

# THE VORTEX

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CAL-ACS Project Seed poster at the Chemluminary Awards at the DC ACS meeting in August 2009

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### *Chair's Message*

Eileen Nottoli

As we close 2009, it's a good time to look back at the Section's activities and the gallant efforts of our many volunteers who devote countless hours to helping the Section and encouraging students. We have great plans for 2010 and invite each of you to participate in programs that are of interest to you.

The Vortex - our editor Lou Rigali has devoted energies both in ensuring a vibrant publication and guiding us as we switch over to an electronic newsletter.

Programs such as Chico Sub-Section, Women Chemists and Science Cafe- thanks to Jennifer Petoff, Jim Postma, Paul Vartanian, Linda Wraxall, Marinda Wu, and lots of others.

Education - thanks to Steven Bachofer, Bryan Balazs, Michael Cheng, Glenn Fuller, Anne Frazer, Sheila Kanodia, Alex Madonik, Jeanne Pimentel, Ann Rosecrance, Greti Sequin, Al Verstuyft, Elaine Yamaguchi, Sheila Yeh, and many other volunteers. We continue to have a vibrant team to encourage chemistry students and assist teachers. Our Section has the

second largest Project SEED program in the nation. Project SEED offers economically challenged high school chemistry students an opportunity to work in a lab during the summer under a mentor. Our Educational Grants program issues grants to high school chemistry teachers for supplies and equipment, and we have an active program to identify outstanding high school chemistry teachers. We continue to work with the Santa Clara Valley Section in conducting our Olympiad program for high school students. We attended career workshops sponsored by the Girl Scouts, Boy Scouts, Expanding Your Horizons, and others. Our Section sponsored Family Science Nights at two middle schools this year with enthusiastic participation of students, faculty, and families. We worked with minority students in educational workshops during the spring and summer, and sponsored an undergraduate symposium. During 2010, we plan to expand our efforts to grade and high school teachers.

Budget - our Section is fortunate to have Bryan Balazs, Will Kuo, Gary Martin, Alex Mihailovski, Igor Sobolev, Larry Weibe to prepare budgets and manage our trust account.

Website - our website is undergoing changes to be more vibrant thanks to Doug Henry, Lou Rigali, and Jeremy Waen.





## Moderation and Common Sense, XVIII

A. Pavlath

In the previous articles, I have discussed the various ways nuclear power can contribute to the solution of our energy problem. Fission creates a radioactive waste disposal problem. Fusion between deuterium and tritium is clean and has great potential but uses more energy than it yields. Cold fusion through the electrolysis of heavy water is thought to eliminate the need of high temperature. However, there is a great controversy about it and the jury is still out whether it really happens. Interestingly another type of cold fusion, even though it is proven, does not get as much publicity: it is called muon-catalyzed fusion.

Principles of nuclear chemistry are complex, therefore it is difficult to give precise description of the muon and its role in this process. For our purpose, we will give a very shortened definition. Muon is an elementary particle, designated as “ $\mu$ ” with a negative charge same as the electron, but its mass is 207 times greater. Its life time is 2.2  $\mu$ s. It was discovered in cosmic radiation; it can penetrate deeply in ground.

Muon can catalyze the fusion of deuterium and tritium. This was first observed in 1956 at U.C. Berkeley in a hydrogen bubble chamber, however, it can occur even at very low temperature 3°K where the hydrogen isotopes are frozen. Since the muon is much larger than the electron it can serve as a shield between the nuclei overcoming their electrostatic repulsion. With a deuterium and tritium atom it will form a complex positive ion (D- $\mu$ -T)+ in which the nuclei are so close that fusion will occur resulting in helium and one high energy neutron. It is the same equation as in the high temperature fusion. The muon is released and could then form of another complex, thus it acts only as a catalyst. The fusion occurs in 0.001-0.01  $\mu$ s;

therefore theoretically it can bring about 200-2000 fusions during its 2  $\mu$ s lifetime

The process appears to be very simple, but presently there are problems with its practical utilization. One is, we need to have enough muons to start and maintain fusion. Its natural source is cosmic radiation, but it can be created in an accelerator. When accelerated deuterium collide with deuterium and tritium gas another atomic particle pion is formed, which is just another subatomic particle with a mass of 20% larger than muon. This will quickly decompose yielding muon. If the muon can cause enough fusion, the energy balance is positive.

However, the major problem is that a muon released from the (D- $\mu$ -T)+ ion can be side-tracked, while searching for other deuterium and tritium nuclei to form another complex. It may stick to the forming alpha particle, i.e. helium and, if this happen, it will decay before it can start another fusion. The practical application of the muon-catalyzed fission depends on what percentage of the muons will be taken out of the catalytic process due to this “alpha-sticking”. It was estimated that 1% will stick to the forming helium and removed from further catalytic fusion, though some calculation comes up with 0.4-0.5%. The break-even point depends on the efficiency of creating muons and decreasing the alpha sticking percentage.

It is evident that nuclear reactions have a great potential to satisfy the ever-increasing hunger for more energy. Obviously, as all other alternate energy sources, it also has problems. In the next article I will report on new developments in the alternate energy area and revisit some of the old ones in view of the questions I have received. Since this article will appear in the December issue, I wish you a Merry Christmas, Happy Holidays and New Year.



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## October Meeting Report, “*Drinking Wine Responsibly*”

Linda Wraxall

On October 28, 2009, a full crowd of ACS members and students gathered at the Buttercup Grill near Oakland’s Jack London Square to hear Valery Uhl, MD a radiation oncologist and international wine judge, talk about the health benefits of drinking wine with an evening meal.

First, she gave us the official definition of how alcoholic drinks are measured (1 beer=12oz, 1 wine=5oz, 1 spirits=1.5oz). She defined moderate alcohol consumption for a male under 65 years of age as two drinks a day. Over 65 years, for both men and women, it is one drink a day with food. It is known that wine aids in the digestion of fats and the inference to be drawn from this is that drinking a little wine (not alcohol) every day has health benefits. Overconsumption results in death.

Conservatively, research has found that the main benefit of drinking wine is a reduction in heart disease, peripheral vascular disease, and ischemic strokes. Other benefits are a significant reduction in the risk of a heart attack upon waking (the most common time for one), gallstones, peptic ulcers, and nerve cell protection against Alzheimer’s disease. Drinking wine with food also boosts the immune system (fewer common colds), inhibits tumor development (less cancer) and protects the body from radiation scarring during cancer treatments.

On the down side, too much alcohol consumption puts the body under stress and can result in many types of cancers (mainly mouth, throat, esophagus, pancreas, liver and breast). It can also encourage pancreatitis, heart muscle damage leading to heart failure, high blood pressure, miscarriages, strokes, impaired motor skills, and fetal alcohol syndrome in babies.

Dr. Uhl, a lively and eloquent speaker, went on to explain that flavanoids, the chemical compounds in red wine that are good antioxidants decrease the production of LDL and increase HDL in our cholesterol. They also reduce the clotting of blood which often leads

to heart problems. The main flavanoid in wine is called resveratrol and is only found in the grape skins and seeds: the other flavanoids are catechin, saponin, and guercetin. All are related to the tannins and are vulnerable to light and oxygen, which is why wine is best stored away from sunlight and kept airtight in a cool temperature. She also recommended corking the wine between pours. Keeping a half empty bottle in the refrigerator until the next day is OK.

Red wine contains 1.5-3.0 mg/L of resveratrol and white wine has less because the color of red wine comes from the first two weeks of fermenting with the skins and seeds. This is the critical period and drinking grape juice or eating grapes do not have the same benefits as finished wine because no fermentation is involved. Dr. Uhl quoted a 2006 study in which overfed mice had their tumors reduced when given resveratrol. However, as in most animal studies, they were given absurdly high levels. Most of the human data is on the over-50s as there is little benefit for 20-30 year olds who are less likely to have plaque buildup in their arteries or heart attack issues.

It has been found that wine drinkers generally have healthier lifestyles: they exercise more often, eat good food, and do not smoke. Drinking wine with food produces a lower alcohol and higher acid levels which aids digestion. The debate continues but the evidence is clear that the regular moderate consumption of red wine is beneficial to one’s health as one gets older. Most people live longer if they drink in moderation on a regular basis and do not have significant health problems. Smoking with alcohol consumption is the kiss of death.

Dr. Uhl recommended fresh young red wines. The most bioflavanoids are to be found in Cabernets, Petite Syrahs, and Pinot Noir. In the Napa Valley, where mainly Pinot grape varieties are grown, they are working on a new antidiuretic wine to be called Pinot More. As a potent anti-oxidant and anti-inflammatory, red wine slows the aging process. However there has to be a balance and its consumption is not for alcoholics, pregnant

*(Continued on page 6)*

## Volunteers Needed to keep the California Section as a leader

The California Section is seeking help from its members for the following tasks. We are all a volunteers organization, so your help is needed and greatly appreciated. Please contact Julie Mason at our office at (510) 351-9922 or office@calacs.org) if you can help.

We need volunteers to collect the names and addresses of teachers or public and private schools within our Section. For more information, please call Julie Mason.

Project SEED Coordination. Project SEED is an important program that provides an opportunity to economically disadvantaged high school students to work in a laboratory under the supervision of a scientist during the summer. There are a number of tasks that are needed throughout the year which are not time intensive. If you are able to help, please contact Elaine Yamaguchi at 510-242-4932 or ESYA@chevron.com.



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(Continued from page 5)

women, those with a strong breast cancer gene, or patients who are on many medications.

Finally, after many questions from the audience, they were able to sample the many bottles of a variety of mainly red wines that Dr. Uhl had brought with her from the various tasting competitions she had judged.



## Section Election Results

Chair-Elect Tim Kamerzell  
Treasurer Igor Sobolev  
Director Atilla Pavlath  
Member-at-Large Glenn Fuller  
Councilors Eileen Nottoli & Lee Latimer  
Alternate Councilors James Postma & Don MacLean

## Special Message from the Editor

First, the Executive Committee and the *Vortex* staff wishes you and yours a Happy Holiday season and lots of good wishes for the New Year.

We are planning a new look in 2010 for the Section website. The *Vortex* will be on the website each month and can be downloaded as a pdf file and printed. In addition we will be able to expand the content and add features that members request. As many of you know, for budgetary reasons, the Executive Committee has decided to significantly limit the printing and distribution of the *Vortex* to only those members who specifically request a mailed paper copy. While this program will be phased in during the year, do not be surprised when a *Vortex* is not in your mailbox.

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Lou Rigali

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