricity and on the photoelectric effect. He was born on this date.

**March 24, 1711** Three hundred years ago, William Brownrigg, the first to describe platinum and use pneumatic trough for collection of gases, was born on this date.

**March 24, 1884** Seventy-five years ago in 1936, Peter Joseph William Debye received the Nobel Prize in Chemistry for his contributions to our knowledge of molecular structure through his investigations on dipole moments and on the diffraction of X-rays and electrons in gases. He was born on this date.

**March 26, 1911** One hundred years ago, Bernard Katz was born on this date. He shared the Nobel Prize in Physiology or Medicine in 1970 with J. Axelrod and U. Von Euler for discoveries concerning humoral transmitters in the nerve terminals and the mechanism for their storage, release and inactivation.

**March 27, 1861** One hundred and fifty years ago, Nikolai Y. Demjanov was born on this date. He was a researcher on decomposition of aliphatic diazonium ions and Demjanov-Tiffeneau rearrangement.

**March 28, 1861** One hundred and fifty years ago on this date, George C. Pond was born. He was a chemistry teacher and preserver of the Priestley home in Pennsylvania.

**March 31, 1811** Two hundred years ago on this date, Robert Bunsen was born. One hundred and fifty years ago in 1861, he and Gustav R. Kirchhoff discovered rubidium (Rb, 37). They also invented the spectroscope in 1859 and discovered cesium (Cs, 55) in 1860. He invented the Bunsen burner, filter pump, a galvanic battery, and with Henry E. Roscoe, the actinometer.



## *Chemists Celebrate Earth Day 2011: “Energy It’s Everywhere!”*

As part of their Chemists Celebrate Earth Day (CCED) and the International Year of Chemistry (IYC) celebration, the American Chemical Society (ACS) is sponsoring an illustrated poem contest for students in Kindergarten – 12th grade.

Write and illustrate a poem using the Chemists Celebrate Earth Day theme, “Energy – It’s Everywhere!” or using the IYC theme of water. Your poem can be in any style as long as it is no more than 40 words. Some examples are: Haiku, Limerick, Ode, ABC poem, Free Verse End Rhyme, Blank Verse, and Sonnet.

Possible topics related to energy and chemistry include: Nuclear Energy, Solar Energy, Wind Energy, and Water

Winners will be selected in each of the following categories:

- K – 2nd grade
- 3rd – 5th grade
- 6th – 8th grade
- 9th – 12th grade

National Prizes:

1st Place in each grade category – \$300

2nd Place in each grade category – \$150

Please submit posters by April 1 to the Section Office (address located on page 3) For more information, visit the Section web site [www.calacs.org](http://www.calacs.org) or contact the American Chemical Society Department of Volunteer Support at 800-227-5558, x6326 or [earth-day@acs.org](mailto:earth-day@acs.org).

## *American Chemical Society unveils International Year of Chemistry Virtual Journal*

The American Chemical Society has launched the inaugural edition of its International Year of Chemistry (IYC) Virtual Journal, a dynamic online snapshot of the ways in which chemistry improves everyday life for people around the world. It illustrates how chemists and other scientists work to protect the environment; develop lifesaving new medicines; create cleaner, greener and more sustainable sources of energy; design new materials for cars, buildings, electronics, medical implants and a host of other products.

Called IYC-365: Chemistry for Life, the calendar links almost 250 days of the year to notable events highlighting chemistry’s important role in health, medicine, energy, the environment and related fields. They range from Jan. 1 which in 1907 saw debut of the Chemical Abstracts Service, a chemical database that has fostered unprecedented scientific discovery to Dec. 31 and a scientific law about those New Year’s toasts with champagne. A mouse-click on the days in-between revisits Joseph Priestley’s discovery of oxygen; the first successful treatment of diabetes with insulin; George Washington Carver’s discovery of hundreds of new uses for crops like peanuts; Marie Curie’s landmark research on radioactivity; and much more. I The IYC Virtual Journal and IYC: 365 are part of ACS’ celebration of the International Year of Chemistry. The 63rd General Assembly of the United Nations proclaimed 2011 as envisioning a worldwide celebration of the achievements of chemistry and its contributions to the well-being of humankind. Also being celebrated in 2011 is the centennial of the awarding of the Nobel Prize in Chemistry to Marie Curie for her work on radioactivity, and the 100th anniversary of the founding of the International Association of Chemical Societies.

# BUSINESS DIRECTORY

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