MEDIA PLANET

BUSINESS OF CHEMISTRY

3 TIPS TO PARTICIPATE IN THE INTERNATIONAL YEAR OF CHEMISTRY

A FOCUS ON GLOBAL CHALLENGES

Industry leaders are playing an essential role in addressing the increasing demands for food, water, energy conservation and sustainable thinking

PHOTO: STEPHEN CHEE, SAMARITAN'S PURSE

CHALLENGES

All known matter is composed of **chemical elements or of compounds** made from those elements. Indeed all living processes are controlled by chemical reactions.

TIP 1

VISIT THE IUPAC'S IYC WEBSITE FOR EVENTS

The International Year of Chemistry

In 2011, Chemists will encourage the world to celebrate an International Year of Chemistry.

Only the United Nations General Assembly can declare an International Year.

However the International Union of Pure and Applied Chemistry (IUPAC) (formed in 1919) was the driving force behind this initiative. In April 2006, Professor Bryan Henry (IUPAC President 2006 and 2007) brought the idea of an international chemistry year to the IUPAC Executive and the Union officially endorsed IYC in August 2007. UNESCO designation followed in April 2008 and UNESCO and Ethiopia went on to play critical facilitating roles in obtaining the United Nations declaration in December 2008.

The objectives of the International Year of Chemistry are to:

- Increase the public appreciation and understanding of chemistry in meeting world needs
- Encourage interest of young people in chemistry
- Generate enthusiasm for the creative future of chemistry
- Celebrate the role of women in chemistry (2011 is the 100th anniversary of the award of the Nobel Prize in Chemistry to Marie Curie).

The Opening Ceremony took take place in Paris, France under the aegis of the UN, UNESCO, and IUPAC on January 27-28, 2011. Its theme focused on how Chemistry could help to meet the UN Millennium Goals. There will be an IUPAC World Chemistry Congress from July 30 to August 7, 2011 in San Juan, Puerto Rico, entitled "Chemistry Bridging Innovation among the Americas and the World". The closing event will be on December 1, 2011 in Brussels, Belgium under the patronage of the Chemical and Pharmaceutical Industry.

The UN declaration highlighted the role of chemistry in achieving environmental sustainability. As mentioned, IUPAC and UNESCO are the key international organising partners for IYC. However, the organizations carrying out most of the IYC activities will be the national chemical societies. They will target audiences that are absolutely critical to the success of IYC, namely young people and the general public.

There is an IUPAC website that provides information about events and activities associated with IYC (www.chemistry2011.org). The site is interactive and invites participation. Groups, chemical societies, countries, etc. are encouraged to post information on the site about their own IYC activities.

A Global Experiment is planned as a signature/flagship IYC-2011 activity initiated by IUPAC/UNESCO that will involve children and teachers from around the world. In fact, the experiment hopes to include one million children in 100 countries. These young people will measure simple properties of water and log their data so that there can be a global visualization of the results. The purpose is to provide wider engagement by young people and schools throughout the world in visible hands-on chemistry activities that they share and analyze together.

Our understanding of the fundamental nature of our world is based on chemistry. Molecular transformations are what lead to the production of foodstuffs, medicines, fuels and essentially all manufactured and extracted products. We will rely on this science to maintain a sustainable environment for all the Earth. IYC 2011 is a wonderful opportunity for everyone to celebrate the central contributions of chemistry.

> "Our understanding of the fundamental nature of our world is based on chemistry."

Bryan Henry
University Professor Emeritus, Department of Chemistry, University of Guelph, Guelph,Ontario,Canada

WE RECOMMEND

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Cultivating chemists
Find ways to link chemistry to students' common interests.

> "I've always been really interested in things that don't make sense when you look at them the first time."

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chemistry loves celebrating

Chemistry provides the materials for more than 70,000 products that keep you safe, warm, cool, on time, moving and connected. BASF innovations meet today's most critical challenges—providing energy, mobility, nutrition, construction and housing for a growing world population. BASF celebrates the International Year of Chemistry. At BASF, we create chemistry.

www.basf.com/IYC

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NEWS

CHANGING THE WAY WE LOOK AT CHEMISTRY

Chemists find themselves essential elements in facing increasing demands for food, water, energy conservation and sustainable thinking.

Growing food concerns

According to the United Nation's Food and Agriculture Organization, a projected 2.3 billion population increase by 2050 will require 70 percent more food. Aside from production, chemists look to better preserve and transport high-nutrition foods.

"We're working on the design of food packaging from a respiratory standpoint—meaning when foods are packaged then you have potential for rotting," says Dr. Theresa Kotanchek, vice president of sustainable technology and innovation sourcing at Dow Chemical Company. Kotanchek notes that advances in packaging technology increases the ability to move fresh foods around the world and extends their shelf life.

Changing the way we look at business

BASF is looking at ways to meet environmental challenges by changing the way business works, balancing ecology, social responsibility and economics with tools such as their Eco-Efficiency Analysis.

The Freedom Tower in New York will stand as a successful representation of the program. The environmental and economic balance resulted in a construction mixture of concrete and waste materials of fly ash and slag, conserving water, energy and fossil fuel.

Students looking to the future

Future chemists are exploring challenges as well. With the International Union of Pure and Applied Chemistry's (IUPAC) Water: A Chemical Solution program, part of the International Year of Chemistry celebration, students from primary to high-school levels conduct experiments including water filtration, as well as tests for water quality, including acidity and salinity.

"We want to focus on young people from around the world to show how chemistry can make a difference in the provision of potable water," says Dr. Peter Mahaffy, professor of chemistry at The King's University College, Edmonton and chair of IUPAC's Committee on Chemisty Education.

Dr. Peter Mahaffy,
Professor of Chemistry at The King's University College, Edmonton and Chair of IUPAC's Committee on Chemistry Education

"We want to focus on young people from around the world to show how chemistry can make a difference in the provision of potable water."

In conjunction, the Visualizing and Understanding the Science of Climate Change allows students from 14 to 18 to explore lessons regarding temperature, precipitation, radiation balance, climate models as well as basics of the language of understanding and explaining climate change.

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QUESTIONS & ANSWERS

Michiel van Lookeren Campagne, Ph.D.,
Head of Biotechnology Research for Syngenta, Research Triangle Park, N.C.

■ With the population growth occurring today, the need to address food security is greater than ever. How will the biotechnology industry address the needs that population growth demands?

We can meet the challenge of a bigger population by growing more from less. We can do that by changing the way we produce; developing and using practices and technologies that dramatically increase yield per acre, while using water and other natural resources efficiently and sustainably.

That demands a multi-disciplinary approach, including better and faster plant breeding, improved agronomic practices, broad use of genetically enhanced crops, and high-tech crop protection technology.

We can feed more people in the future the way we have in the past—by innovating.

PROVIDING WATER
Water purification before and after in Cambodia. Samaritan's Purse's Household Water Program works to provide clean water to densely populated areas of the world.
PHOTO: STEPHEN CHEE, SAMARITAN'S PURSE

TIP 2
CONSIDER HOW CHEMISTRY IMPACTS YOUR LIFE

From human health to household products: Chemistry solutions for everyday living

■ **Question:** Unsure what role chemistry plays your life?
■ **Answer:** Just take a look at your health and your home

You attend to family in your home, probably without a thought to the team of scientists who make it possible.

For example, upon opening your pantry, you'll find several foods now fortified with vitamin A thanks to chemistry. This important building block for the immune system not only helps prevent disease around the globe, but also within your home. Items such as cereals and low-fat milk now include the supplement, which assists in fighting off viruses and harmful bacteria. Also, as the weather warms up this spring, Americans will grab thousands of bottles of sunscreen, that include UV filter ingredients, which are developed through chemistry.

Not only does chemistry attribute to keeping your body healthy, but it also extends to a cleaner home. Many products' effectiveness and cost efficiency are improved through chemistry's innovations.

"One example where chemistry plays an important part is laundry detergent ingredients," Dr. Beate Ehle, executive vice president, BASF Corporation says. "It may seem hard to believe, but the simplest of purchases, for example, household detergents, can offer the end user savings. BASF produces ingredients for laundry detergents that enable cleaning in cold water temperatures and the utilization of less water."

"Countless other products in our lives are made possible by chemistry, from heart monitors to satellites and cell phones to synthetic fibers," says Ehle. "Shampoo, chairs, insulation, flooring, and even catalytic converters and concrete are comprised of chemicals. In summary, almost everything we come into contact with in our day-to-day life involves chemistry."

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"Countless other products in our lives are made possible by chemistry, from heart monitors to satellites and cell phones to synthetic fibers."

PANEL OF EXPERTS

David E. Kepler, Executive Vice President, CIO and Chief Sustainability Officer, The Dow Chemical Company

Dr. Kurt Bock, Chairman and Chief Executive Officer, BASF Corporation

1.How do you hope the initiatives around International Year of Chemistry will influence the way people view and understand the chemical industry as a whole?
2. The chemical industry is highly innovative and a key driver for many other industries. Based on your experience, can you provide an example of how this is true?

1. The International Year of Chemistry provides a unique moment in time to advance public understanding of chemistry and how, as a science, it's applied in everyday life. Many of us understand the amazing things chemistry can do, but most do not. The world needs chemistry to address the needs of our evolving planet to ensure we have access to safe and abundant water to drink, to guarantee our food supply is plentiful, and to ensure we all have access to safe and affordable energy to power our homes. It's chemistry's time to shine as a catalyst for solutions.

2. With approximately 95 percent of manufactured products enabled by chemistry, it's hard to narrow it down to only one example. Dow is a materials company and materials are enabled by chemistry. From advanced batteries for transportation to energy efficient building materials, from purification systems that improve access to clean water and better seeds and packaging materials that allow the delivery of safe and healthy food options to a growing population—these are just a few of the ways that Dow scientists and engineers improve quality of life on a daily basis through chemistry.

1. There is perhaps no industry with greater potential to solve the challenges facing the next generation. By the time today's third graders reach their thirties, there are expected be another 2.2 billion people in the world—roughly the combined population of present day North America, South America and Africa. How will we sustainably feed, house, move, power and keep healthy this growing global community? The answers, very probably, will depend on chemistry. The International Year of Chemistry is a chance to demonstrate to people of influence, as well as everyday citizens, the unique power of chemistry as a force for positive change in the world.

2. With the number of private vehicles expected to quadruple by 2030, the need for sustainable transportation technologies is quite clear. From the catalytic converter, to lighter plastic components, to energy and emissions-reducing coatings, chemistry innovations contribute significantly to the evolution of the automobile.
In October, 2010, BASF broke ground on a new plant in Elyria, Ohio that will produce material for lithium-ion batteries. This chemistry-enabled energy-storage technology will help deliver the power and range needed to take electric vehicles from cutting-edge to commonplace—another important transportation option for the growing global community.

NEWS

2011 is the 100th anniversary of the award of The Nobel Prize in Chemistry to Marie Curie.

This year, Dr. Jillian Banfield will receive the L'Oréal-UNESCO "For Women in Science" award for her studies on microbes and their effect on our planet. Her success is fueled by work ethic, passion and a focused commitment to science's oft-forgotten purpose: to change the world for the better.

"It never occurred to me to choose a research topic that would be publicly popular," Dr. Banfield says. "Incorporating information about microbial effects into descriptions of how the biosphere functions will be important for predicting and managing the environment in the future."

Like her inspirational female predecessors, Dr. Banfield's achievements are helping to eliminate the relevance of gender in the scientific world.

"Over the past twenty years, I feel that things have changed considerably," Dr. Banfield says. "It is clear that things are moving in the right direction."

GERRY STRAUSS

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TIP 3

MOTIVATE YOUNG STUDENTS

Veggie Van
From left to right: Jonathan Boyle, Jonathan Jackson, and Robert Elio of South Shore Charter (Northwell, Mass.) sit on a Veggie Van, a vegetable-fuel-powered shuttle they developed. PHOTO: SOUTH SHORE CHARTER PUBLIC SCHOOL

Question: How do we prepare for greater workforce demands in the field of chemistry?
Answer: Make science more relevant to students while they're young.

Cultivating chemists

Jonathan Jackson is a busy 11th grader at South Shore Charter in Norwell, Mass. In addition to studying advanced Spanish, playing soccer and volunteering with river clean-up activities, he's helping design alternative-fuel transportation projects.

Jackson and his classmates developed a project calculating carbon emissions and expanding use of vegetable-fuel-powered shuttles, or Veggie Vans, to their school. The endeavor earned them one of the five final spots in the Samsung's Solve for Tomorrow competition competing for $155,000 in technology prizes. The team will learn how the project fared against other students in April.

Finding a link to student interests

"I've always been really interested in things that don't make sense when you look at them the first time," Jackson says. "It's really developed a lot more through my high school science courses."

Several of Jackson's classmates are involved in the sciences and particularly interested in how they work to improve the environment. Jackson considers himself fortunate, learning from teachers who made science relevant to his life, a thought echoed by Dr. Peter Mahaffy, professor of chemistry at The King's University College, Edmonton and chair of the International Union of Pure and Applied Chemistry's (IUPAC) Committee on Chemistry Education.

"We haven't done as good of a job as we can of really communicating to students that the tools of chemistry can make a difference –a big difference in challenging complex problems," Mahaffy said. "It's a message that's beginning to get through."

The Chemical industry has also noted the rising need to recruit students to sciences and started courses of their own. Programs such as Dow Chemical's You Be the Chemist and BASF's Kids' Lab focus on sparking early interest in the growing fields of chemistry.

"I think the demand side has increased rapidly as we see all these daunting challenges in climate change and energy efficiency, food security and affordable housing," Bo Miller, global director of corporate citizenship and president and executive director of the Dow Chemical Company Foundation says.

"If you get students interested in science in a fun way early, they'll continue their interest in science throughout their life," Robin Rotenberg vice president and chief communications officer at BASF Corporation says. "We have experiments which link chemistry to everyday life, where kids create hair gel, lip gloss and items they can relate to so they better understand science, and will hopefully continue exploring."

Jackson anticipates he'll continuing studying science for the pure pleasure of learning and understanding issues, something he encourages other students to do.

"I think it's really about finding what interests you," Jackson says. "There really is just so much out there."

WENDY TAYLOR

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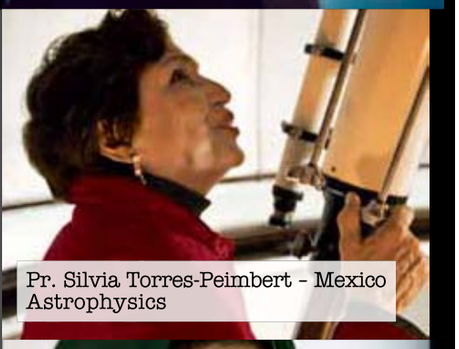
L'ORÉAL-UNESCO AWARDS 2011 FOR WOMEN IN SCIENCE

We support women who move science forward

The L'ORÉAL-UNESCO Awards honor women scientists from five continents. Each year, they are selected by an international jury presided by a Nobel Prize laureate.

To date, 67 women have been recognized for the exceptional quality of their research, which has made them role models for the next generation. In addition, L'Oréal and Unesco have granted more than 1,000 fellowships to young women researchers. Unesco and L'Oréal are convinced that science is the source of progress for society and that women have an essential role to play in that progress.

Pr. Jillian Banfield - USA
Geophysics



Pr. Silvia Torres-Peimbert - Mexico
Astrophysics

Pr. Faiza Al-Kharafi - Kuwait
Chemistry

Pr. Vivian Wing-Wah Yam - China
Chemistry and Energy

Pr. Anne l'Huillier - Sweden
Attophysics

FOR WOMEN IN SCIENCE

UNESCO
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www.forwomeninscience.com

I am the Human Element in the relentless pursuit of making things faster and smaller. Innovation in this world happens at the molecular level. And it's achievements like these that are being honored during the International Year of Chemistry in 2011. Throughout the year, we'll be joining the United Nations in this celebration of how chemistry can change what we consider possible for humanity.

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