THE VORTEX

AMERICAN CHEMICAL SOCIETY CALIFORNIA SECTION
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Beth Cutter, recipient of the California Section Lloyd Ryland High School Teacher Award (page 4)

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THE VORTEX

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Chair's Message

Bryan Balazs

The California Section is fortunate to have the resources to offer several awards each year, and the list of awards has been growing over the years. These awards are generally given annually, and the award cycle is such that May is the logical point in the year at which to honor these teachers, students, volunteers, and ACS members. Our awards luncheon was held on May 14th, and it was good to be able to see some new faces, both young and old.

The Petersen Award is given to a member volunteer with a distinguished record of service in all things ACS, whether these activities be at the local, regional, or national level. This award was first given in 1982 and has been given every year since, with the exception of 1996 when the award sequence was changed. As one of the responsibilities for receiving the Petersen Award, the awardee gets to lead the efforts to identify the individual who will be awarded in the subsequent year.

In conjunction with efforts at the national ACS level, we also honor those members who have reached either 50 or 60 year membership status with the ACS. At the May awards luncheon, we recognized them with a certificate and the chance to entertain the audience with stories from their long and illustrious chemistry past. It is actually quite a bit of fun (although sometimes alarming) to hear how chemistry was often done in the "good old days", before the age of so many regulatory, legal, safety and environmental protection issues!

We also have several awards that are relatively recent additions. The Lloyd Ryland High School Teacher Award, which is selected by a group led by Eileen Nottoli, Chair of the High School Committee, is awarded to a high school teacher in the Section who has demonstrated substantial contributions to chemistry education. We also offer an opportunity for each high school teacher in the California Section to select an outstanding high school chemistry student, and we recognize these gifted and talented young chemists with a certificate. Along a similar vein, we award certificates to a select few students at the San Francisco Bay Area Science Fair held in Golden Gate Park each Spring.

We also select a recipient for our Teacher-Scholar Award for Community College Chemistry Faculty, to recognize contributions to teaching at the junior college level, and the selection process for this award

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Women Chemists Committee
American Chemical Society, California Section
Summer 2011 Meeting

Join us for our Summer Event at Filoli on Saturday June 18, 2011
The Women Chemists Committee of the California Section ACS invites members of the California and Santa Clara Valley Sections to meet at Filoli. Our visit includes an optional two hour docent-led tour through both the house and gardens followed by lunch at the Café at Filoli.
Meeting Time: 10 am
Admission: $12 adults, $5 students, free for children ≤ 4 years old.
Lunch: $14 at the café for our group to sit together. Box lunches include a hearty sandwich, pasta salad, seasonal fruit, cookie and beverage. Sandwich choices are Roast Beef, Turkey, Ham and Swiss, Vegetarian.
Total cost: $26 for admission and lunch.
Reservations must be made before June 1 to office@calacs.org or call (510)351-9922 and indicate if you are staying for lunch. Please make checks out to "California Section ACS". Mail to 2950 Merced St. #225, San Leandro CA 94577.

Lloyd Ryland Outstanding High School Teacher Award

Beth Cutter at Amador Valley High School in Pleasanton is the recipient of the California Section 2011 Lloyd Ryland High School Teacher Award.

Beth is a skilled educator and does many demonstrations to illustrate complex chemical principles. She is the adviser for the Chemistry Olympiad Club, Science Team, and Science Bowl. In addition she has implemented a successful peer-tutoring program to assist at-risk chemistry students by paring them with AP chemistry students. Many of those students improved their grades and gained immeasurable confidence. Two of her students were awarded first place in the Tri-Valley Science and engineering Fair.

Taking more than five dozen students on a field trip to test the water in San Francisco Bay is just one indication of her commitment to teaching and to her students.

The award is named after Mr. Lloyd Ryland, a member of the California Section of the American Chemical Society for 65 years and a strong believer in chemistry education. He was born in San Francisco in 1912 and lived his entire life in the Bay Area. Mr. Ryland received his bachelors degree from U.C. Berkeley and was employed by Shell Development Company for many years as a chemist. During World War II he joined the U.S. Coast Guard Auxiliary and after the war became a member and officer of three Yacht Clubs. Mr. Ryland made a generous contribution to the Section and we are pleased to honor him by naming this award after him.

Gordon E. Moore Award

Lafayette High School students, Matthew Troy Feddersen, 17, and Blake Marggraff, 18, share a prize of $75,000 for their project "Treatment of Simulated Cancer Cells with Compton Scattering-Produced Secondary radiation"

Both are students at Acalanes High School.

The Gordon E. Moore Award recognizes the Best of the Best among the outstanding students from around the world who participate in the Intel ISEF. The Finalist with the winning project is selected on the basis of outstanding and innovative research, as well as on the potential impact of the work—in the field and on the world at large.

JUNE MEETING of the CALIFORNIA SECTION OF THE AMERICAN CHEMICAL SOCIETY

Topic "Radiation in Our Lives"
Guest speaker-Mark Hart
From Lawrence Livermore National Laboratory

DATE & TIME:
Thursday, June 16th, 2011
5:30 – 6:30 Social hour
6:30 – 7:30 Dinner
7:30 – 8:30 Presentation

LOCATION:
Willow Tree Restaurant (Chinese, served family style)
6513 Regional Street, Dublin, CA

Note that the restaurant has free onsite parking, and it is also a short walk from the new West Dublin/Pleasanton BART station (if arriving by BART and walking, note that this involves a 10 minute walk through some industrial streets).

COST:
Dinner: $24 (free if attending only the talk)

RESERVATIONS:
Advance reservation is required (with or without dinner) so that we may provide the restaurant with an accurate head count for the room and seating arrangements. Please RSVP by Friday, June 10th by contacting Julie Mason at office@calacs.org or at (510) 351-9922. You may prepay by sending a check to Cal. Section ACS, 2950 Merced Street, #225, San Leandro, CA 94577.

You would not want to miss this! This is our first opportunity to schedule the speaker since the nuclear events in Japan earlier this Spring, and it is also a rare opportunity to see a large collection of antique consumer items that used radioactive materials for decorative, ornamental, and practical purposes. Accompanying this display are selected mineral specimens and fossils exhibiting radioactivity. These items are integrated into a presentation that will create a foundation for understanding radiation and radioactivity in the environment.

ABSTRACT

We have reached the centennial anniversary of the discovery of ionizing radiation. The purpose of this presentation is to acquaint the public and members of the scientific community with the concepts of radiation and contamination. These subjects are discussed from a historical perspective, while addressing the presence of radiation in our daily lives, and its impact on health, safety, and the environment. The audience will leave with a new understanding and

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BIOGRAPHY

Mark M. Hart is a multi-disciplined scientist/engineer with undergraduate degrees in physics and chemical engineering and a Master of Science in Electrical Engineering as well as a Master of Business Administration degree. Having earned degrees at Carnegie-Mellon University, Southern Illinois University, and Washington University in St. Louis, Hart worked at the U.S. Army Cold Regions Research and Engineering Laboratory and in the iron and steel indus-

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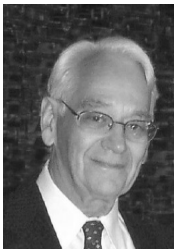

ELK-N-ACS Directory of Articles

Evaldo Kothny

ELK-N-ACS was created in 1993 with a column appearing in *The Vortex*. The column's name was in allusion to ELK-N-ACS the American Chemical Society. The first article, Gold Geochemistry, appeared in 1994.

Saved collections (notes, magazines, personal experience, books, etc.) provided a source for small articles which with time became larger and more complex. Looking back at what was published in *The Vortex* (1994 to 2011), one may realize that these articles deal with at least one if not more elements from the Periodic Table. Below is a listing of about fifty articles describing one single element at a time. Hopefully, many readers have complete collections of The Vortex and are able to find descriptions involving any specific element. Today, though, the total count of ELK-N-ACS articles reached 165. Articles for some other elements will be forthcoming.

Au	*Jan 1994*	*Gold Geochemistry*
Au,Pd	*Sep 1995*	*Ash and Sludge*
U	*Mar 1996*	*Age Measurements*
Ti	*Apr 1996*	*New Elements*
Ni	*May 1996*	*Metal Farms*
S	*Jun 1996*	*Worried about Sulfur?*
Ag	*Oct 1996*	*The Lost Art of Photography*
H	*Dec 1996*	*Lab Hydrogen Generators*
V	*Dec 1996*	*Vanadium Functions*
Ge	*Dec 1996*	*Germanium in Your Life*
C	*Feb 1997*	*Diamonds*
PGE	*Sep 1997*	*Pd Catalysts and Platinum GE*
Fe	*Nov 1997*	*Writing Inks*
H	*Dec 1997*	*Hydrogen as a Fuel*
W	*Feb 1998*	*Tungsten Musings*
Cu	*Mar 1998*	*Simple Discoveries still Happening*
O	*Apr 1998*	*Hydrogen Peroxide*
S	*Nov 1998*	*Sulfur Deficiency in Vegetation*
Mn	*Jan 1999*	*Mn, the almost Forgotten Biogenic Element*
Cu	*Dec 1999*	*Copper Recovery*
C	*Apr 2000*	*Carbonic Acid in Air*
Cr	*Sep 2000*	*Is Cr Really Hazardous?*
Ta	*Nov 2000*	*A Tantalum Refresher*
Hg	*May 2001*	*Fluorescent Lamps*
Au	*Dec 2001*	*Au in CA, an Historical Account*
Au	*Jan 2002*	*(continuation)*
Ir	*Mar 2002*	*Iridium*
Hg	*Dec 2003*	*Mercury and Geothermal Energy*
Hg	*Jan 2004*	*Cinnabar*
Ti	*Feb 2004*	*Titanium*
Zn	*Jun 2004*	*Element No. 30*
Hg	*Sep 2004*	*Mercury Revisited*
Tl	*Dec 2004*	*Thallium*
In	*Apr 2005*	*Indium*
Si	*May 2005*	*Silicon*

(Continued on page 7)

Pb	*Nov 2005*	*The Power of Lead*
Br	*Jan 2006*	*Bromine and its Oxides*
Sn	*Apr 2006*	*Stannum aka Tin*
Ag	*Jun 2006*	*Silver, the Bactericide*
Ag	*Nov 2006*	*The Value of Money - I*
Ag	*Dec 2006*	*(continuation, II)*
Au	*Feb 2007*	*Overlooked Gold - I*
Au	*Mar 2007*	*(continuation, II)*
Hf	*Apr 2007*	*Hafnium*
F	*Jun 2007*	*Fluorine*
As	*Sep 2007*	*Arsenic*
Ga	*Jan 2008*	*Gallium*
Si	*Feb 2008*	*Silicic Acid*
Fe	*Mar 2008*	*Iron and Steel*
Mn	*not publ.*	*Higher Oxidation Status of Mn*
Sb	*Jun 2010*	*Antimony*
R.E.	*Sep 2010*	*Carl Auer, the Innovator - I*
R.E.	*Oct 2010*	*Carl Auer, the Innovator - II*
W	*Mar 2011*	*Tungsten*
I	*May 2011*	*Iodine*

"PGE" refers to any or all of the group of platinum metals such as Ru, Rh, Pd, Os, Ir and Pt.

"R.E." refers to any or all of the group of Rare Elements, also called The Lanthanides, such as La, Ce, Nd, Pr, Sa, Eu,Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and sometimes including Y and Sc.

Under the term of "Actinides", only two natural metastable elements that may include U and The. All others are instable or artificially produced in reactors.

International Year of Chemistry Meeting Report

On April 30, the Section officially opened the International Year of Chemistry (IYC11) with four presentations at Mills College. The presentations were on four major areas of our life: Energy &Transportation, Communication & Information, Health & Medicine and Agriculture & Food, describing the contributions of chemistry to our everyday life. A summary of the talks of the four speakers (Paul Vartanian, Jacques Guertin, Mark Frishberg and myself) will be printed in *The Vortex* in installments starting with *Energy and Tranasporation* and *Communication and Information* in this issue.You can also find a detailed description on the webpage (Benefits of Chemistry). The conclusion of the four talks made it evident; that without those contributions we would be back to the Medieval, if not the Stone Ages. In September there will be a Science Café in the Lafayette Library where this will be also discussed in details.

Simultaneously with the presentations there was an exhibit of 32 posters, which illustrated in vivid colors these contributions. The exhibit, which is translated into 30 languages, is being used worldwide for the celebration of IYC11. Any of them can be viewed and downloaded freely from www.chemistryinyourlife.org. It describes the benefits of chemical discoveries in our life. The goal of the exhibit is the same as IYC11: to improve the Public Image of Chemistry for the average person on the street who generally have a distorted view created by the frequent sensationalist headlines about some problems assumedly caused by chemistry. Please help in this campaign; the posters are easily transported and displayed in high schools and colleges and do not cost anything. If anyone has connections with institutions or civic groups, (e.g. Lions, Rotary Clubs, *etc*.) who are interested in a seminar, luncheon or dinner talk I am available. Email me (Attila@pavlath.org) for details.

The Sanitary Revolution (Part I)

Bill Motzer

Introduction

This year marks the International Year of Chemistry (IYC2011) and the ACS (http://iyc2011.acs.org/) is celebrating chemistry's importance in our daily lives by noting significant contributions to chemistry in our diet, medical chemistry, dyes, plastics, and the green chemistry revolution. However, from a water quality chemist/geochemists' perspective, one of chemistry's greatest achievements in modern times is the 20th century treatment and distribution of safe drinking water and subsequent wastewater treatment and disposal. This is often called the "Sanitary Revolution" and it began by the simple addition of chlorine to water before distribution to the consumer. We are so used to turning on the tap that dispenses clean and safe drinking water that we take this chemical treatment event for granted.

History

Public water treatment began as well head protection in England in 1848, with passage of the Public Health Act, which was actually written before the establishment of the science of bacteriology and pathology. In the U.S. it began in 1908 when Chicago and Jersey City first began treating drinking water against pathogenic (disease-causing) organisms such as cholera, typhoid fever, dysentery, and hepatitis that annually killed thousands of U.S. residents. In fact, typhoid fever death rates prior to 1908 often exceeded 30 deaths per 100,000. In the 1908 U.S. population of approximately (~) 89 million, this translated to an annual death rate of ~27,000 people for one pathogen. Drinking water chlorination and filtration have helped to virtually eliminate these diseases in developed countries causing Life magazine in 1997 to declare that: "The filtration of drinking water plus the use of chlorine is probably the most significant public health advancement of the millennium."

In 2002, the U.S. EPA estimated that ~170,000 public systems treat and transport billions of gallons of water daily through ~880,000 miles of distribution system piping to U.S. homes, farms and businesses. The goals of such water treatment are to produce a biologically (disinfected) and chemically safe product with no objectionable taste or odor, with low levels of color and turbidity (cloudiness), and a chemical stable (non-corrosive and non-scaling) water. Individual treatment facilities across the country customize treatment to address their particular natural and human-caused contaminant problems associated with raw surface and/or groundwater. Surface water commonly presents greater treatment challenges than groundwater because groundwater is often naturally filtered as it percolates through alluvial sediments. Surface water often contains organic and mineral particles, but it also may harbor protozoan parasites such as Cryptosporidium parvum and Giardia lamblia.

Treatment Process

During treatment, chlorine in some form is added to raw water. However, the particular usage of a chlorine-bearing chemical agent depends on the treatment facility's size. For example, for large treatment systems that treat water for more than 10,000 persons, chlorine (Cl_2) gas is used 84% of the time, 20%, for sodium hypochlorite (NaClO) solution, 29% for chloramine (NH_2Cl), l8% for chlorine dioxide (ClO_2), 6% for ozone (O_3), <1% for dry calcium hypochlorite, and only a trace number of facilities use ultraviolet (UV) light treatment. (Note: the total is greater than 100% because some systems use more than one type of disinfectant.) Except for O_3 and UV, when applied to raw water, each of these chemicals produces some form of free chlorine, which aids in pathogen destruction.

Chemistry of Chlorine Disinfection

When chlorine is added to water, it reacts to form a pH-dependent equilibrium mixture of chlorine, hypochlorous acid (HOCl) and hydrochloric acid (HCl):

$$Cl_2 + H_2O \rightarrow HOCl + HCl$$

Depending on the pH, hypochlorous acid partly dissociates to hydrogen and hypochlorite (ClO^-) ions:

$$HOCl \rightarrow H^+ + ClO^-$$

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ENERGY AND TRANSPORTATION

Two hundred years ago we obtained energy by burning wood and coal However, to a small extent we still do.. We utilized water and windmills to grind wheat. For transportation we depended on horses and sailboats. The oil exploration opened up new opportunities, but without chemistry this almost would not have been possible. Drilling for oil needed drilling equipments with special structural materials. The crude oil had to be refined through separation and catalytic cracking to obtain fractions to be used in cars and airplanes. New energy sources were developed such as nuclear and solar, and chemistry made this possible. Nuclear generators need special isotopes separated through various physical and chemical processes. To obtain solar energy without chemistry is only possible through absorbtion of the sunrays by the walls and roof of your house. Solar cells are the products of chemical developments. Even concentrating the sunray requires lenses and parabolic mirrors. Batteries, whether storing or creating electricity are based on chemical processes.

Horse drawn carriages in developed countries are only used for tourist attractions. Chemistry is the basis for automobiles and airplanes not just by providing the fuels, but also for long-lasting strong materials both for the engines and the structure. Various plastics lighten the weight, therefore, decrease gasoline consumption. Rubber tires assure the smooth ride in automobiles which need asphalt or concrete covered smooth roads. Concrete also provides for durability and safe bridges. Large bridges would not be possible without steel and superior strength. Coating with zinc and various alloys give corrosion resistance, thus decreasing the needed maintenance.

Chemistry provided lubricant for the internal combustion engine, which extends its lifespan. Different compositions are made for hot and cold weather. Lubricants are also needed for joints and other moving parts in cars, trucks, and machinery. Mufflers decrease pollution by catalyticconverting partially burned fuels to carbon dioxide while decreasing motor noise. Additives increase the fuel efficiency. Other contributions of chemistry include safety glasses, protection from glare and ultraviolet radiation.

In addition to the internal combustion engine, today's transportation is heavily dependent on jet engines both for airplanes and rockets. They require special fuels and adequete structural materials. The latter needs to be light, corrosion resistant and with high temperature stability. When the space shuttle returns to the earth special tiles are needed to withstand the extreme high reentry temperature.

Before anyone thinks that electricity was left out of this discussion, consider that the electricity has to be obtained somehow and transmitted. Everything else is the same as with the internal combustion engine. Without chemistry we are back to the horse drawn carriage. How could we provide horses for commuting by 300 million people in the United States? How do we provide feed for at least 50 million if not more horses? The only advantage would be more fertilizer for organic food. But this will be discussed later.

Paul Vartanian

Vacationing in Alaska this summer?

If you will be in Fairbanks, Anchorage, or Juneau and you would like to give a research seminar at the University of Alaska, please contact Bill Howard by email (wahoward@alaska.edu) or by telephone (907-474-6019). Although the Alaska Local Section cannot provide any funding for these summer seminars, we can provide a seminar room and an audience at one of our U. A. branches!

SURPRISE

our editor by calling and saying you appreciate the quality and content of our newsletter. Our editor works hard to maintain a publication of interest to our membership. Oh, and by the way you could also give credit to our advertisers who financially support us.

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is handled by Peter Olds, Joe Ledbetter, and Kent Campbell. June 15th is the nomination deadline for this award, and you will hear about the 2011 recipient in an upcoming Vortex article.

Finally, if you recall back to my February Chair's Message on the Chemistry Olympiad, I am happy to report that two high school students within the California Section scored high enough on the tests, out of 1000 national participants, to be in the group of twenty students to attend the Olympiad training camp at the US Air Force Academy in Colorado in June. Congratulations to Zhouran Zhang and I-Ling Chiang, and to their teacher James Camacho at Mission San Jose High School in Fremont! Way to

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appreciation of the levels of natural and man made radiation, and the effects and influences of low levels of radiation on the human body.

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try prior to starting a career in the nuclear industry over ten years ago. Working at the Savannah River Plant, operated by E. I. DuPont, Hart lead engineering teams in the design and development of nuclear reactor safety/process monitoring computer systems and computer systems for the remotely controlled loading/unloading of fuel & target assemblies in the nuclear reactors.

Hart is currently with the Lawrence Livermore National Laboratory and has had the opportunity to work hands-on with plutonium over a period of three years. During this time he found himself facing the realities of radiation and radioactivity. In his work he has come across interesting, and at times surprising, information about the subjects of radiation and radioactivity. He enjoys sharing this information because there is always something new for everyone in the audience. Hart has given his presentation to professional and public educational groups across the country and internationally. His talks have been covered by the media in a number of television news segments.

COMMUNICATION AND INFORMATION.

For communication the pony express might avoid the use of chemical developments, though one could argue that manufacturing paper and ink is already dependent on chemistry, unless we use papyrus and stone tables. The telegraph uses copper wires, tapes and ink. Telephones are made of various polymeric plastics and the membrane, which converts and detects the sound, is the product of chemistry. Nowadays the wires are replaced by fiber optics, which allow multiple transmissions on the line making it cheaper and faster with more clarity. In early times, radio and television were dependent on electron tubes, which you mistakenly might think has nothing to do with chemistry. However, chemistry contributed the unique materials for electrodes and control elements within the tubes. Later they were replaced by transistors, silicon chips and many other advanced materials decreasing the size of the devices. The various cell phones are integral parts of our everyday life used everywhere in the world providing instant communication. Chemistry is making the telephone booths anachronism.

Chemical developments infiltrated the entertainment industry. Even the silent movies were the result of chemical development just providing the films, which were also the basis of the simple black and white cameras. Recording of the sound was made possible by magnetic tapes. Color and their fade resistance were achieved through various chemicals. The developments of films required appropriate chemical solutions to achieve the eye-pleasing effects.

Early computers used mechanical devices and electron tubes. The developments which allowed the miniaturization of the telephone and radio revolutionized the way as we process and save data. Even forty years ago a simple computer took up a good size room. Data was introduced through punch card and simple calculations took hours. A laptop computer is portable; make the same calculation in seconds displaying the results if necessary in color, which can be easily printed. The small size and colorful display are made possible by using microchips. Screens depend on liquid crystals. Computers are used more and more for instant face-to-face communication. Computer units are the components of communication satellites. They are being used more and more in various controlling devices in the household. You can program your coffeemaker to greet you with fresh coffee when you wake up.

Computers will provide further development making our life easier providing better use of our time. As shown later they are used in diagnostic devices in the medical science. Science fiction books are giving an insight what might be in the future. That is the power of chemistry.

Jacques Guertin

Neal Byington receiving the Petersen Award Plaque from Chair Bryan Balazs

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In an acidic solution, the major species are Cl_2 and HOCl; however, in alkaline solutions, generally only ClO^- is present. Very small concentrations of chlorite (ClO_2^-), chlorate (ClO_3^-), and perchlorate (ClO_4^-) are also found. Disinfection occurs primarily by oxidation of biological tissues from the action of HOCl and ClO^-.

Problems and Concerns

Chlorination disinfection may cause problems because free chlorine may react with naturally occurring organic compounds producing disinfection byproducts (DBPs). The most common DBPs are the trihalomethanes (THMs) and haloacetic acids (HAAs), some of which may be potential carcinogens [e.g., chloroform or trichloromethane ($CHCl_3$)]. However, both the U.S. EPA and World Health Organization (WHO) have indicated that such DBP-related health risks are extremely small when compared to risks imposed by inadequate disinfection. Other concerns about chlorine include its volatility, which causes it to rapidly disappear from water as it is distributed in the water system, and aesthetic concerns such as taste and odor.

Modern Alternative Disinfection Methods

Chlorine in water is three times more effective as a disinfectant against Escherichia coli than an equivalent concentration of bromine and it is more than six times more effective than an equivalent concentration of iodine. However, several alternatives to traditional chlorination exist, and some of these have been put into practice by treatment facilities. Many European countries and a few U.S. municipalities now treat water using O_3. However, current U.S. regulations require that systems employing ozonization must still maintain chlorine residuals comparable to systems that treat raw water without ozonization. The advantage of chlorine, when compared to O_3, is that residual chlorine persists in treated water, effectively controlling pathogenic backflow contamination. None the less, in some large systems chlorine levels are boosted at several distribution points.

Chloramines are also becoming increasingly common for disinfection. They are produced by the addition of ammonia into drinking water to form mono-(NH_2Cl), di-($NHCl_2$), and tri-(NCl_3) chloramines. Generally monocholoamine forms at public water pHs between 7.5 and 9. Unlike free chlorine, chloramine disinfection has a longer distribution system half life; this is due to its relatively lower redox potential when compared to free chlorine. Chlormaines are effective against Escherichia coli but are more effective than chlorine against Helicobacter pylori (which causes stomach ulcers).

UV disinfection is another method gaining popularity because it leaves no DBPs. It is effective against Cryptosporidium. However, this method (and chlorination) alone will not remove bacterially produced toxins, pesticides, heavy metals, or other organic emerging contaminants from water. These often require multiple remedial removal processes.

In Part 2, I will discuss what happens after you consume your drinking water.

50 Year Members

John King, Gilbert Gomes, Fred Davis, Ronald Buxton with Bryan Balazs

60 Year Members

Milton Mozen, T.C. Yao, David Cox, Frank Delfino with Bryan Balazs

June Historical Events In Chemistry

Leopold May

June 1, 1936 Seventy-five years ago in 1936, the paper "Electric Moments of Molecules in Liquids" by Lars Onsager, published in the Journal of the American Chemical Society (1936, 58, 1486-1493), was received on this day.

June 2, 1787 Nils G. Sefstrom, one of the discoverers of vanadium (V, 23) in 1830, was born on this day.

June 3, 1873 Seventy-five years ago in 1936, Otto Loewi shared the Nobel Prize in Physiology or Medicine with Henry H. Dale for their discoveries relating to chemical transmission of nerve impulses. He was born on this date.

June 4, 1886 One hundred and twenty-five years ago on this date, Henri Moissan isolated fluorine by electrolysis of a solution of KHF2 in anhydrous HF.

June 7, 1811 Two hundred years ago on this date, James Y. Simpson was born. He was an obstetrician who was first to use chloroform as an anesthetic and introduced the use of ether in Great Britain.

June 11, 1842 Carl von Linde constructed equipment by which air could be liquefied on commercial scale in 1895 and developed a methyl ether refrigerator in 1874 and an ammonia refrigerator in 1876. He was born on this date.

June 13, 1827 Charles Goessmann, who was born on this date, made an analysis of peanuts and did research in chemistry of sorghum and sugar beets.

June 15, 1754 Juan José D'Elhuyar, the discoverer of tungsten from wolframite ore in 1783,was born on this date.

June 17, 1832 One hundred and fifty years ago in 1861, William Crookes, discovered thallium (Tl, 81). He separated uranium into two parts, naming the new one, uranium-X and was born on this date.

June 18, 1932 Twenty-five years ago in 1986, Dudley R. Herschbach shared Nobel Prize in Chemistry with Yuan T. Lee and John C. Polanyi for their contributions concerning the dynamics of chemical elementary processes. He developed molecular beams to study products of collisions that occur and was born on this date.

June 20, 1886 One hundred and twenty-five years ago on this date, James R. Partington was born. He was a researcher on specific heat of gases and a historian of chemistry.

June 24, 1835 Johannes Wislicenus, who proposed geometric isomers and synthesized acetoacetic esters, was born on this day.

June 25, 1911 One hundred years ago on this date, William H. Stein, a researcher in enzyme chemistry, was born. He shared the Nobel Prize in Chemistry in 1972 with Stanford Moore for their contribution to the understanding of the connection between chemical structure and catalytic activity of the active centre of the ribonuclease molecule and Christian B. Anfinsen for his work on ribonuclease, especially concerning the connection between the amino acid sequence and the biologically active conformation.

June 27, 1854 Abraham Gesner patented a process for obtaining kerosene by distillation on this date.

Additional historical events can be found at Dr. May's website, "http://faculty.cua.edu/may/Chemistrycalendar.htm"

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