



In Conjunction with the American Chemical Society
Student Affiliates at the University of Pittsburgh



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Welcome Back!

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Hello and welcome back! Allow me to introduce myself. My name is Rich Miller and I along with Katie Hammer am one of the co-editors our American Chemical Society newsletter: The Chem Major News. I hope that all of you enjoyed a well deserved break from classes and had a great holiday season.

Ready or not its time to jump back into full swing here at Pitt, and what better way to start off a new semester than to get involved in our award winning ACS student affiliate! We meet each Friday at noon in 132 Chevron and all are welcome. Each week our group tries to present speakers who will talk with us about their positions in research or industry, as well as activities going on at or around campus. Another goal of our organization is to be actively involved within the community. Volunteer programs like National Chemistry Week and Saturday Science afford us the opportunity to make an impact on young students seeking to pursue careers in science.

Not only is the ACS is a great way to become informed about the diversity of our field, (while enjoying some free food) but it is also a great way to meet new people who share the same passion for science that you do. When people united in the pursuit of knowledge come together, minds are opened and there is nothing which they cannot achieve.

On a lighter note, as some of you might have noticed the newsletter has undergone a few changes. Since Katie and I have taken over as the editors back in September, we have strived to incorporate some fun new features into each edition. We would both like to express that if anyone should have an idea for something which they would like to see in the newsletter to please let us know. You can contact me at rhm10@pitt.edu or Katie at klh29@pitt.edu. Remember, this is YOUR newsletter and you can help to make it great!

It's a new year and a new semester here at Pitt and we wish you all the best in each of your endeavors. Hope to see you Fridays at noon!

Rich Miller, Co-Editor
ACS Newsletter



CHEM
MAJOR
NEWS

NEWSLETTER STAFF: *Melissa Forry-Co-President, Erica Trimble-Co-President, Max Osipov-Vice-President, Ted Boron-Secretary, Zach Pozun-Treasurer, Neil Robertson-Outreach Coordinator, Chris Fennig-Assistant Outreach Coordinator, Rich Fair-Co-Newsletter Editor, Katie Hammer-Newsletter Co-Editor, Eric High-Senior Affairs, Kim Masuga-Senior Affairs, Valerie Mitchell-Senior Affairs, Andy Petit-Senior Affairs, Kanika Gupta-Webmaster, and Regina Mahouski*

The Department of Chemistry of the University of Pittsburgh and Valspar Corporation

are pleased to announce

The Valspar Corporation Award in Chemistry

The Award will be made in Spring 2007 to one or more outstanding chemistry majors completing their sophomore or junior year. The award consists of a three month paid internship for Summer 2005 in the Valspar Laboratories in Pittsburgh, plus a \$2,000 scholarship to be used to attend the University of Pittsburgh during the student's junior or senior year.

Criteria for the award are as follows:

- The student must be a non pre-professional chemistry major at the University of Pittsburgh.
- The student must have a 3.0 or higher grade point average at the time of selection.
- Where applicable, financial need will be considered.

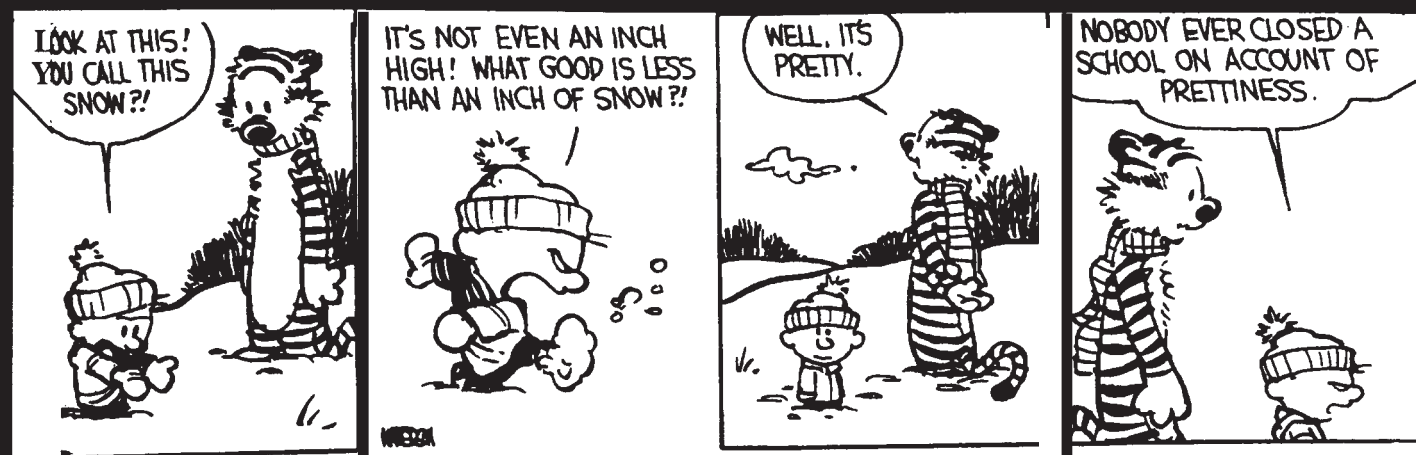
To apply for the award:

- Complete and submit an application form (available in 107 Chevron Science Center)
- Submit an unofficial transcript of all undergraduate work.
- Arrange for a letter of reference (from a member of the University of Pittsburgh faculty) to be submitted.

Materials are to be submitted to:

Dr. George C. Bandik
107 Chevron Science Center
Department of Chemistry
University of Pittsburgh

Deadline for all application materials is February 5, 2007



2007 January ACS Schedule

January



12 Welcome Back Meeting for all old friends and interested new members.

19 Implications of Cognitive Research to Teaching with Dr. Chandralekha Singh, Department of Physics

26 The Value of Undergraduate Research with Dr. Stephane Petoud

February

02 Help us prepare for Saturday Science to be held Saturday, February 03, 2007

Hoagies and Notes yet Again!

Our most visible activities are the ACS hoagie and Chemistry Notes sales. Just about everyone having a Chemistry class in Chevron's lecture halls has at one time or another eaten an ACS hoagie from Uncle Sam's while studying. The funds raised by these sales help to defray the weekly meeting expenses for refreshments and other incidentals as well as the cost of the food and supplies at our social functions.

Hoagies are sold on Tuesdays throughout the semester.



I Need a Job!

It's that time of year! Time to begin the search for a summer position. There are several opportunities for summer work available to Chemistry majors.

The first place to look is the Chem Major News area of the Fishbowl. Here you will find the current Research Experiences for Undergraduate (REU) listings. They are from all over the country.

You may also want to visit Career Services (2nd floor WPU). Ms. Erin Bridgen can help you with opportunities available through their Office.

Finally, don't forget the Arts and Sciences Office of Experiential Learning (B-4, Thaw Hall). Dr. Peggy Healy can assist you there.

With all of these opportunities available, it should be an exciting and productive summer for everyone. Good Luck!

How Do Salts Melt Ice?

by: Katie Hammer, Co-Editor

Welcome back to Oakland and what I hope will soon be a winter wonderland! When the snow blankets the earth and temperatures drop, the maintenance crews spread salt around the sidewalks to keep us from slipping on the ice. But how does this work?

Adding salt lowers the melting or freezing point of the water, a colligative property called freezing point depression. Colligative means that it depends only on the number of particles present, and not on the chemical properties of the particles (2). As the salt dissolves in the ice and snow, it dissociates into its ions—thus multiplying the molar quantity and increasing the effect of freezing point depression (2).

Different salts are used to achieve these effects. Originally, sodium chloride (NaCl), also called rock salt or halite, was chosen to melt the ice on the streets. Each molecule dissociates into one sodium ion and one chloride ion. The environmental problem with NaCl is that it damages vegetation in high concentrations. Over the years of spreading it continuously, it will kill plants along the sides of the road and sidewalks (2). It is also corrosive to the concrete surfaces. The lowest practical temperature of NaCl is 15 degrees Fahrenheit (1). The positives about NaCl are its abundance in nature and that it keeps sidewalks dry.

Calcium chloride (CaCl₂) and magnesium chloride (MgCl₂) have a higher molar quantity as they dissociate into one calcium (or magnesium) ion and two chloride ions; they can melt ice faster than NaCl! MgCl₂ and CaCl₂ are both exothermic, releasing heat as they dissolve, which lowers the temperature at which they can melt ice—MgCl₂ at 5 degrees Fahrenheit and CaCl₂ at -20 degrees F. These chemicals can be hazardous to human health, and they also make the surfaces extra slippery since they attract moisture. They also refreeze quickly, have to often be reapplied, and are hygroscopic causing them to clump, harden, or liquefy during storage (2).

Two other salt possibilities are ammonium sulfate (NH₄)₂SO₄ and potassium chloride with a lowest melting temperature of 20 degrees F. The positive about these salts is that they fertilize vegetation. The down side is that they damage concrete. Another salt used to melt ice is potassium acetate (CH₃COOK), effective down to 15 degrees F. CH₃COOK's pro is that it is biodegradable; the con is that it is corrosive.

The safest salt for concrete, vegetation, water sources, and the applicator is calcium magnesium acetate (CMA) which is composed of calcium carbonate (CaCO₃), magnesium carbonate (MgCO₃), and acetic acid (CH₃COOH). CMA is non-corrosive and biodegradable. The problem with CMA is that it works better to prevent re-icing than it does as an ice remover (1) and it costs 30 times as much as NaCl rock salt. Between that and its ineffectiveness at low temperatures, it is not widely used (2).

Potassium chloride (KCl, potash) is only effective down to 20 degrees F, so is not practical for use unless mixed with other ingredients. KCl is found in plants so it is safe for landscaped areas, though sometimes over-nourishing plants can have negative consequences as the plants flourish and overgrow the sidewalks or roads (2). There are also reports in northern Arizona of long green grass in the freeway medians causing an increase in vehicle and animal accidents since the animals are looking for new grazing pastures in spite of the heavy traffic (2).

Alpha methyl glucoside (MG-104) is sometimes added to the other chemicals to speed the melting process, lowers the temperatures at which they work, and lengthens the amount of time of freeze-thaw cycles to reduce the surface damage (2).

Cost considerations are another one of the issues in choosing the best ice melter for an area. It is a matter of weighing out the pros and cons. Blending combinations of these chemicals effectively helps to reduce their environmental impacts and some increases the effectiveness of melting ice at low temperatures. If the temperature of the road is too low, the solid salt cannot get into the structure of the solid water and start the dissolving process (3). In this case, spreading sand over top of the ice to provide traction helps more. Cost considerations are another one of the issues in ice melting choice for all of the salts.

So when it snows, the sidewalks get icy, and the maintenance crews go out, take a look at the salt pellets on the ground and think about the chemistry allowing them to work.

Sources:

(1) Melting Snow & Ice with Salt <http://chemistry.about.com/cs/howthingswork/a/aa120703a.htm>

(2) Using Salt To Melt Ice, MadSci Nework (Mon., Nov. 9, 1998) <http://www.madsci.org/posts/archives/nov98/910675052.Ch.r.html>

(3) How Stuff Works: Why do they use salt to melt ice on the road in the winter? <http://science.howstuffworks.com/question58.htm>