THE VORTEX

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50 year members, left to right:Daniel Farkas, Dimitris Argyriou, Harold Redsun, Frederick Giarrusso, Robert Heckly, James Singmaster, III, Herbert Scher, Attila Pavlath

60 year members, left to right: Amos Leffler, Harold Adler, Kymus Ginwala, Darleane Hoffman, Edwin Tallyn, Attila Pavlath

THE VORTEX

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Volume LXX September 2009 Number 7

Chair's Message

Eileen Nottoli

Congratulations to our Section members who have been elected as ACS Fellows. This is a prestigious honor given to those who have made a significant contribution to chemistry and demonstrated outstanding service to the ACS or a local Section. There is too little space here to discuss all the individual awards and achievements of these distinguished scientists. Additional references are provided.

A. Paul Alivisatos, Ph.D.

Dr. Alivisatos is the Larry and Diane Bock Professor of Nanotechnology at the Univ. of California Berkeley, Deputy Director at the Lawrence Berkeley National Laboratory, and Scientific Director, Molecular Foundry, Inorganic Nanostructures Facility. Professor Alivisatos has gained worldwide recognition for his work on the synthesis and characterization of semiconductor nanocrystals. Visit http://www.cchem.berkeley.edu/pagrp/paulbio.html for additional information.

Don R. Baker, Ph.D

Dr. Baker obtained 205 US patents related to food and agriculture representing over 10,000 novel compositions in his career at Stauffer Chemical Company. He invented the selective herbicide, Devrinol and prepared the first herbicide safeners or antidotes that could be incorporated into the thiolcarbamate herbicides. For additional information visit http://cas.umkc.edu/chem/kcacs/spencer/Archive/spencer.html

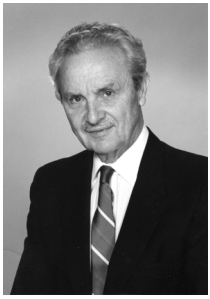
David Chandler, Ph.D.

Professor Chandler made significant contributions in statistical mechanics including the development of the Weeks-Chandler-Andersen theory, generally regarded as the basic equilibrium theory of the liquid state, and the Pratt-Chandler theory of hydrophobic effects. He also created many of the basic techniques with which condensed matter chemical equilibrium and chemical dynamics are understood with molecular theory. For additional information please visit http://en.wikipedia.org/wiki/David_Chandler_(chemist)

Glenn Fuller, Ph.D.

Educated at Stanford University and the Univ. of Illinois, Dr. Fuller enjoyed a productive career for industry and government. His work with the USDA lead to the introduction of sunflower oil as a beneficial oil and successful crop in California. His research has also lead to improved shelf life of broccoli, nuts, and fruits.

(Continued on page 6)



MODERATION AND COMMON SENSE XV.

In the previous article of this series, I described the utilization of uranium-235 in atomic reactors. But is there enough uranium to fuel all the atomic reactors being planned and built or are we going to experience the same difficulties as with fossil fuels? This isotope, the basis of the simple atomic reactors, is present only in quantities less than 1% in natural uranium. The main component, uranium-238 is not directly fissionable, therefore the amount of energy obtainable from all uranium resources is limited. However, there is a way to utilize the non-fissionable uranium. With the use of what is commonly known as breeder reactor, the available energy from atomic reactors can be multiplied. The Breeder reactor creates more nuclear fuel than it consumes. The available space does not allow me to go into full engineering details. Let me just describe the principle and the major points.

A breeder reactor is converting non-fissile isotopes by neutron radiation into fissile material (nuclear fuels). It can not only use uranium, but also the more abundant thorium. The requirement is that the amount of energy gained should be more than the invested energy. This is characterized by a breeding ratio that is the number of fissile atoms created with each initiating fission. Depending on the design, this can range from 1.01 to 1.8. If the material is reprocessed, practically everything can be utilized, thus the available resources will last longer, thus providing much more energy.

Breeder reactors burn the normal fissionables, same as standard atomic reactors, but also convert some of the non-fissionable material into usable fuel. When uranium-235 undergoes fission in a nuclear plant, each atom will yield 2-3 neutrons. These neutrons can convert non-fissionable uranium-238 to plutonium-239 in the three steps. This has many advantages. Plutonium-239 has a higher probability for fission than uranium-235 and produces a larger number of neutrons per fission event. Therefore the reactor can be periodically reloaded with non-fissionable materials thus can continuously provide energy. Furthermore it can not only use natural uranium without enriching, but also thorium, which is about four times more abundant than uranium. The half life of the waste from breeder is 30-40 years in contrast to that of the waste from standard nuclear reactors; over 25,000 years.

There are two types of breeder reactors. One is the fast breeder reactor using an initial amount of plutonium-239, thereafter only requiring natural uranium for energy. This kind of reactor is cooled with liquid sodium, which needs more safety precautions. The other type is the thermal breeder reactor, which uses an initial fuel charge of enriched uranium, thereafter employs only thorium.

One objection to the operation of the breeder reactor is that it requires reprocessing of the fuel element, plutonium, one of the elements, which could be diverted for the development of weapons. In 1977, an overeager executive order banned reprocessing nuclear fuel in the United States. The rationale behind was that terrorists could possible steal the plutonium to make atomic bombs. Breeders are the present day solutions to our energy problem. Fuel reprocessing does not yield weapon-grade plutonium because the result is a mixture of various plutonium isotopes, mostly plutonium-240. Since Plutonium-240 in the amount of 18% or more makes it unusable for weapons which require less than 7% concentration. Such a grade requires a different type of reactors. While the French, British and Japanese use technology developed, we do not. Instead, we are trying to find some complicated ways to keep the regular waste safe for the next 25,000 years. Sometimes common sense is not necessarily common even in executive orders.

Attila E. Pavlath,
AttilaPavlath@yahoo.com

California Section
American Chemical Society
September Meeting (in early October)
Tour of the Hazel-Atlas Mine
Black Diamond Mines Regional Preserve
Antioch, California

Date: Saturday, October 3, 2009

Place: Black Diamond Mines Regional Preserve, Somersville Road, Antioch (see the article below for directions)

Cost: $3 (plus East Bay Regional Parks parking cost if not a member of the EBRP Foundation) Reservations: Limit 30! RSVP by Monday, Sept. 28, by e-mail to office@calacs.org or call (510) 351-9922

Time: 1:00 pm start (please arrive by 12:30 pm in parking lot for check in and walk to mine)

The Hazel-Atlas Mine is in the Black Diamond Mines Regional Preserve at the Somersville Road exit from State Highway 4 in Antioch. Take Somersville Road south to the Regional Preserve entrance. Proceed past the Park Office to the mine parking lot about 1 mile south.

We have reserved two 15-person tours for October 3. The initial orientation will be together in the mine starting at 1:00 pm and then the tour will be done in the two groups separately. The tour will require walking about 0.3 mile up to the mine entrance from the lower parking lot and the reasonably level tour of the mine itself. Visitors must be seven or older. The mine is about 56° F so wear suitable clothing. Hard hats and flashlights will be provided. There are picnic facilities and restrooms around the mine parking lot for before or after the tour.

There are other sites of interest in the Black Diamond Mines Regional Preserve including the Rose Hill Cemetery, a hike uphill from the Hazel-Atlas Mine parking lot.

Women's Chemist Committee,
California Section Fall Program

Speaker: Caroline Cox, Research Dir. Center for Environmental Health, Oakland, CA

Topic: Three Toxic Surprises in Everyday Life: Pesticides and the Light Brown Apple Moth; Lead in Wallets, Handbags, and Purses; and Pesticides in Food.

Date: Saturday, September 26, 2009

Place: Mills College - Bender Room - Carnegie Hall 5000 MacArthur Boulevard Oakland, California 94613

Time: 11:45am Registration, Meet the Speaker and Others.
12:00 - 1:00 Lunch
1:00 - 2:30 Program

Price: $15.00 (Includes Box Lunch) 1/2 price for students; free for those who come just for talk.

RSVP by Friday, September 18, at (510) 351-9922 or by email at office@calacs.org

Caroline Cox is the Research Director for CEH and leads its research on toxic exposures, identifying, analyzing and substantiating the scientific basis for its work to eliminate threats to children and others exposed to dangerous chemicals in consumer products.

(continued from page 3)
He helped developed Project SEED, a program to provide economically disadvantaged high school students an opportunity during the summerwith experience in a laboratoryduring the summer. Among his honors are the California Section Walter Petersen Award in 1984, the Santa Clara Valley Section's Shirley Radding Award, and the USDA Western Regional Research Center Lifetime Achievement Award.

Clayton Heathcock, Ph.D.

Professor Heathcock is well known for his creative approaches to the synthesis of complex polycyclic natural products and for his contributions to the chemistry community. He has planned and directed the synthesis of almost fifty natural products. Additional information is available at http://en.wikipedia.org/wiki/Clayton_Heathcock

Darleane Hoffman, Ph.D.

Professor Hoffman has made many important discoveries in her career at the University of California, Berkeley, and Lawrence Berkeley National Laboratory including isolation of plutonium-244 from natural ores. Additional information can be found at http://chem.berkeley.edu/faculty/hoffman/index.php

Mary Singleton

Mary Singleton made many important contributions with her research on tritium-getter materials, oil shale processing, and growth of nonlinear optical crystals for the Lawrence Livermore National Laboratory (LLNL) laser project. She also worked with Melvin Calvin on the initial photosynthetic light reactions in chloroplasts at UC Berkeley. She has been a tireless advocate for equality for women, and her efforts have lead to significant reforms which benefited over 3000 women who worked at LLNL. She has initiated many programs to encourage women in science and has developed many programs to assist teachers. Among her honors are the California Section's Water Petersen Award and the ACS Award for Encouraging Women into Careers in Chemical Sciences.

Gabor Somorjai, Ph. D.

Dr. Somorjai's work in the field of surface science and the structure, bonding, and reactivity at solid surfaces on the molecular scale has lead him to be recognized as the father of modern surface chemistry. Additional information can be found at http://www.lbl.gov/msd/investigators/investigators_all/somorjai_investigator.html

Andrew Streitwieser, Ph.D.

As a professor at the Univ. of California, Berkeley, Dr. Streitweiser pioneered the use of molecular orbital theory in organic chemistry and the use of deuterium kinetic isotope effects in the study of reaction mechanisms. He develop the most extensive and widely used hydrocarbon acidity scale. Dr. Streitweiser mentored over 200 postdoctoral fellows and Ph.D. students as well as countless undergraduates, many of whom are now leaders in their own right. Additional information is available at http://chem.berkeley.edu/faculty/emeriti/streitwieser.php

BUSINESS DIRECTORY

SEARCHING FOR THAT SPECIAL JOB?

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- Companies for laboratory and management positions
- Universities & Colleges for teaching positions and laboratory personnel
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There are several web sites that may help you search for these open positions.

- www.mboservices.net
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