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Kathryn Rem: Better cooking through chemistry

University of Illinois Springfield celebrates National Chemistry Week

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"Let the magic begin," announced Harshavardhan Bapat to a crowd of students as he stirred liquid nitrogen into a bowl of sugar and heavy cream.

With a temperature of -320 degrees F, the nitrogen turned into a white gas when poured, looking a bit like puffy Cumulus clouds.

"Cool," murmured more than one onlooker.

Last week was National Chemistry Week. At the University of Illinois Springfield, the annual event was celebrated by the school's Chemistry Club with a public demonstration of instant ice cream-making.

When the liquid nitrogen hit the sugar and cream, it sucked out the mixture's energy, making it very cold. It took just seconds for the concoction — with some spoon stirring from Bapat and an added dash of vanilla extract — to transform into vanilla ice cream. It was dished into waffle bowls and given away to awestruck gawkers gathered in the concourse of the Public Affairs Center.

"It's very smooth," said Chelsea McFadden, a freshman from Danville. "I think it's better than store-bought. It has a richer flavor and it's creamier."

The Chemistry Club puts on the ice cream demo every year. It's a way for scientists to enlighten the public about chemistry.

"People are afraid of chemistry, unnecessarily," said Bapat, chair of the UIS Chemistry Department and an associate professor. "We hope to show that chemistry can be fun. I wish more people learned about chemistry and took an interest."

Cooking is, essentially, a series of chemical reactions.

Plunging asparagus into boiling water, for example, makes the cells pop, resulting in a bright green color. Overcooking causes the asparagus cells to release acid, altering the color to an unappetizing gray.

Ever have a green banana rapidly turn brown and spotty? It might be caused by exposure to ethylene gas. Make sure the bananas aren't stored with apples, which give off the gas.

Heat red cabbage and it turns from acid to alkaline. Because heat breaks down the red anthocyanin pigment, the cabbage turns blue. To retain the red color, add vinegar (an acid). To make it blue again, add baking soda (a base).

Chemists know why an onion makes you cry, why searing browns a steak, why water causes melting chocolate to seize, why baking powder makes a cake rise, why mold grows on cheese and why brining insures a tender pork chop.

If cooks knew more about chemistry, they would have more success at correcting kitchen mistakes.

To that end, UIS offers a class for non-chemistry majors called "Chemistry Cooks." Taught by dean emeritus Bill Bloemer, it covers general principles and theories of chemistry in the kitchen, including atomic structure of matter, bonding, acid-base concepts and solution chemistry.

"Most of the students watch Alton Brown, get intrigued and want to learn more," said Bloemer about the Food Network host who delves into the science of cooking.

Students do lab work in their own kitchens. They've made litmus paper out of coffee filters stained with the dye of red cabbage. They've concocted ice cream by hand by rolling plastic bags of ice and salt with ice cream ingredients. They've studied caramelization by preparing light roux and dark roux. They've made Jell-O successfully with canned pineapple and learned why it didn't gel with fresh pineapple.

The week that includes Oct. 23 is National Chemistry Week.

Why?

Oct. 23 is Mole Day. On that day, 6:02 a.m. is Mole Minute.

Written as 6:02 10/23, it symbolizes the number of particles — 6.02×10^{23} — in a mole, the basic unit of matter.

Confused?

Eat some ice cream. And appreciate the chemists who understand the processes that make it taste so good.

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