Halloween wasn’t quite over for the Chemistry department until after the night of November 1 when Karen Stump held the department Halloween dinner at her house. Finding the location was no problem for students, as it was the only house around with a lawn completely covered in brightly-colored Halloween decorations. It was equally as festive inside, and those who attempted to pour a cup of grape juice were greeted by a disgruntled voice from the mirror above the bowl. Of course, the dogs—dressed up with fairy wings and orange and black jester’s collars—were just as eager to greet everyone at the door. There were plenty of sweets, from carrot cake to mildly intimidating eyeball cupcakes. Dinner was just as delicious; after weeks of Skibo and Si Señor, home-cooked ham, meatloaf, and green bean casserole couldn’t be more appreciated. Plenty of great conversation and laughter filled the welcoming home, and it is worth noting that the evening may have finalized the decision for at least one freshman still debating between chemistry and biology.
At the beginning of my sophomore year of college, anyone who discovered that I was a chemistry major would automatically ask what plans I had after graduation. “So what are you going to do after school?” my fellow friends and classmates would inquire. This has been a daunting and complex question that has left me with feelings of indecisiveness and apprehension. Nonetheless, this issue is certainly normal amongst college students alike. Although Carnegie Mellon University is filled with undergraduates who have known their career path ever since middle school, there are an abundance of students who are still undeclared until their sophomore year and still change multiple times! But at such a young age how can anyone know what they really want to do for the rest of their lives?

This prompted an investigation to research the potential futures of a graduating chemistry major. Some options were very obvious: graduate school to obtain a masters or Ph.D. or even medical or dental school. Either path would land a job in industry or academia, but for others, like me, committing to another long period of schooling just is not the most feasible direction.

Another common dilemma is: what if a major in chemistry does not appeal to you anymore? The options then become even more overwhelmingly vast. The possibilities are limitless, ranging from teaching to becoming a lawyer. Recently, a CMU alum came back to give a seminar lecture about how she ended up selling healthcare digitizing software to companies—something that does not require a lot of chemistry at all. Many people, in fact, take part in dealings that do not pertain to their majors, but take time to enjoy activities that they can benefit from while being young, like traveling.

In short, it does not matter if you have planned out your life to the exact specification or you are still trying to find your niche. College is an important place to find who you really are and what you want as a career. There is no reason to limit or get overwhelmed by the endless opportunities—just do something that genuinely interests you.
Oh no! Yet again, a freak nuclear reaction has turned all of the letters in the alphabet into elements! Restore harmony to the universe by solving the quote below for its original letters. Hint: Pt = I.

“C F Pt O B Zn C W P N C F P N B Ba U C Zr Xe

C Zn C Os B I Al U Ba Pt Xe F.

Sc P Zr Xe Sc C I P W W U N Os U Zn Pt S Xe

Answers on page 10
Registering a few weeks ago put us in a reflective mood about our classes, so we've picked a few we've taken in the past and shared our thoughts on them. If you've taken these classes, these may be nostalgic, and if you've yet to take them, here's what you have to look forward to.

**Biochemistry**  
*By Helen Park*

Need to fill a chemistry elective? If you like biology, taking biochemistry is a great way to fill one of those slots. Even if you don’t particularly care for biology, if you have a passing interest in things like amino acids, proteins, nucleic acids, protein-ligand interactions, enzyme kinetics, etc., this class is worth checking out. I took this class with Dr. Rule, who teaches the class in the spring, and he’s a good professor to take this class from. If you put in a reasonable amount of effort you’ll get a decent grade, and if you put in a little more effort, you’ll get an even better grade. As with most classes, recitations and SI sessions (if available) are helpful and are good resources to facilitating the understanding of the material covered.

**Communication Design Fundamentals**  
*By Alanna Schwartz*

This class offers a rare opportunity at Carnegie Mellon University where students are introduced to another major at a beginning level. If you ever wanted to take a non technical class, but not feel intimidated because you can’t draw, this class may be the solution. CDF teaches the students how to use the Adobe programs and most of the class is working on a computer. It’s a hard class not to do well in, especially because it is interesting and a nice break from equations and memorizing material.

**Inorganic Chemistry**  
*By Michelle Noh*

The Periodic table is the central doctrine to chemistry majors like the Bible is the dogma to divinity aficionados. How can we fully understand its existence with all of the complex information it possesses? Extending from learning organic atoms and compounds, inorganic chemistry can enlighten us on properties of numerous elements and inorganic compounds via discussions of periodic table trends and transition metals. Not only is inorganic chemistry intimately connected to other chemistry subjects including quantum chemistry, it can divulge the secrets of elemental behaviors observed in our lives. Although inorganic chemistry is a relatively tough course, it is undeniable that learning inorganic chemistry will allow us to grasp a broader understanding in chemistry and engender more enthusiasm and love for chemistry.
Introduction to Green Chemistry
By Neeta Kulkarni

Interested in learning what all the hype for the “Green Chemistry Movement” is about? This class teaches you the meaning of sustainability, the history of lead poisoning, and current issues such as how endocrine disruptors in our water are affecting us. The readings can get long (4 books), and the tests require lots of memorization, but the material is interesting.

Science Writing
By Helen Park

If you have a knack for writing in addition to your knowledge of science, taking this class is a great way to combine the two skills. This class is probably more properly described as science journalism, not so much for scientific journals as for regular newspapers. Ever wondered how to explain complex scientific concepts to a general audience? This class will teach you how. Mark Roth, writer and editor for the Pittsburgh Post-Gazette, teaches this class. He has lots of experience and really knows what he is talking about. There’s a healthy mix of science majors and writing majors; they may bring different strengths to the table in the beginning, but by the end of the class everyone will have learned how to be effective science journalists.

Religion and Politics in the Middle East
By Neeta Kulkarni

Do you know the difference between Sunni and Shi’a Islam? How did the term “Islamic Fundamentalism” develop? What role does religion play in the “Jewish state” of Israel, and how is it different from religion in the “Islamic state” of Iran? You’ll learn all of this and much more in this class, taught by an amazing professor (Dr. Laurie Eisenberg). Her lectures are engaging, short readings are required for almost every class, it’s easy to earn extra credit, and papers are almost all opinion-based.

Bioorganic Chemistry
By Alanna Schwartz

This upper level chemistry course with Dr. Ly is a great way to apply general chemistry knowledge to bioorganic research. If you don’t know what bioorganic is, it is exactly what the name suggests, an area of research that creates a marriage between biology and organic chemistry. Dr. Ly uses current research along with everyday examples to get his students to start thinking like a scientist. His enthusiasm and modern approach to teaching makes him a very likable and approachable professor. The class is based off of exams and projects, but as he says, “Don’t worry about the grade.” I highly recommend this class if you want to get excited about chemistry again!
National Chemistry Week Update

It [was] Elemental!

Mole Day holds a special place in the hearts of chemists, and the chemistry department at CMU celebrated the day by passing out Mole Day paraphernalia around campus. This year’s theme was “Molar Express.” Though the event is officially October 23, 6:02am-6:02pm, Mole Day at CMU was celebrated on Thursday the 22nd. Becka Reed, Suhl A Choi, David Ortiz-Grob, and Alanna Moss spent their Thursday evening spreading the Mole love, in the form of Mole Day themed balloons. They cheerfully blew up the balloons and distributed them around Doherty and Wean to mark this special day.

Earlier that day, temporary tattoos were handed out in seminar and a couple of “Molar Express” t-shirts were raffled off.

Mole Day falls within National Chemistry Week, October 18-24, and this year’s theme was “It’s Elemental.” In addition to the Mole Day celebrations, ChemSAC volunteers, led by Sarah Marks, went to the Carnegie Science Center on Saturday October 24. The volunteers helped guests discover the joys of chemistry through hands-on activities like making sodium alginate gummy worms and borax slime.

Upcoming Seminars

There are only three lectures/seminars for the remainder of this semester. If you are interested, you can attend these events at 4:45 pm in the Mellon Institute Conference Room. Let’s show some love for chemistry!

Thursday, December 3, 2009
Nathaniel Rosi, University of Pittsburgh
Bio-Inspired Synthesis and Organization of Nanostructures
Host: Rongchao Jin

Thursday, December 10, 2009
Ben Van Houten, University of Pittsburgh
Structure-Function Studies of Bacterial Nucleotide Excision Repair Proteins: How Do Protein Machines Detect and Remove Damaged DNA?
Host: Marcel Bruchez
Rules: Fill in the grid so that every row, every column, and every 3 x 3 box contains nine separate elements:
  Carbon, Copper, Fluorine, Hydrogen, Iodine, Molybdenum, Rubidium, Tungsten, and Vanadium.

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Answers on page 10
Developing an ‘Artificial Leaf’

Some say solar power is essential to reduce our need for fossil fuels.

We have and use solar cells to generate electricity, as well as thermal solar power plants, which use the sun to heat water or some other liquid in order to power turbines like fossil fuel plants. The energy in biofuels, such as ethanol or biodiesel, also originates from the sun, and plants convert it to chemical energy. Scientists are working on developing an ‘artificial leaf’, which takes in sunlight.

The products would not necessarily be glucose as is produced in plants, but more likely methanol, which can be used directly as a fuel, and is a much simpler molecule to synthesize.

<www.sciencedaily.com>
Christmas Cookies
By Neeta Kulkarni

Winter break is almost here, and I’m dreaming of white Christmases... along with my nice warm bed at home and my mother’s home-cooked meals. Especially her Christmas cookies - nothing can beat the smell of fresh cookies coming from the oven, or the taste of an iced sugar cookie in the shape of a Christmas tree...and we don’t even celebrate Christmas. But for those of you who do celebrate Christmas, and those of you who just eat the cookies, this issue’s “Everyday Chemistry” is about the chemistry that goes into making cookies.

First off, the ingredients that go into making cookies: butter, sugar, eggs flour, and baking powder. Butter works to tenderize the cookies through weakening the overall structure of the cookie. It also adds flavor to the cookie, and because the melting point of butter is just below our body temperature, it melts smoothly and slowly in the mouth. Sugar also tenderizes, due to its hygroscopic properties. The eggs and flour provide the protein and starch that give the cookies structural integrity and most of its mass. Chemical leavening agents like baking powder tenderize by increasing the size of the bubbles in the batter.

Next, we make the cookie dough. First, the butter and sugar are mixed together in a process called “creaming.” Creaming aerates the butter - the sharp shards of the sugar crystals cut into the soft butter to create tiny bubbles in the butter. This increases the volume of the butter and serves as a starting point for the bubbles that eventually grow and cause the cookies to be light and fluffy. Then the eggs are mixed in. The flour and baking powder are added next, but be sure not to over mix! Mixing the dough too much causes the flour to form gluten, which makes cookies tough.

Lastly, the cookie dough is rolled into small balls, placed onto a cookie sheet, and sent to the oven to bake. In the oven, the sugar (sucrose) breaks down into fructose and glucose, forming a polymer chain and giving the cookie its light brown, shiny outer crust. When the baking soda (sodium bicarbonate) heats up, the following reaction occurs: $2 \text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$. The carbon dioxide gas expands the bubbles that were created earlier in the creaming process, causing the cookies to rise. The butter prevents the flour from forming an overly extensive network of gluten by weakening the bonds between the proteins. The egg yolk holds the dough together, and the albumin in the egg whites serve as a support structure for the bubbles. Once the cookies are done, they are left to cool, which allows the sugar to caramelize completely and sets the structure formed by the gluten and egg. The cookies then rapidly disappear through a mechanism known as eating.

So, the next time you catch a whiff of those delicious cookies baking in the oven, be sure to stop a moment and pay tribute to all the reactions that are currently occurring and will soon provide you with a yummy, soft, moist cookie!

*note: “Everyday Chemistry” is a new section about the chemistry present in your everyday life. It’s auditioning to become a permanent addition to Reactions, so let us know if you like it!
"A tidy laboratory means a lazy chemist."
-Jons Jacob Berzelius

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Answer from page 3

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