



Catalyzer

44th International Chemistry Olympiad United States of America

no. 1

July 17, 2011

Welcome to the 44th IChO! We look forward to your arrival in the USA.



On behalf of President Obama and myself, I send greetings to participants in the 43rd International Chemistry Olympiad, being held this year in Ankara, Turkey. To the Olympians themselves, who have come from scores of nations around the world, I commend you for your pursuit of one of the most exciting and valuable disciplines in science. Chemistry is the science that turns physics

into biology. It is the science that transforms raw materials into commercial products such as fuels, pharmaceuticals, and building materials, and in doing so powers our economy in countless ways. And it is the science that illuminates how all that grows or is built gets decomposed and recycled, forever giving life a fresh chance to make the most of our world's limited resources.

To your parents, teachers, and other supporters, I send my good wishes as well. Thanks to your patience and generosity, the students competing in Ankara are well along the path to becoming leaders in a field crucial to humanity's ability to meet the grand challenges of the 21st century, including the growing need for fresh drinking water and healthy food; environmentally sustainable energy sources; and new medical treatments and cures.

I encourage everyone associated with this year's Olympiad to continue your efforts to harness the magnificent potential of chemistry and to make our world a more sustainable and healthy place for all. And I look forward to seeing many of you in July 2012, when the United States will be hosting the 44th International Chemistry Olympiad. Best wishes and good luck to you all!

Sincerely,

John P. Holdren, Director
Executive Office of the President
Office of Science and Technology Policy



As president of the 44th International Chemistry Olympiad (IChO), I am delighted that the 2012 competitions will be held in Washington, DC. The International Chemistry Olympiad is uniquely positioned for celebrating the beauty and cornucopia of chemistry with the best young minds. By intellectually bonding with fellow students from all over the world, they form networks for the future.

Chemistry remains at the very center of scientific endeavor with fundamental contributions in the physical and life sciences. It is fitting that the American Chemical Society, the world's largest scientific society, oversees this significant event in a special year — The International Year of Chemistry.

I welcome all of you to the United States and look forward to seeing you in 2012.

Sincerely,

Dr. Ahmed H. Zewail
1999 Nobel Laureate in Chemistry
President, 44th IChO, 2012
Linus Pauling Professor of Chemistry
California Institute of Technology



Celebrating International Excellence in Chemistry

About the United States of America



"I have no other view than to promote the public good, and am unambitious of honors not founded in the approbation of my Country."

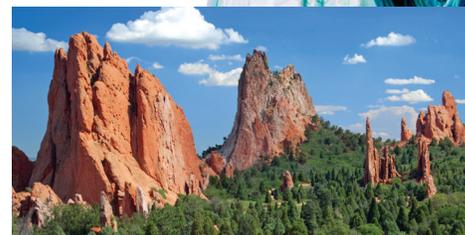
—George Washington, 1st American President

"The American, by nature, is optimistic. He is experimental, an inventor and a builder who builds best when called upon to build greatly."

—John F. Kennedy, 35th American President

"I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin, but by the content of their character."

—Martin Luther King, Jr., Civil Rights Advocate



Top: The Statue of Liberty in New York City, New York. Above: Garden of the Gods in Colorado Springs, Colorado

U.S. Geography/Culture: From the cool and remote coastline of Maine to world-class cities like New York and Los Angeles that never sleep, from the wide prairies of America's heartland states, to the towering peaks of the Rocky Mountains, the United States is one of the world's most geographically diverse nations.

Likewise, as the product of more than 500 hundred years of large-scale immigration with more than 308 million people, the U.S. is one of the

world's most ethnically diverse and multi-cultural nations. Founded July 4, 1776, the U.S. is comprised of 50 states and a federal district, Washington, DC.

Visitors to the U.S. are often surprised by the distance between metro centers, favorite historic sites, and popular attractions as the nation spans 3.79 million square miles (9.83 million square kilometers). Forty-eight contiguous states extend across the width of the North American continent from the Atlantic Ocean to the Pacific Ocean; Mexico lies to the south, with Canada to the north. The 49th state, Alaska, is north and west

of Canada; the archipelago of islands that make up the 50th state, Hawaii, lie 2,500 miles (4,023 kilometers) off the coast of California near the middle of the Pacific Ocean.

Climate: Summers vary considerably in the U.S., but late July in Washington, DC. is reliably hot and humid. Expect average temperatures around 88° F (31° C) and bring light clothing. Buildings are generally well air-conditioned, so a light sweater may be handy.

The Space Needle in Seattle Washington

About Washington, DC

The District of Columbia, which is commonly referred to as Washington, "the District," or simply, DC., is the capital of the United States. In addition to being the headquarters for the U.S. government, Washington is home to many of the nation's most famous monuments and museums, including the extensive and varied holdings, known as the Smithsonian, which include: The National Air and Space Museum, the American History Museum, the National Portrait Gallery, the National Museum of Natural History, and the National Gallery of Art, among others. The greater Washington area hosts 174 foreign embassies as well as headquarters of the World Bank, the International Monetary Fund (IMF), and many other institutions, universities, lobbying groups, and professional societies.



The American Chemical Society (ACS) has its headquarters in Washington, with additional offices in Columbus, Ohio. ACS is a nonprofit organization chartered by the U.S. Congress. With more than 163,000 members, ACS is the world's largest scientific society and a global leader in providing access to chemistry-related research



through multiple databases, peer-reviewed journals, and scientific conferences.

A sponsor of the 44th IChO and a key source of professional support, advice, and scholarships and mentoring opportunities for young chemists, ACS welcomes you to Washington!

About the



UNIVERSITY OF MARYLAND



The University of Maryland, College Park, the venue for the theoretical and practical examination, is a major public research university located on 1,250 acres of rolling land on the Baltimore-Washington, DC. corridor.

Founded in 1856, the University of Maryland educates the most talented students from Maryland and beyond. It ranked 12th among all public U.S. universities and 36th worldwide in a recent international survey and was named one of the top 18 “green universities” in the country. UM’s faculty and alumni include



Rub a turtle for luck! Testudo, a Diamondback turtle, is the official mascot for the University of Maryland, and statues of the lucky turtle can be found at three locations: Comcast Center, Cole Student Activities Building, and Byrd Stadium. Rubbing his nose before an exam is one of UM’s most enduring traditions, going strong since 1933! Students have also been known to leave the ter-rapin offerings of many kinds: food, soda, poems, candy, coins, even computer disks!



ODK fountain and McKeldin Library

six Nobel laureates: of particular note, Herbert Hauptman who received his Ph.D. in mathematics from UM and won the 1985 Nobel Prize in Chemistry.



In the fall of 2010, 37,595 students were enrolled at UM, 26,876 of which were undergraduate students, including: 74% from Maryland, 17% from other U.S. states and territories, and 9% from other countries. UM embraces diversity and takes advantage of its proximity to Washington, DC., to educate tomorrow’s leaders and address global challenges.

The Department of Chemistry and Biochemistry is part of the College of Computer, Mathematical and Natural Sciences. The College offers every student a high-quality, innovative and cross-disciplinary educational experience. The Department of Chemistry and Biochemistry integrates the Biological Sciences with the Physical Sciences and Engineering in research and teaching. As the principal home for biophysics and biochemistry on campus, the department is the link to biology and bioengineering.



The M circle on campus



Photos left to right: ACS Hach Building, Smithsonian Castle, White House, Washington Monument, Lincoln Memorial, and NASA’s Goddard Space Flight Center Science Exhibit



Exterior of Jeong H. Kim Engineering & Applied Sciences



Aerial view of University of Maryland campus

Tentative Schedule

Date	Students	Mentors, Observers
July 21 Sat	Whole day	Arrivals and Registration
July 22 Sun	morning	Opening Ceremony
	afternoon	Recreation/Excursion
July 23 Mon	morning	Lab Inspections
	night	Free Time
July 24 Tue	Whole day	1st Jury Meeting
July 25 Wed	morning	Excursion
	afternoon	Translation – Practical Exam
July 26 Thu	morning	Safety Instruction / Practical Exam
	afternoon	Excursion
July 27 Fri	morning	Free time
	night	2nd Jury Meeting
July 28 Sat	morning	Excursion
	afternoon	Translation – Theoretical Exam
July 29 Sun	morning	Theoretical Exam
	afternoon	Excursion
July 30 Mon	morning	Reunion Party
	night	Score Marking
July 31 Tue	morning	Recreation/Excursion
	afternoon	Excursion
August 1 Wed	morning	3rd Jury Meeting
	night	Arbitration
August 2 Thu	morning	Excursion
	afternoon	4th Jury Meeting
August 3 Fri	morning	Free Time
	afternoon	Free Time
August 4 Sat	morning	Closing Ceremony
	afternoon	Banquet – Farewell Party
August 5 Sun	Whole day	Departures



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Designer: Cornithia A. Harris

See you Soon!



no. 2

July 21, 2012

Catalyzer

44th International Chemistry Olympiad United States of America

The organizers of the 44th International Chemistry Olympiad (ICHO) would like to extend our welcome to the world's most talented chemistry students at the secondary school level. You and your teammates are joining teams from around the world to test your chemistry knowledge and skills in a five-hour laboratory practical and five-hour written theoretical examination.

But beyond that, it is our great hope you will make new friends from different nationalities and learn about their culture and education. Some of the friendships you will form at this Olympiad will last for the rest of your lives.

In addition to the technical program, we have planned an exciting schedule of excursions and events where you can learn about our country and our culture. You will be staying at the **University of Maryland**, one of the most beautiful university campuses in our country. You will have a chance to visit the world famous **Smithsonian museums** and take a trip to **NASA Goddard Space Center** and see the future of space exploration. You will tour our **national monuments and landmarks** in **Washington, D.C.** We also have a full-day excursion to the amazing amusement park at **Kings Dominion**, along with a major league baseball game and even a little time to do some shopping.

We are pleased you are here and together we will make the 44th International Chemistry Olympiad an event you will remember forever.



Photos.com



University of Maryland



Photos.com

Top to bottom: Skyline view of Washington, D.C., map of Maryland and Washington, D.C. area, University of Maryland campus and students. Far left: The Thomas Jefferson Memorial statue. Left: Tourists and Park Ranger explaining one of the Washington, D.C. memorials.

Herbert H. Dow

Advancing U.S. Chemical Industry

Herbert H. Dow was an industrious youth. While he was still a schoolboy, Dow invented a new method of extracting bromine from the brine deposits that underlie much of the American Midwest. Instead of boiling the treated brine solution, he trickled it over a burlap curtain and blew a current of air through it.

“By passing the bromine-laden air through a body of iron turnings,” Dow said in his patent application, “the bromine and iron will chemically unite, forming a bromide of iron known as ferric bromide.”

In the late 19th century, the U.S. was highly reliant on European nations for chemicals, medicines and other products. Bromine, a main component of medicines, was largely imported from German and British companies. Dow’s innovative process allowed bromine to be produced in the U.S. through the successful application of electrochemistry. The company he founded in 1897 quickly became the world’s most efficient producer of bromine.

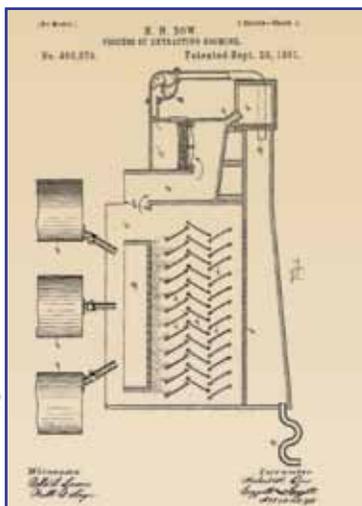
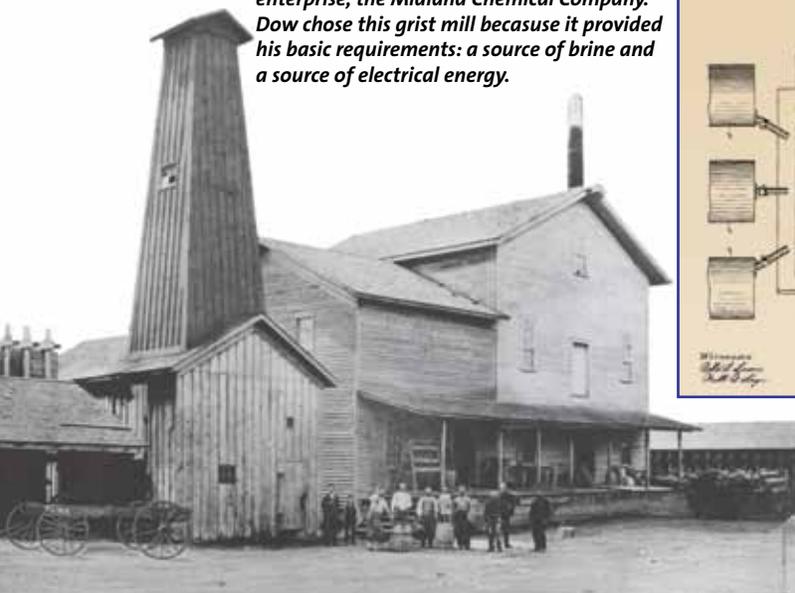
Dow built upon this innovation and was soon extracting chlorine, iodine, potassium salts and other chemicals from brine deposits. Over time, Dow’s company worked to develop new products derived from the brine stream, including chloroform, calcium chloride and Epsom salts. As the supply of chemical products expanded, the company grew, and the steady and reasonably-priced supply of chemicals contributed to the rapid development of pharmaceutical and photographic industries in the U.S.

Over the next century, the Dow Chemical Company would become one of the world’s largest specialty chemical, advanced materials, agrosiences, and plastics businesses. These successes stem from the ideas and determination of the young inventor, Herbert H. Dow.

Dow’s discovery of an electrolytic process for the production of bromine was designated as a National Historic Chemical Landmark by the American Chemical Society in 1997. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.



Above: Herbert H. Dow, 1924.
Below: The Evans Mill, rented by Herbert Dow in 1890 as the location of his new enterprise, the Midland Chemical Company. Dow chose this grist mill because it provided his basic requirements: a source of brine and a source of electrical energy.



Above: Illustration from Herbert Dow’s “Process of Extracting Bromine”, patented in 1891.

The Dow Company and its Role as a Sponsor

As an advocate for the advancement of STEM education, The Dow Chemical Company is extremely proud to be the sole corporate sponsor of the 44th International Chemistry Olympiad (IChO).

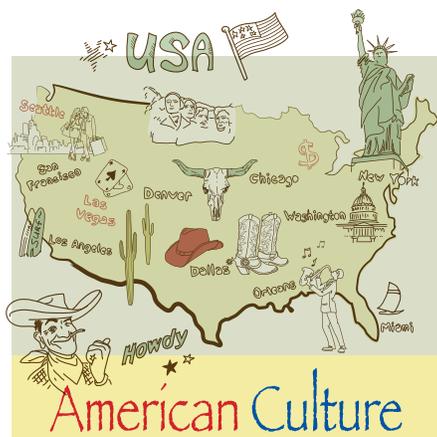
As a global chemical company based in the United States, Dow saw the 44th IChO as a unique opportunity to celebrate the power of chemistry and inspire the next generation of chemists to solve global challenges. This year’s competition is particularly special because it marks the second time in history that it has been held in the United States.

Since announcing the commitment in September 2011, Dow has facilitated events leading up to the 44th IChO in several countries including Brazil, France, Russia, and Thailand.

Building on this tremendous opportunity to connect with chemistry students across the globe, Dow launched the **Dow Solutionists in School Facebook page** in March. Since the launch, the page has built a community of more than 14,000 students, educators and influencers around a common interest in chemistry.

Dow is honored to work with the American Chemical Society to raise public appreciation for the role of chemistry in our lives, and for the future scientists who will help ensure a sustainable future for our planet. Best of luck to all of the competitors!





The **United States of America** is a multicultural country where our citizens originate from all over the world. We are a nation of native Americans and immigrants. Traveling across the country you can experience many cultures. However, there are several things that many Americans enjoy—seasonal sports, literature, going to the theater or a movie. Since the 1920s, America's film industry (*known as Hollywood*) has been the major producer of motion pictures in the world.



You will find food from all over the world in the USA. Regional food like Maine Lobster and Pacific Salmon is transported all over. And don't be surprised to find hamburgers, hot dogs and pizza sold almost everywhere.



Though many Americans drive, we love to ride bikes and walk. You are visiting Washington, D.C. which is one of the largest metropolitan areas in the country. Yet, the USA has hundreds of natural parks and an abundance of open space. The USA has long been a leader in technology, from the invention of the steamship and the light bulb to today's computers and smart phones.



PAST PARTICIPANT



J.L. Kiappes

J.L. Kiappes, USA 2004

As a student in 2004, I remember furiously studying for IChO before leaving the States...trying to cram as much as I could. Even so, I was very nervous about the exams. This year as an author, I am nervous about the exams again, but it is because I hope you will find the chemistry interesting and worth thinking about!

Having been an IChO participant, I can tell you that more important than the exams and medals are the friends you will make while here. Almost a decade later, people I met through the Olympiad are still friends, and some are now colleagues with whom I collaborate. This is truly a once in a lifetime experience to meet people from so many places who share an interest—make the most of it. I hope our chemistry and capital will be the backdrop for memories and friendships that will last a lifetime. Best of luck this week! Welcome to the 44th IChO!

PAST PARTICIPANT

Jason Chen

Assistant Professor, Department of Chemistry, Iowa State University

Chemistry is often referred to as "the central science" since it is so broadly applicable. Chemistry is critical to advances in medicine, agriculture, energy, and materials (to name but a few uses). I remember being overwhelmed by the broad range of topics (spanning organic, inorganic, physical, and analytical chemistry) that I had to study while preparing for the Chemistry Olympiad. However, this whirlwind tour gave me a strong appreciation for the wonders of chemistry. I found the combination of logic and creativity in organic chemistry to be particularly appealing. This led to my decision to study chemistry in college, where I decided to specialize in organic synthesis. Now a professor of organic chemistry, I look back at my participation in the Chemistry Olympiad as the key event that started me down this road.



Jason Chen

PAST PARTICIPANT

Ísak Sigurjón Bragason,

Iceland IChO: Greece 2003

Since my first contact with chemistry in grade school it has been my favorite subject, so getting to participate in the 35th IChO in Athens was an incredible adventure. We had some excellent training at home, both informative and fun, but in truth I didn't know much about what to



Ísak Sigurjón Bragason

expect from the exams. It was only the second time Iceland participated in the Olympiad, so our mentors were still learning as well! On the whole it was a great experience, further invigorating my interest in the field. Since then I've attained a bachelor's degree in chemistry and spent a couple of years teaching the subject before moving on to my master's studies. In 2010 I had the privilege of revisiting the IChO, in Tokyo, Japan, this time as a mentor. I have many fond memories of the Olympiads and sincerely hope I'll get the chance to acquire some more in the future!

10 Day Schedule

		Students	Mentors and Observers
July 21 Sat	whole day	Arrivals and Registration	
July 22 Sun	morning	Opening Ceremony/Clarice Smith Performing Arts Center UM	
	afternoon	Washington, D.C. Tour	Lab Inspections
	night	Evening Activities	1st Jury Meeting
July 23 Mon	whole day	NASA Annapolis, MD Tour	Translation – Practical Exam
July 24 Tue	morning	Safety Instruction / Practical Exam	Washington, D.C. Tour
	afternoon		Meeting with Authors
	night	ACS Pres. Demonstration	2nd Jury Meeting
July 25 Wed	whole day	Washington, D.C. Tour	Translation – Theoretical Exam
			Potomac River Cruise
July 26 Thu	morning	Theoretical Exam	Washington, D.C. Tour
	afternoon		
	night	French Embassy Reunion Party	
July 27 Fri	morning	Baltimore Harbor Camden Yards Baseball Game	Score Marking
	afternoon		Free Time
	night		3rd Jury Meeting
July 28 Sat	morning	Kings Dominion Amusement Park	Arbitration
	afternoon		
	night		4th Jury Meeting
July 29 Sun	morning	Free Time	Free Time
	afternoon	Closing Ceremony/Gaston Hall Georgetown University	
	night	Banquet – Farewell Party/ National Building Museum	
July 30 Mon	whole day	All Day Departures	

Weather Today
Partly Cloudy
82 °F (27 °C)

Weather Tomorrow
Partly Cloudy
88 °F (31 °C)

Puzzle

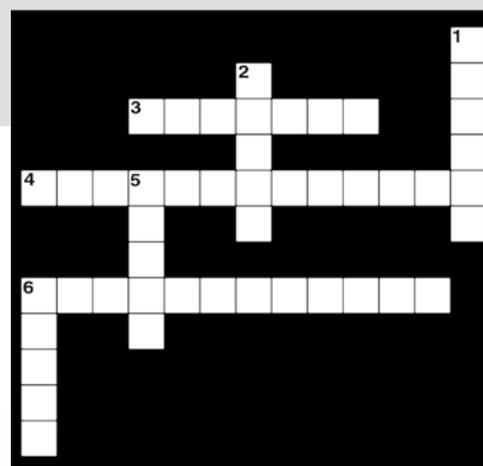
Simple Machines

Across

- The point about which 5 down pivots.
- A ramp. (*two words*)
- This simple machine lets cars and bicycles roll.

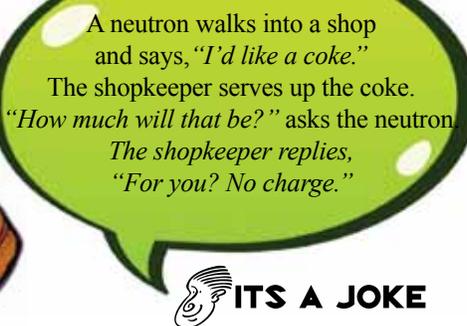
Down

- A wheel over which a rope or belt is passed.
- A spiral version of 4 across.
- There are three basic types of this simple machine.
- A modified version of 4 across, it can be found in the blade of a knife or an axe. (*three words*)



Sebastian Gogg,
Austria, July 21

HApPy BiRtHDay!



On the cover masthead: Testudo, a Diamondback terrapin, is the official mascot for the University of Maryland. Statues of the lucky turtles, known as Terps, can be found throughout the campus. Rubbing his nose before an exam is one of Maryland's most enduring traditions.



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Catalyzer

44th International Chemistry Olympiad United States of America

no. 4

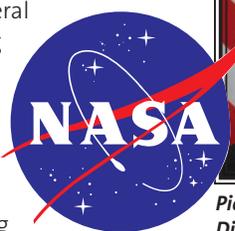
July 23, 2012

To Boldly Go on a NASA Goddard Excursion!

NASA's Goddard Space Flight Center is home to the nation's largest organization for the exploration of space. Teams of scientists, engineers and technologists build spacecraft, instruments and new technology to study the Earth, the sun, our solar system, and the universe.

Named for American rocketry pioneer Dr. Robert H. Goddard, the center was established in 1959 as NASA's first space flight complex. Goddard and its several facilities are critical in carrying out NASA's missions of space exploration and scientific discovery.

The Visitor Center has many exciting and visually stimulating exhibits describing some of the space exploration programs of the Goddard Space Flight Center. They have interactive displays and models, as well as real examples of satellites and rocket flight hardware. The collection even has a piece of the moon! A new and exciting exhibit called "Science on a Sphere" uses computers and video projectors to display animated data on the outside of a suspended, 6-foot diameter, white sphere. Get ready to go boldly where no Olympiad has gone before!



Piers Sellers, NASA Astronaut and Deputy Director, Sciences and Exploration Directorate at NASA Goddard Space Flight Center.



All photos courtesy of NASA

John Mather, senior astrophysicist, Nobel Prize in Physics laureate and James Webb Space Telescope Project Scientist at NASA Goddard Space Flight Center.



NASA Goddard Space Flight Center



Joshua Sebree, research fellow at NASA Goddard Space Flight Center, conducts chemistry demonstrations.

Carbon Fibers: A Vital Material for the Modern World

Carbon fibers stand as one of the most versatile materials in the world today.

From iPad covers to aircraft, carbon fibers have proven vital in the modern world.

The modern era of carbon fibers began in the 1950s, when research on the melting point of graphite under high temperatures and pressures led to the discovery of carbon moving straight from the vapor phase to the solid phase.

Roger Bacon, a young American physicist at Union Carbide, demonstrated the first high performance carbon fibers in 1958.

Experimentation in the United States continued using rayon to create fibers, while in the United Kingdom scientists used polyacrylonitrile (PAN) fibers, which eventually became the dominant technology. In either case, the fibers are spun into filaments and then carbonized to produce carbon fiber. The carbon fibers may be further treated to improve their qualities.

Today, the largest consumer of carbon fibers is the aerospace industry. Carbon fiber-based composite materials are used in the fuselage and segments of the



wings. Carbon fibers are ideal because of their lightweight qualities and superior strength. They can also be found in the blades of wind turbines and in sports equipment such as skis, tennis rackets, and golf clubs.

Applications for carbon fibers continue to grow. The automotive industry is expected to employ carbon fibers to produce lighter vehicles that will use less fuel compared to vehicles made with traditional materials.

The development of high performance carbon fibers was designated as a National Historic Chemical Landmark at GrafTech International (as Union Carbide's carbon products division is now known) in Parma, Ohio, on September 17, 2003. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.



Sustainability

As part of Dow's business of rearranging atoms and reshaping molecules to create new materials and technologies, our innovations help contribute to a more sustainable world. Our sustainability focus is organized around four pillars: innovations for tomorrow, smart solutions for today, partners for change, and responsible operations.

Dow contributes to the sustainability of society and our planet by developing innovative technologies for today. Unveiled in 2009, Dow Solar manufactures Powerhouse Solar Shingles that function like a standard asphalt shingle while harnessing the power of the sun to offset a portion of a home's energy usage.

Looking ahead, Dow technologies enable our customers, and their customers, to develop products and services for a more sustainable future. As the world continues to evolve, Dow researchers are committed to maintaining a robust innovation pipeline that will provide solutions for future challenges.



Shutterstock

Dow is a leader in collaborating with customers, suppliers, communities, civil society and governments to advance sus-

tainability. Perhaps the best example of this is our collaboration with The Nature Conservancy, announced in January 2011, to incorporate nature into Dow's business goals, decisions and strategies.

Dow is committed to ensuring that our infrastructure has a positive impact on our company, our communities and ourselves. To accomplish this, we will continue to make progress toward a vision of no accidents, injuries or harm to the environment.

These pillars are an integral part of Dow's drive for sustainability because they help our employees achieve, customers succeed, consumers live better lives, and communities thrive. Dow is committed to setting a positive example for sustainable practices, and will continue to lead the charge toward a more sustainable world.



Photos from the Opening Ceremony and Sightseeing



Photos by Peter Cutts Photography

Energy Sources Puzzle Answers

ACROSS: 1.fission 3. fusion 4. hydroelectric 5. renewable
DOWN: 1. fossil fuels 2. solar cell 6. wind

Monday, July 23 Schedule

	Students	Mentors and Observers
whole day	NASA Annapolis, MD Tour Dinner, Game Night and Shopping	Translation – Practical Exam

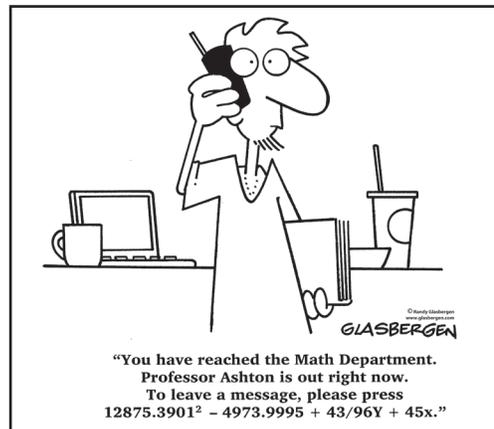


Teams coming to the IChO are encouraged to share their culture with the rest of the world. Team Mexico brought some amazing foods for others to try including **hot chilis** and **crickets**! Cultural exchange at the International Olympiad is definitely off to a hot start!



Natalia Tono
Student Guide

Team Mexico



A Quick Quiz for You: Are you a chemist?

1. What is a mole?
2. Pronounce 'unionized'.

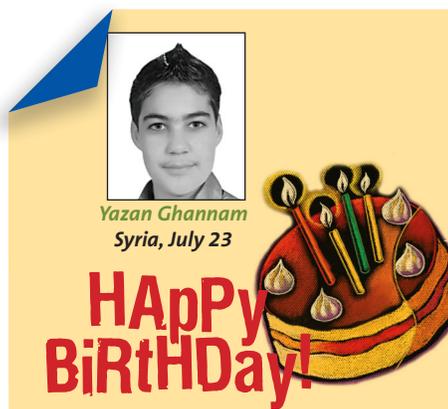
Answers are in issue #5.

Q What was your favorite part of the Opening Ceremony?

A. "I was very inspired by the Nobel Prize winner, Richard Schrock, when he said that he wasn't that interested in winning awards or medals, but was more interested in making contributions to chemistry."



Ivan Kurniawan
Indonesia



2000 B.C., Egypt

The first toothpaste mentioned in recorded history was devised by Egyptian physicians about four thousand years ago. Highly abrasive and puckeringly pungent, it was made from powdered pumice stone and strong wine vinegar and brushed on with a chew stick.

On the cover masthead: NASA space shuttle prepares for launch.

SUPPORTERS



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no. 5

July 24, 2012

Alexander Tukov, PhD Student, Russian Academy of Sciences, Moscow, bronze medalist of the 35th IChO, 2003, Athens, Greece



Alexander Tukov

Prior to the olympiad the Ukrainian team had intensive theoretical and practical training at the Chemistry department of V.N. Karazin Kharkiv National University. We fundamentally reviewed all topics related to the preparatory problems. Thanks to remarkable lecturers this training was very useful both for solving tasks at the olympiad and during university courses afterwards.

The theoretical exam at the 35th IChO was a little different than I expected. It featured many but quite simple problems (multiple choice tests) and only a few complex theoretical problems. To my mind, that exam predominantly required quickness and attentiveness, but not deep knowledge and creativity. Hence, many students got very high points.

The practical exam was in line with my expectations. It included organic synthesis and an analytical part (including qualitative and quantitative analysis). Due to the relatively simple theoretical exam, the practical one appeared to gain elevated importance.

I was very glad to take part in the International Chemistry Olympiad. This gave me an opportunity to meet a lot of young gifted people from all over the world. Amazingly, later I met some of them at the University and conferences. The olympiad definitely gave me aspiration for further learning and still inspires me for success in any activity!

Lab Practicals: Advice from Past Participants

Mykhailo Vybornyi, PhD Student, Department of Chemistry and Biochemistry, University of Berne, Switzerland, silver medalist of the 37th IChO (2005, Taipei, Taiwan)



Mykhailo Vybornyi

It's been really something incredible being a part of the Ukrainian team for the 37th IChO. In May 2005 I was aware that in a few months I'd be surrounded by the best young chemists from all over the world. Even more – I'd be a part of this community. A lot of questions arose immediately: how should I spend my time before the Olympiad, what thing should be done, books should be read, etc. I felt a high degree of responsibility, and now I think it was the most difficult thing I dealt with seven years ago. And then I realized that there wasn't enough time for thoughts about how and when to do

something. I just kept doing things I used to. I relied on my own method of preparation for the Olympiad – solving sets of different types of problems from previous IChO's handbooks, various National Olympiads, etc. And it's really worked out. At least I felt myself patient and confident before the theoretical exam.

The trickier story was about the practical exam. In my opinion, you can't totally rely on your knowledge, because sometimes things happen that even the professional chemists fail in their experiments due to numerous circumstances. In normal life it's not a total disaster, unless during the IChO. This competition has time limits, so generally you have only one possibility to perform your practical tasks and get final marks. Of course your personal experience means a lot in this case, but a little piece of luck is vitally important. The last sentence can be attributed to many life situations.

The Closing Ceremony of 37th IChO was quite difficult for me. I understood that it was the end of a great and unforgettable period in my life, and the beginning of the brand new chapter at the same time. Our life is built from such small bricks. And the end of one is only the beginning of something new.

Just don't stop and keep going.

I'd like to wish good luck to all participants.



The Cori Cycle: Understanding the Science of Carbohydrate Metabolism



Photos courtesy Becker Medical Library, Washington University School of Medicine

In brilliant collaboration, Carl and Gerty Cori studied how the body metabolizes glucose and advanced the understanding of how the body produces and stores energy. In 1947 the Coris shared a Nobel Prize “for their discovery of the course of the catalytic conversion of glycogen,” with Argentine physiologist Bernardo Houssay.

When they met in 1914 during their first year of medical school in Prague (then in the Austro-Hungarian Empire, now Czech Republic), Carl Cori and Gerty Radnitz found they shared a love of research and an enthusiasm for mountain climbing. In 1920 the two received their medical degrees, published their first research paper together, and were married.

Despite their collaboration as equal partners, Gerty encountered many hurdles as a woman researcher at the time. Eventually the Coris moved to America to pursue their research together, settling at Washington University in St. Louis, Missouri.

An early breakthrough in their research came with the discovery of the “Cori cycle.”

The Cori cycle explained how the body reversibly converts glycogen, a carbohydrate and derivative of glucose, into lactic acid in muscle tissue. The Coris’ findings were particularly useful in the development of treatments for diabetes.

A later breakthrough came when the Coris determined a new intermediate of glycogen breakdown, glucose-1-phosphate, also known as the “Cori ester.”

The American Chemical Society designated the research of Carl and Gerty Cori on carbohydrate metabolism as a

National Historic Chemical Landmark at the Washington University School of Medicine on September 21, 2004. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.



Top photo: Carl and Gerty Cori in their laboratory at the Washington University School of Medicine in 1947. Above: Gerty and Carl Cori at the Nobel Prize presentation ceremony in Stockholm, Sweden, on December 10, 1947.

Innovation

The chemical industry conducts more than \$23 billion of research and development, with one out of eight patents resulting from this effort. However, Dow believes our industry has to move from a philosophy of creating products in a manner which does no harm to creating innovations that do more good.

Dow innovation is powered by an industry-leading research & development organization focused on delivering solutions to the world’s challenges of today and tomorrow in a responsible manner. By aligning to the four megatrends, our innovative solutions find their way into products that make people’s lives healthier, safer and more convenient.

In 2011 alone, Dow invested more than \$1.65 billion in research & development—one of the largest investments in the industry.

However, our goal is not to spend the most, but to be the most productive. In the same year, we introduced innovations for oil and gas exploration, production and recovery; the world’s first zero-saturated-fat Omega-9 Sunflower Oil; and a solid state lighting platform for LED displays.

Dow has the creativity, knowledge and insight to innovate and the resources, discipline and skill to deliver unique solutions to the world. By connecting science with societal needs, our robust innovation engine allows us to solve some of the most challenging problems in the world.



photos.com



Photos from NASA, Picnic and Annapolis, Maryland



Quick Quiz Answers

The clever part is that chemists and non-chemists give wildly different answers to the questions; both types of answers are 'correct' but totally reveal if you are a chemist or not!

Tuesday, July 24 Schedule

	Students	Mentors and Observers
morning	Safety Instruction / Practical Exam	Washington, D.C. Tour
afternoon		Meeting with Authors
night	ACS Pres. Demonstration	2nd Jury Meeting

Question at interview: What is nitrate (nite rate or night rate), Answer: double time.

ITS A JOKE 

Tonight's Event...

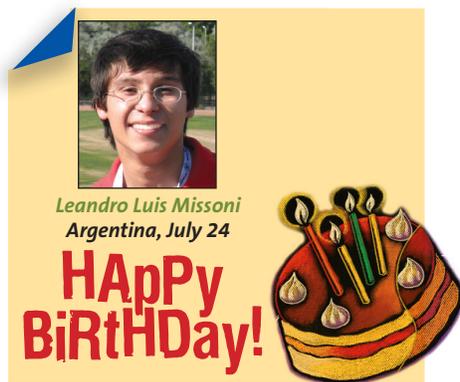


ACS President Bassam Shakhshiri

Tonight features a demonstration show by chemist and educator Bassam Shakhshiri. His show is based on proving that "Science is Fun!" Look forward to an evening of spectacular reactions and unexpected effects, all wrapped in a high-energy presentation. As Shakhshiri says, "I'm a strong advocate of demonstrations—exploding balloons, glowing liquids, spectacular chemical transformations. Connectivity is key. My ultimate purpose is to trigger cerebral and emotional reactions to heighten an audience's joy of learning."

On the cover masthead: American scientists Benjamin Franklin, Thomas Edison, George Washington Carver and Gerty Cori.

*Good Luck
with Your
Lab
Practicals!*



Washington, D.C. • USA

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 Cecilia Hernandez
 Keith Lindblom
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Designer: Cornithia A. Harris

Weather Today SUNNY 95° F (35° C)	Weather Tomorrow SUNNY 91° F (32° C)
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Puzzle

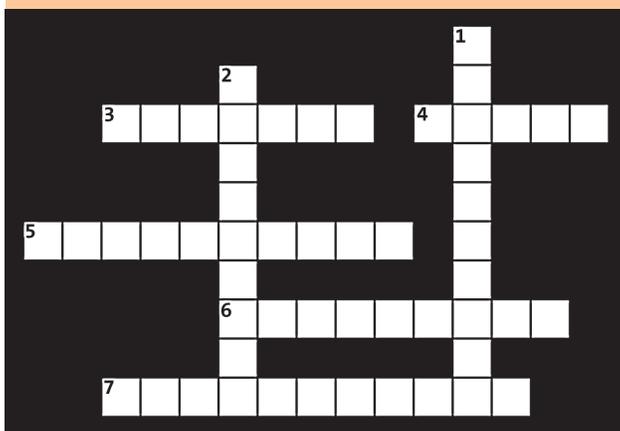
Scientific Instruments

Across

- Used to measure an object's mass.
- Used to measure an object's weight.
- When the wind blows, this spins.
- Used by astronomers to study stars and planets.
- This is used to measure temperature.

Down

- If you want to see a cell, use one of these.
- Used by meteorologists to measure air pressure.



Answers are in issue #6.

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no. 6

July 25, 2012

Catalyzer

44th International Chemistry Olympiad United States of America

Tour of Historical Washington, D.C.

Washington, D.C. is one of the most recognizable cities in the world, perhaps due to news reports or perhaps the number of movies and television shows that use the city as a location. Whatever the reason, today students will get a chance to see it up close and personal. Today's excursion will include a trip to Capitol Hill, site of the Senate and House of Representatives of the United States. We will also travel around the Mall to visit a number of monuments and memorials, from the Lincoln Memorial on the

Potomac River to the Washington Monument in the middle of the Mall.

We will visit **The Albert Einstein Memorial** with its 21 foot bronze statue. A star map at Einstein's feet is embedded with more than 2,700 metal studs representing the positions of the sun, moon, planets and stars. In Einstein's left hand is a paper with mathematical equations summarizing three of his most important scientific contributions including the theory of relativity.



Library of Congress



Albert Einstein Memorial



Photos from Shutterstock and photos.com

Top left: U.S. Capitol Building, top right: the WWII War Memorial, Reflecting Pool, and Lincoln Memorial, left: the White House, above: memorial statue of Abraham Lincoln.

Celebrating International Excellence in Chemistry

End of WWII Leads to Development of Acrylic Paint



The end of World War II meant change throughout the world. For a small U.S. chemical company named **Rohm and Haas**, change meant developing new products that would appeal to households, which had taken a back seat to the military during the war years.

Rohm and Haas had been successful by supplying Plexiglas—a lightweight, shatterproof acrylic glass substitute used in aircraft and other vehicles—throughout the war. In the post-war years, manufacturers would use Plexiglas to make illuminated signs, car taillights and other goods, but the company knew that Plexiglas sales would never again reach war levels. In order to grow in peacetime, the company needed to find other uses for acrylics.

In the years immediately following World War II, nearly 16 million American service men and women returned to civilian life, setting off an unprecedented housing boom. And all of these new homes needed



photos.com

paint, both inside and out. Rohm and Haas found their target product.

Rohm and Haas scientists capitalized on their development of a new, economical way of producing acrylate monomers and turned the monomers into acrylic-based paints, which offered improved qualities over solvent-based paints. **After decades of work improving the product, acrylic emulsions virtually replaced oil-based exterior paint in the United States by the 1970s.**

The development of acrylic emulsion technology by Rohm and Haas (now a subsidiary of Dow Chemical Company) was designated a National Historic Chemical Landmark by the American Chemical Society in 2008. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.

Importance of STEM education

In today's knowledge economy, science, technology, engineering and math (STEM) education is the fundamental enabler of innovation. That is why Dow has a long-standing commitment to improving it.

For high school students, STEM education is a passport to a career full of exciting breakthroughs and solutions through which they can address global challenges facing both current and future generations.

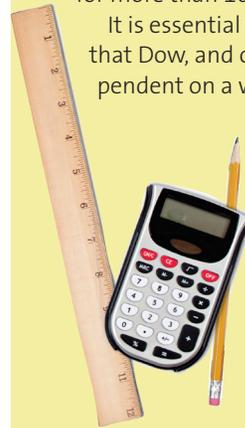
Additionally, a STEM-focused education provides students the opportunity to play a role in a variety of industries, including the chemical industry, which enables more than 96 percent of all manufactured goods.

Through Dow's sponsorship of the 44th International Chemistry Olympiad and its partnerships with other leading organizations including Change the Equation and the International Year of Chemistry, the Company has supported STEM education for more than 100 years.

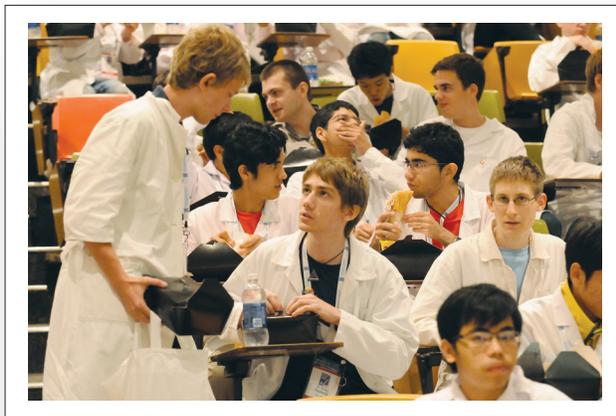


photos.com

It is essential to human progress that Dow, and other companies dependent on a workforce proficient in STEM, continue to engage in similar partnerships and use their resources to encourage student interest in STEM education and make our global workforce stronger.



Lab Practical Day



Photos by Peter Cutts Photography

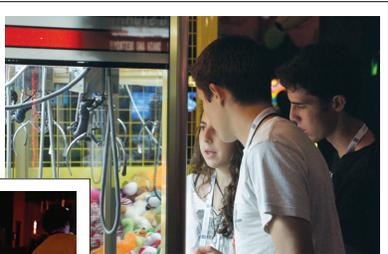
Scientific Instruments Puzzle Answers

ACROSS: 3. Balance 4. Scale 5. Anemometer 6. Telescope
7. Thermometer DOWN: 1. Microscope 2. Barometer

Wednesday, July 25 Schedule

	Students	Mentors and Observers
whole day	Washington, D.C. Tour	Translation – Theoretical Exam Potomac River Cruise

Last Night's Fun at Dave and Buster's!



Photos by Michael Mury and Michael Tinnasand



Puzzle

Atoms and Matter

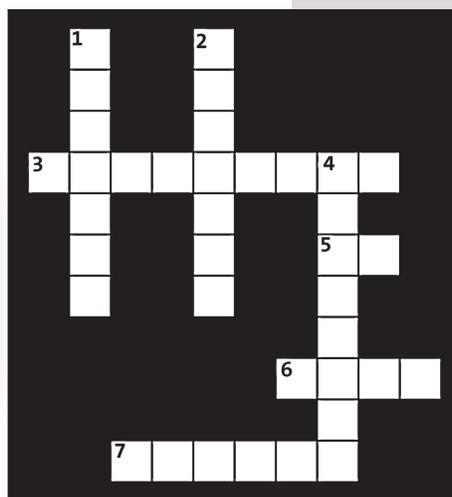
Across

- Negatively charged particles that circle the nucleus.
- The name of one of the types of quarks found in protons and neutrons.
- The name another of the types of quarks found in protons and neutrons.
- Protons and neutrons are made up of these particles.

Down

- The central part of the atom.
- Positively charged particles found in the nucleus of the atom.
- Neutral particles found in the nucleus of the atom.

Answers are in issue #7.



If you're not part of the solution, you're part of the precipitate!

ITS A JOKE



Henry Pak and Hang Yuen
New Zealand, July 25

Happy BirthDay



"I'm updating the Wizard of Oz. In my version, the Tin Man is recycled into a Prius and they all drive home to Kansas on less than a half-tank of gas!"

On the cover masthead: The Thomas Jefferson Memorial in Washington, D.C., honors the third President of the United States of America.



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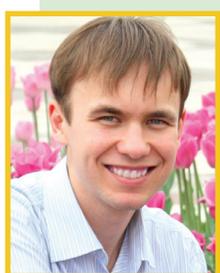
44th International Chemistry Olympiad United States of America

Theoretical Exams and a Reception at the French Embassy

The **French Embassy** will host the reunion party, where mentors and students will meet again after being separated for four days. The French Ambassador will welcome all the delegations and guests. In addition, some delegations will be welcomed by their home Embassies prior to the reunion party.

The French-American relationship has evolved greatly from the bond established more than two centuries ago through the shared ideals of the French and American Revolutions. France joined the American revolutionary forces in 1778 during the time of the American Revolutionary War. They helped America earn its independence.

The city of Washington, D.C. was designed by French-born architect **Pierre Charles L'Enfant**. The city has a number of memorials



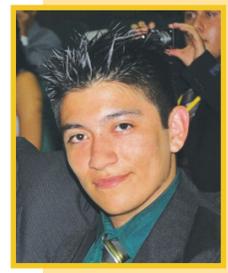
Maxim Zabitsky

Maxim Zabitsky, PhD Student, M.V. Lomonosov Moscow State University, silver medalist of the 36th IChO, 2004, Kiel, Germany and the 37th IChO, 2005, Taipei, Taiwan; guide at the 39th IChO, 2009, Moscow, Russia

It is a long way from a school olympiad to when the IChO is finished on theoretical and practical exams. As I wanted to show at the IChO good results, I tried to study more and more. Sometimes preparation for the IChO was very hard. Even when I slept I studied biochemistry in my dream. The theoretical exam plays a great role in your score, so I tried to have a good rest before it. I participated in the IChO twice. At my second olympiad I expected to meet rather complicated problems, as at the first olympiad. It was a pity to receive very easy tasks.

The knowledge obtained during my preparation for the IChO was a good base for university education and following scientific work.

Past Participants



David Yafte Diaz-Sanchez

Hi everyone! My name is **David Yafte Diaz-Sanchez**, a student from **Mexico City**. I started my training for IChO in 2010 when I was competing for the 42nd IChO, which took place in Tokyo, Japan. I could not go, but the next year I went to Turkey to participate at the 43rd IChO. Training for this Olympiad was hard, some topics are very advanced and I had to study quantum chemistry, kinetics, thermodynamics, organic chemistry and other topics more.

However, it is not the same solving problems alone at home than to be on the other side of the planet competing against the best high school students of the entire world. Actually I did not get any medal, but IChO taught me that what really everyone can win in the competition beyond a medal are friends, great experiences and emotions!

to key allies including Lafayette Square located across the street from the White House. Lafayette was a general in the American Revolution.

There is perhaps no better universal symbol of freedom, democracy and friendship than the Statue of Liberty Enlightening the World, a gift from the people of France to the people of the United States. The Statue of Liberty was dedicated on October 28, 1886 in New York City Harbor.



Courtesy of the French Embassy

French Embassy

Charles Hall Process

Metal of the Modern Era

Aluminum is one of the most commonly used materials in the world today. It is the third most abundant element in the earth's crust. Yet until the late 1800's aluminum was a rare and precious metal, difficult to extract and make into useful products.

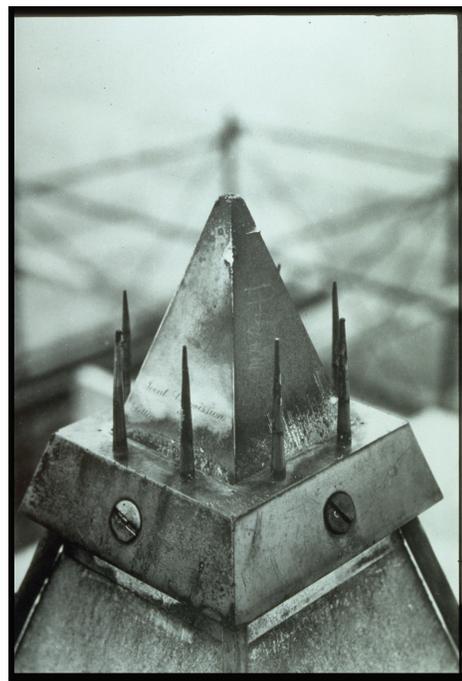
In 1825, Danish chemist **Hans Christian Oersted** was able to produce an impure sample of aluminum, using a potassium-based mixture and heat. Over the next several decades, the process for producing aluminum continued to be refined, and in 1855 at the Paris Exposition, aluminum bars were displayed as "silver from clay." Their value—\$115 per pound—was more expensive than gold.

Finally, in 1886, American **Charles Martin Hall** and Frenchman **Paul L.T. Héroult** independently discovered a method for producing aluminum economically by electrolysis. As the process improved, the price of aluminum dropped from \$4.86 per pound in 1888 to \$0.78 per pound in 1893.

Today, aluminum is a commonplace material we rely on every day in construction materials, food packaging, components for aircraft and automobiles, and even as coins in some nations. While the aluminum can is a readily identifiable product of aluminum, many uses of the metal are less obvious. Take for example the aluminum apex that sits atop the Washington Monument: It was installed in 1884 for use as a lightning rod.

The American Chemical Society designated the production and commercialization of aluminum as a National Historic Chemical Landmark at Oberlin College in Oberlin, Ohio, in 1997 and at Alcoa Inc. in Pittsburgh, Pennsylvania, in 2001. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.

Left: The Washington Monument as it stands today. Right: Flag-raising ceremony marking completion of the scaffolding for cleaning and repairing of the Washington Monument in 1934.



Photos courtesy Alcoa Inc.



Left: Photo of Charles Martin Hall superimposed onto an aluminum can. Hall discovered an inexpensive method for isolating pure aluminum from its compounds in 1886.

Top photo: The top of the Washington Monument's aluminum cap, installed in 1884. Photographed during a cleaning operation in 1934.



Photos from D.C. Sightseeing



Photos by Michael Tinnesand and Peter Cutts Photography

Atoms and Matter Puzzle Answers

ACROSS: 3. Electrons 5. Up 6. Down 7. Quarks
DOWN: 1. Nucleus 2. Protons 4. Neutrons

Thursday, July 26 Schedule

	Students	Mentors and Observers
morning	Theoretical Exam	Washington, D.C. Tour
afternoon		
night	French Embassy Reunion Party	

Weather Today

SUNNY

99° F (37° C)

Weather Tomorrow

SUNNY

96° F (35° C)

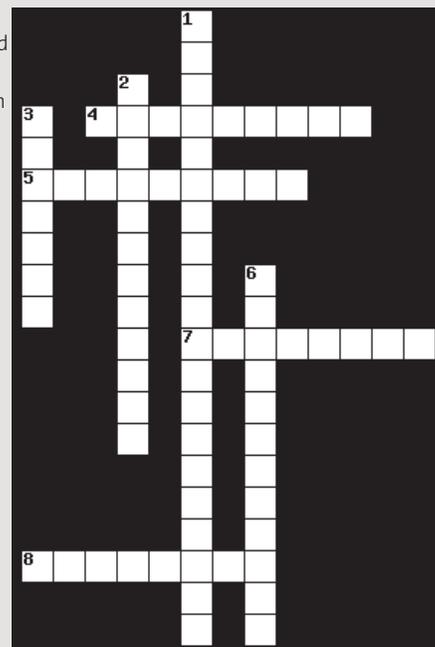
Puzzle
Cell Structure

Across

- Proteins are produced here.
- A jellylike fluid within cells.
- This rigid covering is not found in animal cells. (two words)
- Act as storage sacks within cells.

Down

- Transports materials within the cell. (two words)
- These structures produce energy for the cell.
- The cell's control center.
- In plant cells, these structures contain chlorophyll.



Answers are in issue #8.



Do You Know Where Your Mascot Is?

Arash Firouzbakht
Iran, July 26Daan van de Weem
Netherlands, July 26Happy
BiRtHDay!

"Vegetables are very good for you, but don't overdo it. You're suffering from greenhouse gas!"

On the cover masthead: Washington, D.C.'s iconic skyline is recognized around the world. From left: the Lincoln Memorial, Washington Monument and United States Capitol.



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44th International Chemistry Olympiad United States of America

no. 8

July 27, 2012

Baltimore Aquarium, Maryland Science Center and Orioles Baseball

In 2003, separate aquariums in Baltimore, MD, and Washington, D.C., joined as one "National Aquarium." The National Aquarium holds living collections that include more than 16,000 animals from more than 660 species of fish, birds, amphibians, reptiles, and mammals living in award-winning, naturalistic habitats.

The Maryland Science Center in Baltimore is visited by more than 500,000 people each year. Popular exhibits include: Dinosaur Mysteries with full-size dinosaurs and interactive paleontology activities; a day in the life of the human body in Your Body: The Inside Story; and dozens of interactive experiments in Newton's Alley. Other attractions include a five-story IMAX Theater, and the world-famous Davis Planetarium.

The Baltimore Orioles are a baseball team that is part of Major League Baseball, the top level of professional baseball in the USA. The Orioles (sometimes called the O's for short) have been in the American League since 1901. The Orioles won three World Series Championships (1966, 1970 and 1983). They play in the trend-setting Oriole Park at Camden Yards.



Maryland Science Center



Below: Tall ships anchored in Baltimore Harbor. Above: The Maryland Science Center. Right: Inside the Baltimore Aquarium. Bottom right: Fans in Orioles Baseball Stadium.



Baltimore convention and Tourism



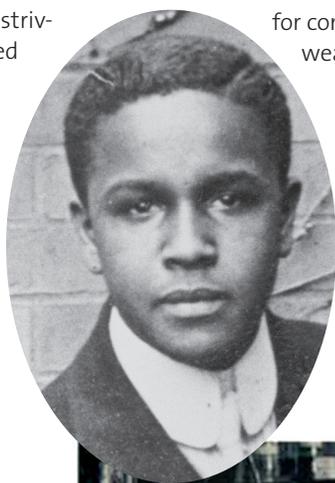
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Percy L. Julian's Lifetime of Accomplishments

In a lifetime of continual striving, **Percy L. Julian** succeeded against the prejudices and discrimination of his time to become a prominent and successful medicinal chemist who made great contributions to chemical synthesis throughout his career.

Julian became a world renowned chemist at the age of 36 through his pathbreaking research on physostigmine. The drug, previously found only in its natural source, is a treatment for glaucoma, a disorder of the eye which damages the optic nerve and often leads to a loss of vision and even blindness. Julian's team of researchers succeeded in synthesizing physostigmine in 1935, a development that made glaucoma treatment widely available.

More than 75 years later, the synthesis of physostigmine remains relevant as derivatives and optically pure forms of the drug have shown therapeutic promise for the treatment of Alzheimer's and



for combating the effects of chemical weapons.

Julian continued to make important contributions to the field of medicinal chemistry throughout his career.

His 1948 synthesis of Reichstein's Substance S is still the most widely used route to the production of hydrocortisone and its derivatives,

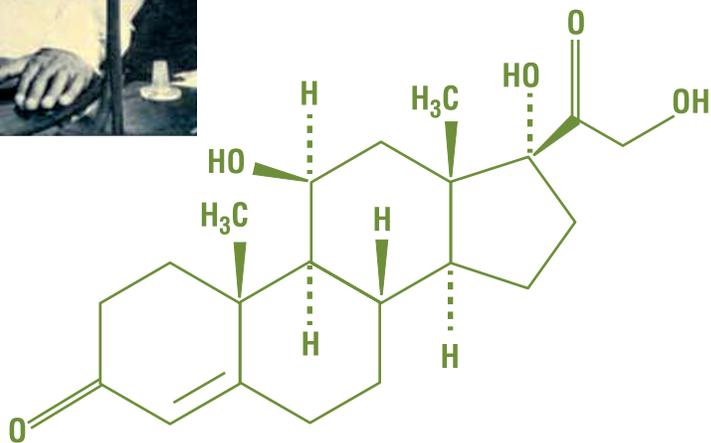
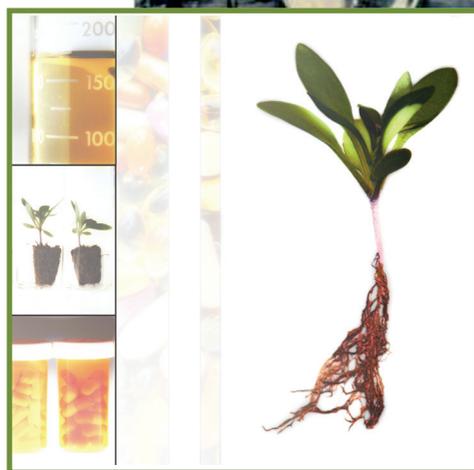


which are used in the treatment of rheumatoid arthritis. He developed efficient syntheses for whole families of steroids, including progesterone and testosterone.

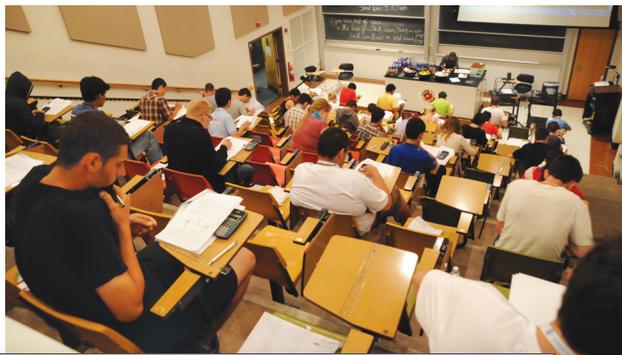
Julian died in 1975 after a lifetime of accomplishments. Among his many honors was election, in 1973, to the National Academy of Sciences. He received more than 130 chemical patents. He was also recognized as a steadfast advocate for human rights.

Julian's synthesis of physostigmine was designated a National Historic Chemical Landmark at DePauw University in Greencastle, Indiana, in 1999. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.

Top left: Percy Julian as a young man in 1918 at DePauw University. Center: Percy Julian in the laboratory. Bottom left: In 1993 the U.S. Postal Service issued a commemorative stamp in his honor. Below: chemical structure of hydrocortisone.



Photos from the Theoretical Exam



Photos by Michael Tinnesand and Peter Cutts Photography

Cell Structure Puzzle Answers

ACROSS: 4. Ribosomes 5. Cytoplasm 7. Cell wall
8. Vacuoles DOWN: 1. Endoplasmic reticulum 2. Mitochondria 3. Nucleus 6. Chloroplasts

Friday, July 27 Schedule

	Students	Mentors and Observers
morning	Baltimore Harbor Camden Yards Baseball Game	Score Marking
afternoon		Free Time
night		3rd Jury Meeting

*Imagination is more important
than knowledge.*

-Einstein

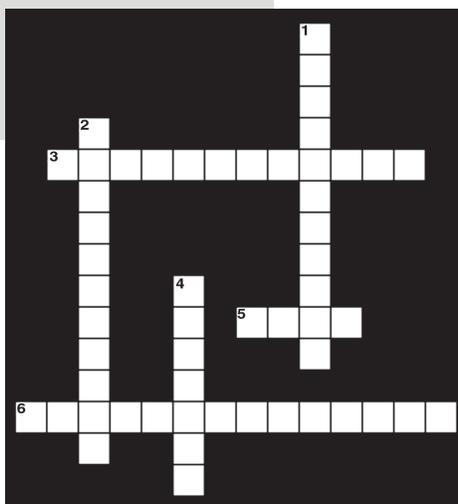
Puzzle Life Science

Across

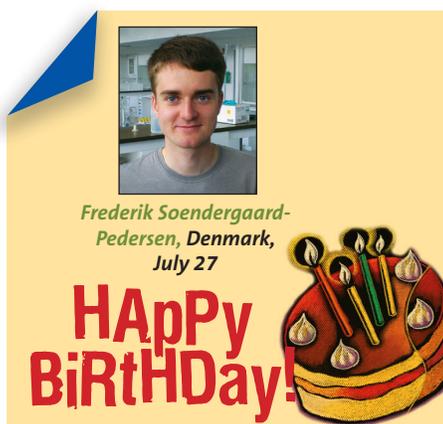
- A thin layer covering the outside of cells (*two words*).
- A kind of fungus.
- A process in plants that uses carbon dioxide, water and sunlight to make sugar, oxygen and energy.

Down

- The green coloring that plants use in photosynthesis.
- A reaction in living things that turns sugar and oxygen into carbon dioxide, energy and water.
- The movement of water from an area with lots of water into an area with less water.



Answers are in issue #9.



On the cover masthead: Baseball, known since the 1850s as the 'national pastime', is one of the U.S.'s favorite summer sports.

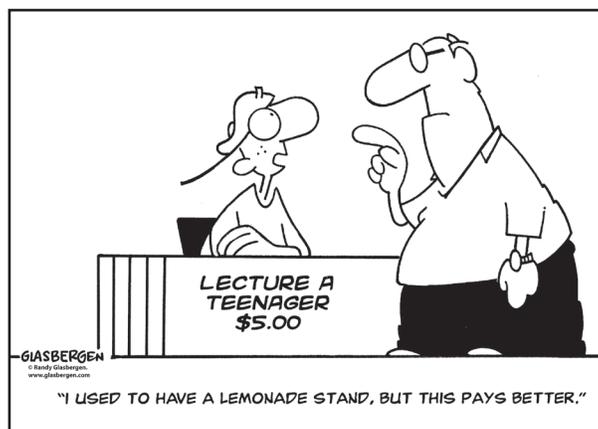


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Weather Today	Weather Tomorrow
Isolated T-Storms	Isolated T-Storms
96 °F (35 °C)	93 °F (33 °C)



3000 B.C., CHINA

One of the earliest recorded **eye drops**, made from an extract of mahuang plant, was prepared in China five thousand years ago. Today ophthalmologists know that the active ingredient was ephedrine hydrochloride, which is still used to treat minor irritations especially eyes swollen by allergic reactions.

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44th International Chemistry Olympiad United States of America

no. 9

July 28, 2012

All day fun! Kings Dominion

What is better than spending a day at an amusement park? And what better park to visit than Kings Dominion, which features 15 roller coasters, numerous thrill rides, live entertainment and a 20-acre waterpark? Kings Dominion offers the coolest array of rides and attractions in the Mid-Atlantic states.

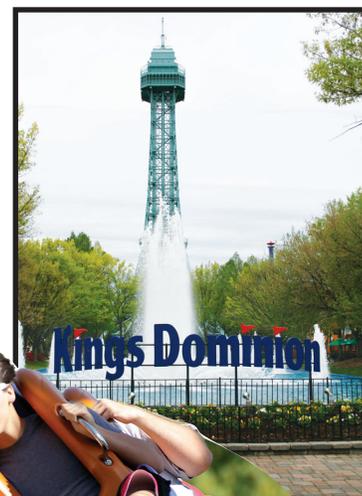
The name given to the park is derived from the name of its sister park, Kings Island located near Cincinnati, Ohio, and the nickname for the state of Virginia, "Old Dominion".

Today we explore the coolest way to beat the heat this summer at **WaterWorks in Kings Dominion**. WaterWorks is one of the premier waterparks in the region and features water activities for guests of all ages, including water slides, rushing rivers, surfable waves and an awesome 650,000-gallon wave pool, featuring giant 4-foot waves, which is guaranteed to give everyone a thrill.

DID YOU KNOW?

It doesn't take much salt to make water "salty." If one-thousandth (or more) of the weight of water is from salt, then the water is "saline."

The park is about two hours south of the University of Maryland, so grab your swimsuit and get ready for a great day.



Exciting rides at Kings Dominion in Doswell, Virginia.

Photos courtesy of Kings Dominion

Celebrating International Excellence in Chemistry

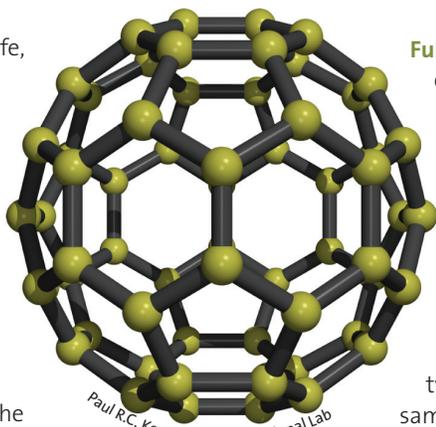
Mysteries in Space and the Origins of Nanoscale Science

Carbon, the basis of life, is one of the most common elements and one of the most studied; it comprises the whole discipline of organic chemistry. A study of pure carbon would not seem all that exciting to most chemists, but British chemist **Harry Kroto** identified a mystery in the well-studied field: an unknown chain of carbon molecules that he, together with Canadian radio astronomers, had discovered in interstellar space.

In 1985, Kroto and Americans **Robert Curl and Richard Smalley**, along with a team of students, began an investigation into Kroto's carbon molecule. Within the first ten days of their experiments, two significant results emerged: First, the team found Kroto's carbon chains, and second, they observed a previously unknown carbon molecule composed of 60 carbon atoms.

The molecule, dubbed C_{60} , formed readily and was extraordinarily stable. It did not react with other molecules, suggesting it had no dangling bonds. But the structure of the molecule was unknown to the scientists.

Kroto thought back to architect **Buckminster**



Paul R.C. Kent, Oak Ridge National Lab

Fuller and his famous geodesic dome at Expo 67 in Montreal. Smalley, using Kroto's inspiration, worked into the night to build a model of a sphere that would have exactly 60 vertices. He succeeded with a form made of twenty hexagons and twelve pentagons—the same shape as a soccer ball.

The new carbon allotrope was

named buckminsterfullerene, shortened to fullerene or buckyball. In 1996, Curl, Kroto, and Smalley shared the Nobel Prize in Chemistry for their discovery. Continued research on fullerenes and carbon nanotubes

—**the cylindrical cousins of buckyballs—has provided abundant research opportunities in pure chemistry, materials science, pharmaceutical chemistry and nanotechnology.**

The discovery of fullerenes was designated a National Historic Chemical Landmark at Rice University in Houston, Texas, on October 11, 2010. To date, more than 65

achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.



Walt Disney World Epcot Center Florida

PAST PARTICIPANT

Taivo Pungas, Estonia
2011 Chemistry Olympiad
Bronze Medalist



Taivo Pungas

As I had prepared for the olympiad beforehand both individually and with my national team, I felt I had most of the necessary knowledge and that everything

was up to myself—that created a healthy pressure under which the olympiad becomes a true challenge, rather than being just another 5-hour period of time spent on chemistry...

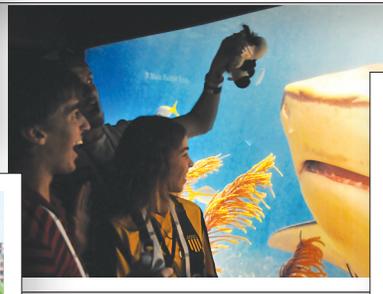
When I first participated (in 2011) the problems were not as hard as I had expected, although I ran into difficulties with managing time since there was not much. Had I spent the whole time on intensive problem-solving, I barely would have finished the tasks.

Most of the subjects in the 2011 theoretical problems I have not really encountered elsewhere since I will finish secondary school this year. However, parts of it were quite interesting to me, especially those concerning fuel cells.

The practical exam was not difficult, it rather demanded a steady hand, good planning and confidence. Before the olympiad, I had not really thought about the practical part per se. I guess I had imagined it would be similar to what I had already done and most of it was. To be honest, the main challenge was not in setting up or conducting the experiments—for me, it was being careful and keeping a calm head.

After the olympiad I have not really put the skills and knowledge acquired in the experiments to use with the exception of experiments in the pre-ICHO olympiads in chemistry (national round, qualification, etc).

Photos from the Baltimore Aquarium, O's and A's game, and the Maryland Science Center



Photos by Peter Cutts Photography

Life Science Puzzle Answers

ACROSS: 3. Cell Membrane 5. Mold 6. Photosynthesis
DOWN: 1. Chlorophyll 2. Respiration 3. Osmosis

Saturday, July 28 Schedule

	Students	Mentors and Observers
morning	Kings Dominion Amusement Park	Arbitration
afternoon		
night		4th Jury Meeting

Weather Today
Sunny
 93 °F (33 °C)

Weather Tomorrow
Mostly Sunny
 91 °F (32 °C)

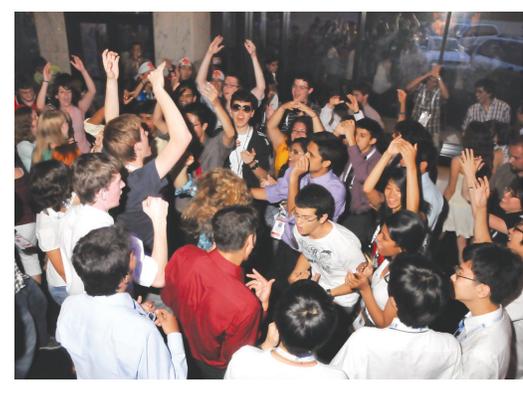
Thursday Night at the French Embassy

You cannot teach a man anything; you can only help him discover it in himself.

-Galileo



And then we danced all night!



Photos by Peter Cutts Photography

On the cover masthead: Denim jeans, also known as blue jeans, were invented by Jacob Davis and Levi Strauss in the 1870s and are an iconic American fashion.

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44th International Chemistry Olympiad United States of America

no. 10

July 29, 2012

Closing Ceremony

Tonight is a gold medal day! It is also a silver and bronze medal day. But more than that it is a night of friendship and congratulations. Many years have gone into our students' preparation for this IChO, and for some it will mean standing on the stage with a medal around their neck. But more importantly, everyone will be standing with new friends from around the world, and if the past is any indication, some of these friendships will last a lifetime.

The closing ceremony will be held at **Gaston Hall at Georgetown University**. At the end of the closing ceremony the USA will pass the IChO flag to Russia where the next event will be hosted.

The Farewell party (banquet) will be held at the **National Building Museum**.

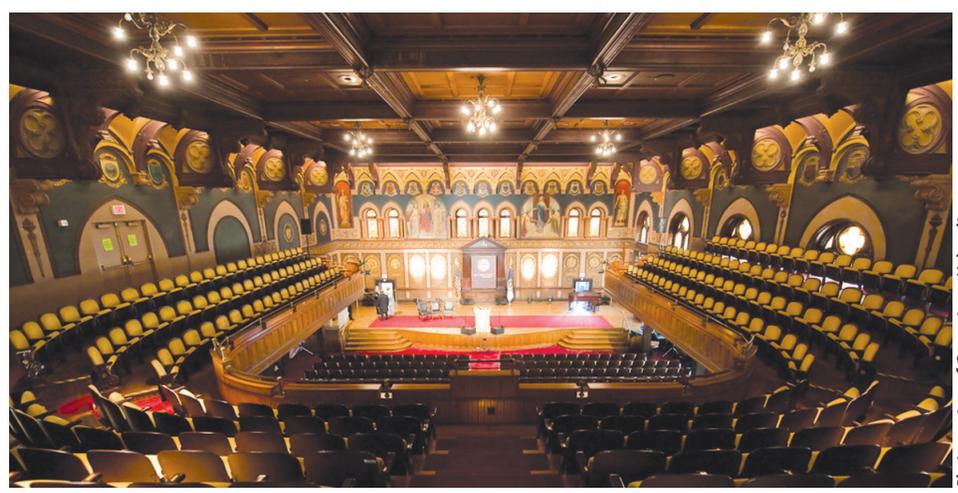


Photo courtesy of Georgetown University

Gaston Hall at Georgetown University

National Building Museum



Photo courtesy of the National Building Museum



Celebrating International Excellence in Chemistry

Joseph Priestly Discoverer of Oxygen

When Joseph Priestly discovered oxygen in 1774, he helped answer age-old questions of why and how things burn. Priestley's work disproved the longstanding belief that air—along with earth, fire and water—was one of the four elemental components of the physical world.

An Englishman by birth, Priestley was deeply involved in politics and religion, as well as science. Following a series of experiments culminating in 1774,

Priestley declared, "air is not an elementary substance, but a composition" of gases.

Within this composition was a colorless and highly reactive gas which he isolated and observed would cause a flame to burn more intensely than in normal air. Priestley called this gas "dephlogisticated air." Antoine Lavoisier, the great French chemist, gave this gas its current name: oxygen. Priestley's discovery provided Lavoisier with an important clue to his revolutionary theory of chemical reactions.

Priestley is also credited with inventing the rubber eraser and carbonated water, which would later evolve into the soda industry.

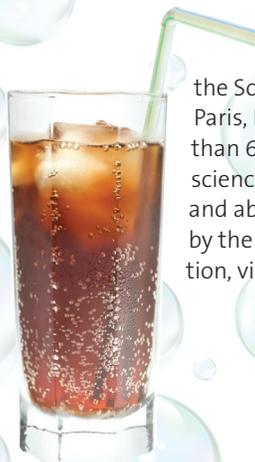


Image courtesy of the Library of the Royal Society of Chemistry

Priestley immigrated to America in 1794 when his vocal support for the American and French revolutions made remaining in his homeland unwise. He continued his research in the United States, where he isolated carbon monoxide and founded the Unitarian Church in the U.S.

Priestley's discovery of oxygen was designated as an International Historic Chemical Landmark in Wiltshire, England, by the American Chemical Society and Royal Society of Chemistry in 2000. Priestley's Pennsylvania home and laboratory was designated a National Historic Chemical Landmark by ACS in 1994.

Lavoisier's work was designated as an International Historic Chemical Landmark by ACS and the Société Française de Chimie in Paris, France, in 1999. To date, more than 65 achievements in chemical science and technology in the U.S. and abroad have been recognized by the program. For more information, visit www.acs.org/landmarks.



About the American Chemical Society

Founded in 1876 and chartered by the US Congress in 1937, the ACS is the world's largest scientific society. The ACS is at the forefront of the evolving worldwide chemical enterprise and is the premier professional home for more than 164,000 chemists, chemical engineers and related professionals around the globe. The ACS



has more than 24,000 international members representing more than 100 countries.

ACS is a global leader in providing access to chemistry-related research through its peer-reviewed journals, scientific conferences, and Chemical Abstract Service, the world's most comprehensive source of chemical information.

The ACS also sponsors and promotes a number of international activities, including joint conferences with national chemical societies and the International Chemical Congress of Pacific Basin Societies (PacifiChem).

ACS chemistry textbooks are used around the world.

In addition, the ACS supports a number of important initiatives including:

ACS Green Chemistry Institute® promotes the implementation of green chemistry and engineering principles.

ACS Scholars Program provides gifted, under-represented minority undergraduates with scholarship and mentoring support in the chemical sciences.

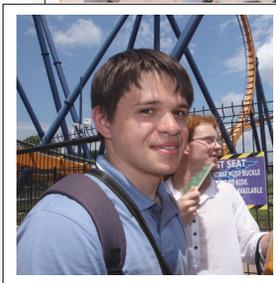
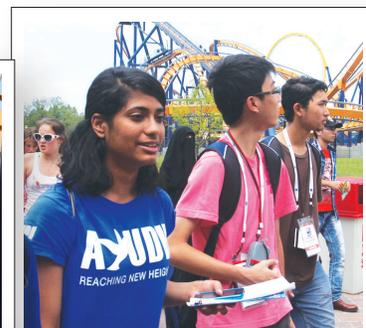
Project SEED offers bright, economically disadvantaged high school students a summer opportunity to conduct chemical laboratory research.

Teacher Training provides professional development for science teachers so that they foster scientific curiosity in our nation's youth.

Petroleum Research Fund supports fundamental research and has, for the last 50 years, launched the careers of countless young scientists. More than 25 of these researchers received the Nobel Prize later in their careers.

To find out more about the ACS, visit www.acs.org

Photos from Kings Dominion



Mentors in Action



Photos by Peter Cutts Photography

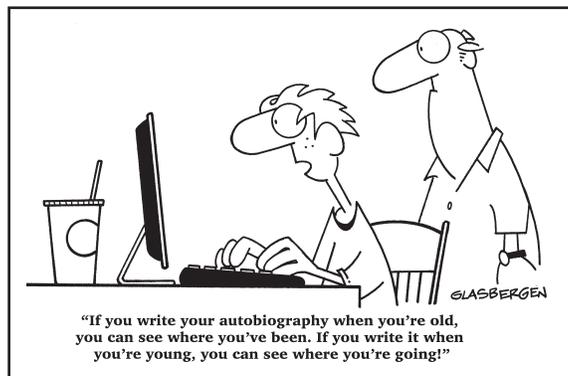
Everyone had a full day!

Sunday, July 29 Schedule

	Students	Mentors and Observers
morning	Free Time	Free Time
afternoon	Closing Ceremony/Gaston Hall Georgetown University	
night	Banquet – Farewell Party/ National Building Museum	

Congratulations!
Farewell!
and Travel Safely!

Weather Today	Weather Tomorrow
Isolated T-Storm	PM T-Storm
90° F (32° C)	89° F (31° C)



Q. What has been your favorite activity in the Olympiad?



Kee En
Malaysia

A. “My favorite part by far was the trip to the Arcade. I’ve never been anywhere like that before. We don’t really have anything like this in our country. It was like stepping into a movie.”



Signý Pálsdóttir
Iceland

Thomas Spence
United Kingdom



A. “The talk by the NASA astronaut was my favorite part. I never thought I would ever see an actual person who had traveled into space, and he did it three times! He was very clever and funny.”

A. “The tour of the monuments was quite spectacular. It wasn’t just the buildings, but it was the history they represent.”



On the cover masthead: Crazy Horse Memorial in the Black Hills of South Dakota is a 172 meter high rock carving that honors Crazy Horse, a legendary Native American warrior.



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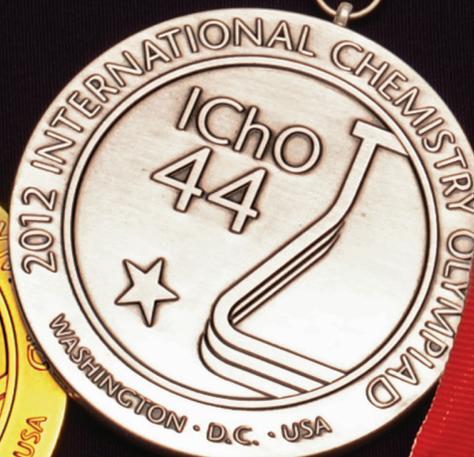


Catalyzer

44th International Chemistry Olympiad United States of America

no. 11

July 30, 2012



Award Results

Congratulations to all of the medal winners and to everyone who participated in this year's Olympiad.

Celebrating International Excellence in Chemistry



Gold

Florian Berger
Min Woo Bae
Jhih-Cing Jhang
Tzung-Hua Hsieh
Ilya Ustinovich
Ran Li
Alexander Oleynichenko
Diptarka Hait
Shubham Chandak
Kirill Petriukov
Hao-Hsuan Hsieh
Ulugbek Barotov
Jiho Park
Rachel Lim
Nikifar Lazouski
Christopher Hillenbrand
Tas Yusootorn
Sebastain Gogg
Kairat Ashim
Arash Firouzbakht
Takuya Yamakado
Aofei Liu
Ihor Cherniukh
Gadam Myratgeldiyew
Tomohiro Soejima
Sigitas Mikutis
Manav Avlani
Hokyung Lee
František Petrouš
Ren Fu
Furkan Cetin
Phạm Huy
Yoo Kyung Jeon
Vlad Bacauanu

Germany
Korea
Chinese Taipei
Chinese Taipei
Russia
China
Russia
India
India
Russia
Chinese Taipei
Tajikistan
Korea
Singapore
Belarus
United States
Thailand
Austria
Kazakhstan
Iran
Japan
Singapore
Ukraine
Turkmenistan
Japan
Lithuania
India
Korea
Czech Republic
China
Turkey
Vietnam
Korea
Romania

Toshiki Ishii
Samuel Putra
Yu-Hung Tung
Iryna Zaporozhets
Daan van de Weem
Ge Zhan
Yao Yuan
Georgijs Treņins
Tomislav Begusic
Dmytro Shybanov
Zhi Yang Tan
Martin Reiterer
Maria Andreea Filip
Vladimir Dolzhenkov
Denes Berta
Nathapon Chareonsirawat
Kamil Adamczyk
Péter Bolgár
Nguyễn Phương
Marton Zwillinger
Run Ze Cao
Yauhen Aniskevich
Szymon Wrzesien
Dominik Štefanko
Sidharth Chand
Daniel Hara
Ryota Shibuya
Antanas Radzevicius
Selman Tekerlek
Artem Boychuk
James Deng
Azim Amanzholov
Mariano Calcabrini
Frederick Stein
Máximo Peré Schröder
Artem Tsymbal
Ivan Kurniawan
Lachlan Vom
Jakub Safin
Leandro Missoni
Rok Kaufman
Jason Ge
Callum Bungey
Thomas Spence
Zvonimir Jurelinac
Petar Karazapryanov
Nguyễn Hoàng
Xiaotian Li
Andy Chen
Kamil Maršálek
Nimit Singh
Dewi Suryana
Alexandru Paraschiv
Ondřej Hák

Germany
Indonesia
Chinese Taipei
Ukraine
Netherlands
China
China
Latvia
Croatia
Ukraine
Singapore
Austria
Romania
Kazakhstan
Hungary
Thailand
Poland
Hungary
Vietnam
Hungary
Canada
Belarus
Poland
Slovakia
United States
Brazil
Japan
Lithuania
Turkey
Russia
United States
Kazakhstan
Argentina
Germany
Argentina
Belarus
Indonesia
Australia
Slovakia
Argentina
Slovenia
United States
United Kingdom
United Kingdom
Croatia
Bulgaria
Vietnam
Norway
New Zealand
Czech Republic
India
Indonesia
Romania
Czech Republic



Silver

Andhika Pradana
Gergő Sályi
Takehiro Kato
Gerard Low
Tzof Peled

Indonesia
Hungary
Japan
Singapore
Israel



Bronze

Marco Lee
 Leslie Ying
 Grzegorz Rak
 Jānis Briška
 Lilit Grigoryan
 Erik Orvehed-Hiltunen
 Patrick Pfaff
 Frederik Soendergaard-Pedersen
 Gabriel Matheus Pinheiro
 Roman Kučera
 Ella Mi
 Matthew Lie
 Taivo Pungas
 Verónica Müller
 Andriy Stelmakh
 Aliaksei Krautsou
 Trần Mai Hương
 Aldo Alan Avila
 George Silvian Baltac
 Mindaugas Siauciulis
 Thanh Phong Lê
 Serafim Buiuclic
 Mohammad Zarei
 Aleksey Galoyan
 Perman Jorayew
 Thomas Schlatzer
 Jaan Toots
 Roman Beránek
 Ori Taichman
 Nejc Čeplak
 Tzu Yi Isabelle Yang
 Vytaute Maciulskyte
 Pawel Blaszczyk
 Eva-Lotta Käsper
 Jiratheep Pruchyathamkorn
 Brian Gao
 Ramon Gonçalves da Silva
 Marco Catalano
 Kevin Chen
 Alexis Poncet
 Etienne Bloch
 Juraj Malinčík
 Robert Shin
 Edi Topic
 Seyedali Tavana
 Alice Balbi
 Ivo Slegers
 Michael Leitsin

Australia
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Germany
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Slovakia
United Kingdom
New Zealand
Estonia
Argentina
Ukraine
Belarus
Vietnam
Mexico
Romania
Lithuania
Switzerland
Moldova
Iran
Armenia
Turkmenistan
Austria
Estonia
Czech Republic
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Slovenia
Canada
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Poland
Estonia
Thailand
Australia
Brazil
Italy
France
France
France
Slovakia
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Croatia
Iran
Italy
Netherlands
Israel

Andrea Melani
 Arash Keshavarzi Arshadi
 Vasil Vasilev
 Emil Damgaard-Møller
 Ivan Palazzo
 Oscar Kivinen
 Niamh Broderick
 Julien Fontanarava
 Nestor Bracho Pozsoni
 Timothy Cashman
 Marufdzhon Boltaboev
 Davit Chitchyan
 Yklym Bolmammedov
 Khomidkhodzha Kholikov
 Foo Jeat
 Hristo Rasheev
 Sidsel Alsing
 Henry Yuen
 Vitória Medeiros
 Nadav Orion
 Vahe Gharakhanyan
 Lona-Liisa Sutt
 Balagardash Bashirov
 Kalysbek Abykeshov
 Zeynep Terzi
 Veronika Saharuka
 Walter Kähm
 Vladislav Kamysbayev
 Jorrit Hortensius
 Nina Gämperli
 Armughan Khan
 Dieter Plessers
 Roberto Ugaz-León
 Andreas Erichsen
 Vidak Raičević
 David Pechersky
 Bruno Buljan
 Ganbadrakh Batnasan
 Sergio Tomás Martínez

Italy
Iran
Bulgaria
Denmark
Italy
Finland
Ireland
France
Venezuela
Australia
Tajikistan
Armenia
Turkmenistan
Tajikistan
Malaysia
Bulgaria
Denmark
New Zealand
Brazil
Israel
Armenia
Estonia
Azerbaijan
Kyrgyzstan
Turkey
Latvia
United Kingdom
Kazakhstan
Netherlands
Switzerland
Pakistan
Belgium
Peru
Denmark
Serbia
Canada
Croatia
Mongolia
Spain

Honorable Mention

Azzaya Khasbaatar
 Ervins Cauna
 Bruno Galán Carminati
 Brayan Paredes-Álvarez
 Matti Mikkola
 Arturo Flores
 Zlatko Jončev
 Jeroen Eijkens
 Luis Requiz Perera
 Batzaya Bekhbaatar

Mongolia
Latvia
Uruguay
Peru
Finland
Mexico
Serbia
Netherlands
Venezuela
Mongolia

Design on the medals

Reverse

The Washington Monument and the dome of the United States Capitol building are featured in the upper half of the design. A molecular model of the antibiotic penicillin occupies the lower portion. A wreath of laurel leaves, symbol of peace and outstanding achievement, surrounds the metal.



Obverse

The 44th International Chemistry Olympiad logo features a stylized Erlenmeyer flask that incorporates stripes that together with the single star represents the flag of the United States, known as the Stars and Stripes.

“Thank your parents and teachers when you return home; you would not be participating in this year’s Olympiad without their encouragement.”

Richard R. Schrock
2005 Nobel Laureate

The DOW Corporation, The American Chemical Society and the University of Maryland are honored that you participated in the 44th International Chemistry Olympiad in Washington, D.C. We hope you enjoyed your experience here and hope you made new friends and memories. We wish you safe travel home and invite you to visit again soon.

On the cover masthead: *The Statue of Liberty is located on Liberty Island in New York Harbor. It was a gift to the U.S.A. from France. The statue is a universal symbol of freedom and democracy. The copper torch covered in 24K gold leaf is lit by floodlights at night.*



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no. 12

August 10, 2012

Catalyzer

44th International Chemistry Olympiad United States of America

Celebrating the Conclusion of the 44th International Chemistry Olympiad



It has been a privilege for the American Chemical Society to organize the 44th International Chemistry Olympiad.

One of the goals of ACS is to "Foster the development of the most innovative, relevant, and effective chemistry education in the world." The International Chemistry Olympiad exemplifies innovation in chemistry education by challenging students to devise creative solutions to complex theoretical and practical problems. We would like to applaud all of the students, all whom are champions in our eyes, who participated in this year's Olympiad! Thank you to all the students, mentors, observers, and guests for being part of the 44th IChO.

Above and left: *Closing ceremony in Gaston Hall at Georgetown University.* Top right: *Bryan Balazs, Chair 44th IChO passes the IChO flag to Valery Lunin, President of the 45th IChO, Moscow, Russia.* Bottom right: *Michael Doyle congratulates first place winner, Florian Berger of Germany.*



Photos by Peters Cutts Photography

Celebrating International Excellence in Chemistry

Moments from the 44th IChO



Photos by Michael Tinnesand

Closing Ceremony and Banquet



Photos by Peters Cutts Photography

Past Participant

Seth Brown, PhD Professor, University of Notre Dame, 1984 16th IChO, Silver Medalist.



When I arrived at the 16th International Chemistry Olympiad in Frankfurt am Main, much of what I saw I had expected. I expected the long, difficult, even occasionally incomprehensible chemistry tests. I expected to visit the local sights—Goethe's birthplace, the river Rhine—of which our hosts were justifiably proud. But the smaller aspects of the local culture caught me by surprise; the notion that the vending machines in the Sportschule where we stayed would carry beer, and that it would be cheaper than water, was almost shocking to a fifteen-year-old American boy.

And I had not expected the deep sense of connection that I felt to the other student participants. They were supposed to be my competitors, after all. And communication was not always smooth; while we were on the Rhine, the attempt by the German speaker to enunciate in French the notion that the first drink would be free came out memorably garbled, not as “La premiere boisson est gratuite” but as “Le premier poisson est libre”—the first fish is at liberty.

But we students—if you'll excuse the expression—bonded. We shared a common passion for, and abilities in, chemistry. We may not have shared these traits with all our compatriots back home, but it did not take us long to discover that at the IChO we had found our kin. It was a joy that to me, at least, was as sweet as it was unexpected.

On the cover masthead: The Liberty Bell located in Philadelphia, Pennsylvania is a national symbol of freedom and liberty for all Americans.

Q. What is the main memory will you take home of this Olympiad?



**Jasmina Büchel
Lichtenstein**

A. “I was very surprised that there was no competition among various teams. The participants seemed much more interested in making friends and sharing experiences, rather than being wary or focusing on rivalries.”



**Manav Alani
India**

A. “I never expected that all the participants would be so open to fun. It is not what I've come to expect of scientists, but I've come to learn that expectation was wrong. I know I will not remember the ‘hiccups’ in the schedule or events, but I will always remember the fun we had.”



**Henry Yuen
New Zealand**

A. I will remember the way all the events worked to bind us together. Even though some participants were not crazy about this event or that, I think we all agree that it was worth it for bringing people together.”



**Walter Kähm
United Kingdom**

A. “The biggest thing I will remember is meeting so many other people who like chemistry like me. Previously, if I met 2 or 3 people like that, I counted myself lucky. But now I know 300!”

Photos by Michael Tinnensand

Much has changed since 1984. The country that I visited in that Olympiad—West Germany—no longer exists. But much is still the same. Now, in 2012, I hope you enjoyed the sights and the culture in Washington, D.C., of which we are justifiably proud. Most of all, I'm sure you enjoyed the company of your fellow chemists, with whom you share so much.

Seth Brown

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INSTRUMENTS**



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