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THE CHEMICAL BULLETIN

Chicago Section of the American Chemical Society Newsletter

Special Commemorative Issue

Fall 2022 National Meeting of the American Chemical Society

Welcome to Chicago!

On behalf of the Chicago Section of the ACS, I'm delighted to welcome you to the Fall 2022 National Meeting of the American Chemical Society.

The organizers of this National Meeting have assembled an outstanding technical program, built around the theme of "Sustainability in a Changing World," with more than 10,000 papers and posters to be presented at keynote events and symposia, at which contributions from students and the chemical industry are prominently represented. As always the Exposition will feature suppliers from around the world, and career guidance offerings will include courses and presentations to help members grow as chemists.

The Chicago Section has prepared a series of offerings that we hope will enhance your experience at the meeting.

- The Welcome Counter in the registration area at McCormick Place will be staffed by volunteers who can provide information about places of interest, restaurants, and transportation, and also answer other questions you may have.
- In keeping with the meeting theme, there will be information about sustainability initiatives at local Chicago area colleges and universities, government laboratories, and industry.
- The section will host a reception on Monday evening to celebrate our Willard Gibbs Award medalists, and there may even be a surprise guest!
- Public outreach events at the meeting will include a scavenger hunt, where members will be encouraged to find chemistry-related places and things at the meeting and in the city of Chicago.

The Chicago Section has been a part of the ACS for more than 125 years, and its roughly 3000 members come from more than 170 primary schools, high schools, colleges, and universities; several prominent government laboratories; and more than 375 industrial employers. Many of our members will be presenting their work at this meeting, and you're invited to seek them out. Our volunteers at the meeting are looking forward to talking with you and to helping you get the most out of your participation in the national meeting and your enjoyment of the city of Chicago.

Mark Cesa
Chair, Chicago Section ACS

IN THIS ISSUE

FROM THE EDITORS' DESK

Celebrating Science and the City!

We are delighted to greet ACS members and visitors from across the country for the **Fall 2022 National Meeting** in Chicago and to introduce you to *The Chemical Bulletin,* the monthly newsletter publication of the Chicago ACS. The *Bulletin,* now in its 109th year of continuous publication, is the principal tool used by the Chicago Section to communicate with its 3000 members in seven counties and two states in the greater Chicago metropolitan area. In recognition of the theme of the meeting, Sustainability in a Changing World, this special issue of *The Chemical Bulletin* is dedicated to the thousands of chemistry professionals who have sustained the science and practice of chemistry for more than 125 years. Thank you also to the companies that support us—see their ads on page 3. The *Bulletin* represents a proud tradition of service to the Society and the profession, and we are honored as editors to continue the tradition.

Drawing on information preserved within an archived and digitized collection of *The Chemical Bulletin* that goes back to 1914, our former editor Margaret Schott has written a captivating historical account of the 60th National ACS Meeting held in Chicago in 1920. Her writing paints a vivid picture of the times and reminds us of the enduring value of our work, "to promote our beloved science and ever widen its field of service to humanity." (See pages 4 and 5.)

The best way to honor the legacy of the past is to "pay it forward" for the next generation. This has been the mission of the national ACS Project SEED program since 1963, and in 2017, the Chicago Section began a scholarship program to recognize area students who have completed Project SEED internships. See pages 16 and 17 to read first-person stories of the lasting value of these internships and scholarships in the students' own words.

Throughout the year we have published a series of articles on sustainability to promote the theme of the Fall 2022 National Meeting. In this issue, our centerpiece feature (see pages 8–11) looks at how universities, research labs, and companies in and around Chicago are helping to develop affordable and clean energy solutions, increase stewardship of the Earth's resources, and ensure that the community is a full partner in these initiatives.

The Chicago Section provides a vibrant and welcoming community for chemistry professionals to share their love of chemistry and promote the core values of the American Chemical Society. We are grateful to have been selected as finalists for five 2022 ACS ChemLuminary Awards. Please join members of the Chicago Section at the Awards Ceremony on Tuesday, August 23, at 8:00 pm CDT in the Hyatt Regency Chicago (see flyer on page 22). Together, let us celebrate the wonderful work done by ACS volunteers from local sections across the country, as well as ACS technical divisions and international chapters, to advance the chemistry enterprise for the benefit of Earth and all its people. We look forward to meeting you!—AMBER ARZADON and IRENE CESA

Sustainability Articles in *The Chemical Bulletin*

- The Chemist's Role in Attaining a Sustainable Future (January 2022)
- ACS Initiatives on Sustainability (February 2022)
- Carbon Capture – Is It Sustainable? (March 2022)
- Native Plants and Biodiversity (April 2022)
- Technology Drives Innovation (May 2022)
- Elements of Sustainability (June 2022)

MEMBER SPOTLIGHT

Milt Levenberg Named ACS Fellow

Congratulations to Milton I. (Milt) Levenberg, Ph.D., who was recently honored as a 2022 ACS Fellow by the American Chemical Society. Milt is one of 45 new ACS Fellows recognized by the national ACS for their outstanding contributions to science, the profession, and the Society. Members of the Chicago Section will also "recognize" Milt based on his ubiquitous presence at local section meetings as point-person for computer and audio-visual technology. In this role, he has played a vital part in keeping the section engaged virtually during the COVID era.

Milt is retired from Abbott Laboratories, where over the course of a career spanning 33 years he served as senior chemical physicist, founder and director of its first mass spectrometry lab, department manager, and senior project leader. In 2000 Milt was honored with the Lifetime Achievement Award from Abbot Laboratories for his many contributions to the company and its success.

Within the national ACS Milt served as a member of Communications and Public Relations Committee from 2008–2016, and he has been an enthusiastic member of the "young" Senior Chemists Committee (SCC) since 2017. Maintaining strong relationships with younger chemists has been a special area of interest for Milt as he has helped to organize SCC networking events with the Younger Chemists Committee.

Within the Chicago Section Milt played a pioneering role in creating the section's first website—this was in 1998, long before most local sections had one. In 2003, Milt was elected Chair-Elect for the section, serving as Chair in 2004. Thus began a "second career" for Milt of dedicated service and leadership to the section. Milt's many duties and roles within the Chicago Section have included terms as chair of the National Affairs Committee, Policy Chair, Director, Councilor, Administrative Division Chair, and Section Trustee. Milt was an early organizer of the Illinois State Fair Committee for the section, a cooperative endeavor with local ACS sections from across the state.

He continues to serve as Co-chair of the State Fair Committee for the section, a role that takes him down to Springfield for two weeks every August to share his love of chemistry with the general public. In 2013 Milt was the recipient of the Distinguished Service Award from the Chicago Section.

Congratulations, Milt, and a sincere thank you from the members of the Chicago Section on your well-deserved recognition as an ACS Fellow. It is an honor!

SECTION HISTORY

A Look Back at the 1920 National ACS Meeting in Chicago

Tumultuous times led up to the **Fall 1920 National ACS Meeting,** held September 6–10 in Chicago. The nation had endured a world war and the influenza pandemic. So it was fitting that organizers of the meeting named it "The Reconstruction Meeting." An editorial in *The Chemical Bulletin* commented that it was a "timely title, in view of the problems now confronting the nation, especially the all-important question of increased production, whose chief handmaiden chemistry is."

As chair of the Chicago Section of ACS, Winford Lee Lewis, a professor at Northwestern University, served as chairman of the Convention Executive Committee.[1] "These great national assemblies of American chemists," he noted, "serve certain fundamental functions, i.e., to promote our beloved science and ever widen its field of service to humanity, to glean from the spoken story of the work of others, inspiration and knowledge of recent advances in American chemistry, and finally to enjoy the fellowship of kindred spirits."

Another role of the national ACS meetings was to facilitate sharing chemical knowledge by scientists worldwide. The 1893 meeting, prior to the formal launch of the ACS Chicago Section in 1895, had been held in conjunction with the Scientific Congresses of the World's Columbian Exposition.

Collage from *Chemical and Metallurgical Engineering*.

In order to finance such a large event, the organizers of the 60th ACS meeting in 1920 secured more than sixty pledges from firms and individuals. Of the 1,305 recorded attendees, close to a thousand were ACS members. Twenty individuals hailed from other nations, including Canada, Cuba, China, England, and Japan. In the U.S., most travelers came by rail, arriving at the Illinois Central Station on Michigan Boulevard. Attendees were advised to make advance reservations on special Chicago-bound coaches made available on several routes. Participants had fifty-five hotels to choose from, including the YMCA.

The 1920 meeting had three main venues: the Congress Hotel in downtown Chicago, selected for its convenient central location; Northwestern University, for the beauty and tranquility of its lakeside campus; and the University of Chicago, which had suitable lecture facilities, including Kent Laboratory. One journalist noted that "the successful carrying out of the extensive program is assured by the fact that it is in the hands of the Chicago Section, whose membership has been drawn upon for thoroughly live, energetic committees." A new feature of the meeting was a dinner hosted by "the ladies of the Chicago Section, for the professional women in attendance."

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[1]Lewis contributed to the war effort as a captain in the Chemical Warfare Service. Notably, he developed the chemical agent Lewisite.

SECTION HISTORY

A Look Back at the 1920 National ACS Meeting in Chicago

(Continued from page 4)

The formalities began with a council meeting on Monday at the University Club of Chicago. Council members passed a motion to increase annual dues from $10 to $15, voted down a plan to hold just one meeting per year, and agreed that a committee would be set up to cooperate with the Chemical Warfare Service. Another topic of discussion was the state of the nation's dye and coal-tar chemicals industry. For a number of years, the Society had been pressing Congress to pass legislation protecting the dye industry in order to boost the economy and free the US from dependence on Germany.

The general meeting commenced the following morning in the Gold Room of the Congress Hotel with welcome addresses from Professor Julius Stieglitz, who was honorary chair, and from a representative of the Chicago Association of Commerce, which cosponsored the meeting. ACS president W. A. Noyes also spoke.

On Tuesday afternoon participants took the Elevated Railroad to the Northwestern campus for technical talks in Patten Gymnasium, followed by a multifaceted program of entertainment—band, orchestra, and organ concerts; "a mammoth community sing"; and a farcical Sullivan operetta. Scheduled activities included a tour of Evanston's water filter plant; one of the best equipped in the nation, the state-of-the-art facility had been responsible for a significant reduction of typhoid cases following its opening six years earlier. A baseball game pitted the Chicago Section against the World of Chemists, and there was a lawn supper for 1,200 attendees with college alumni in their own groupings. Also on the agenda: "8–10:30 pm: Observatory will be open for inspection of the universe."[2]

The scientific sessions were scheduled for Wednesday and Thursday at the University of Chicago. Of the 230 papers in the final program, twelve included women scientists as authors. Topics were organized along divisional lines and ranged from the chemistry of paper pulp manufacturing and methods for vulcanizing rubber to the standardization of chemical thermometers.

There were papers on fertilizers, leather tanning, colloidal fuels, and biological chemistry. Several of the talks were illustrated with "magic lantern" slides, which had become popular in educational settings.

With help from the Publicity Committee, the ACS News Service, which was set up in 1917 to "to tell chemistry's story to the public at large," provided daily meeting highlights for the media. Presenters were exhorted, as a duty to the public, to prepare synopses of their papers "in popular form." Early in the week, a headline in the *Chicago Tribune* read, "Chemists to Discuss How to Cut H.C.L. with Science's Aid," referring to the high cost of living. Newspaper columns featured topics like a new cow feed made from hydrolyzed sawdust, a sweet-potato syrup as a substitute for cane sugar, and alternative fuels.

Looking north on Michigan Ave.

In keeping with the meeting's theme of chemical production, the organizers arranged excursions to leading manufacturing plants, including the Pullman Car Works, American Maize Products Company, and a steel foundry. Separate outings for the ladies included visits to the Art Institute and Hull House. A combined men's and women's excursion to the wallpaper and color plant of Sears, Roebuck & Co. was a popular event.

By all accounts the 1920 National Meeting was a memorable event. The next national gathering of chemists in Chicago would not take place until 1933, during another world's fair.—MARGARET SCHOTT

References for "A Look Back at the 1920 National ACS Meeting in Chicago"

The Chemical Bulletin (1920) Vol. 7, No. 8 (AUG) pp 213-236

Journal of Industrial & Engineering Chemistry (1920) Vol. 12, No. 8 p 730

Chemical & Metallurgical Engineering (1920), Vol. 23, No. 9 p 372

[2]The Men's and Women's Entertainment Committees were headed by Herbert N. McCoy and Ethel M. Terry, who later wed. The organizers of the Spring 1921 Rochester ACS meeting chose to emphasize the scientific program over entertainment.

COMMITTEE SPOTLIGHT

WCC Celebrates 95 Years of Empowering Women in the Chemistry Enterprise

The **Women Chemists Committee** (WCC) was established in 1927 as a joint committee of ACS Council and the Board of Directors. Initially named the Women's Service Committee, the group was instructed to follow five directives to promote, advocate, and inform the Society about issues important to women. While much has changed over the years, the overall goal of the WCC has not altered: to create a more equitable environment for women. Collaborating with other ACS committees, sister organizations, and industrial partners, WCC has hosted symposia, developed national awards, provided networking opportunities, and advocated for equity. The committee creates a safe environment for its members to cultivate leadership skills to hold prominent offices within ACS and the chemical profession, including as an ACS president, ACS directors, upper management positions in industry and government, and professors at academic institutions.

This year, the Women Chemists Committee (WCC) celebrates its 95th anniversary. To continue the year-long commemoration of this milestone, WCC has organized various events for the Fall ACS meeting. As Chair of the WCC, I wish to invite you to our celebrations in Chicago.

The celebration starts on Sunday, August 21st with the 2022 WCC Merck Award symposium. The **WCC Merck Award** recognizes eight individuals in their 3rd and 4th year of graduate school, with a focus on organic, medicinal, analytical, chemical biology, computation or structural chemistry research. This award is open to US citizens studying anywhere and to non-US citizens attending a graduate program in the United States or Canada. This year's recipients are the following: Maria Adrover-Castellano (University of Michigan, Ann Arbor), Maria Camila Aguilera (University of Rochester), Sara Dibrell (California Institute of Technology), Olivia Garry (Princeton University), Rachel Huang (Stanford University), Irene Manning (University of North Carolina, Chapel Hill), Alena Vasquez (Scripps Research Institute), and Zixi Zhang (University of California, Berkeley).

On Monday, August 22nd, WCC will host the **WICE (Women in the Chemical Enterprise)** breakfast.

This ticketed event encourages women to network and to advance their careers. Also on Monday, WCC will host a full-day symposium honoring the 10th Anniversary of the WCC Rising Star Award. The **WCC Rising Star Award** recognizes up to ten women scientists approaching mid-level careers who have demonstrated outstanding promise for contributions to their respective fields. The award is open to all individual ACS members in chemistry and chemical engineering in academic, industrial, government, non-profit or other sectors. During the symposium, presenters will highlight the impact of the Rising Star Award on their careers and discuss their technical contributions.

The celebration continues Tuesday with the first half of the symposium "Celebrating 95 Years of the WCC (Women Chemists Committee)." During this symposium, past WCC chairs will discuss projects undertaken during their tenure and the challenges remaining. The final presentation will highlight future projects the WCC is planning. The **WCC luncheon** also will be held on Tuesday, with ACS President Angela Wilson speaking about the advances of women within the chemical enterprise and how the WCC has impacted the ACS. This ticketed luncheon is popular, so attendees are encouraged to purchase tickets as soon as possible. The winner of the Overcoming Challenges Award, Riley Atrops from California State University Channel Islands, will be honored at the luncheon. The **Overcoming Challenges Award** recognizes a female undergraduate for her efforts in overcoming hardship to achieve success in chemistry.

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COMMITTEE SPOTLIGHT

WCC Celebrates 95 Years of Empowering Women in the Chemistry Enterprise

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The awardee receives a monetary prize and money for travel expenses to attend the ACS Fall Meeting.

Later in the afternoon on Tuesday, the **WCC Open Meeting,** called "Just Cocktails," will take place. Besides free food and drink, the open meeting provides attendees the opportunity to meet current WCC members, learn about future WCC activities and how to become involved within the committee, and network with others. Slides featuring local section ChemLuminary submissions and winners of WCC mini grants will be highlighted. This meeting is open to all and free to attend.

To conclude the celebration at the ACS meeting, past WCC award winners will present at a full day symposium entitled "Past WCC Award Winners in Organic and Medicinal Chemistry." Presenters will provide technical talks and briefly highlight how either the **Merck Research Award** or the **Eli Lilly Travel Award** influenced their careers. Merck and Eli Lilly representatives will discuss the formation of these awards and how the awards impacted the companies.

Updated information regarding the timing and location of WCC activities can be found at https://www.acs.org/content/acs/en/meetings/acs-meetings.html. All events are included with the registration unless otherwise noted.

The 95th anniversary celebration does not end after the Fall ACS meeting. Throughout this year, WCC has been highlighting various aspects of women chemists through Facebook. Stories about chemistry mothers, industrial chemists, and international scientists display the diversity with being a woman chemist. In October, WCC will sponsor a virtual **Women Chemists of Color Networking Event** held during National Chemistry Week. This event will provide attendees the chance to speak with mentors about advancing their careers and how to overcome professional and personal barriers. Information regarding the event will be posted on the WCC website (http://www.acswcc.org) and WCC social media accounts.

Women CHEMISTS Committee

Being involved in the Women Chemists Committee is an excellent opportunity to broaden horizons, network with others, and work towards positively impacting diversity, equity, and inclusion. Whether at the national or local level, members can create an inviting environment for all. Information regarding WCC sponsored awards, how to start a local WCC section, and upcoming WCC sponsored events are found at http://www.acswcc.org.

We invite you to keep in touch with WCC activities and events through our social media accounts: Facebook (https://www.facebook.com/acsnationalwcc), Instagram (https://www.instagram.com/acswcc/?hl=en), and LinkedIn (https://www.linkedin.com/company/acswcc).

—AMY BALIJA

Local Initiatives for a Sustainable Future

Throughout the year we have published a series of articles on sustainability in *The Chemical Bulletin* to promote the theme of the **Fall 2022 ACS National Meeting** in Chicago, "Sustainability in a Changing World." As we welcome chemists from all over the world here this month for the meeting, we are excited to celebrate the role of local institutions and organizations in achieving a more sustainable future.

Argonne National Labs

Argonne National Laboratory, located in Lemont, Illinois, in suburban Cook County, is a national and international leader in developing affordable and clean energy solutions to reduce reliance on fossil fuels and decrease greenhouse gas emissions. As a premier research center for the U.S. Department of Energy (DOE), Argonne carries out fundamental and applied research across many scientific disciplines.

A major area of focus for Argonne is directed toward creating a "circular economy of reuse, recovery, redesign, reduction in resource utilization and recycling." Research in this area includes battery and polymer recycling, reducing the environmental impact of plastic waste, development of methods for carbon dioxide capture and utilization, and designing catalysts that utilize fewer precious metal resources. In addition to its research focus, Argonne has developed a widely recognized "smart campus" site that provides a living model for energy efficiency and environmental sustainability.

Recent notable achievements by Argonne scientists include:

- The use of ultrabright x-rays to probe the atomic structure of perovskite crystals and develop a model for their use in solar cells.
- Identifying innovative and practical ways to decrease agricultural greenhouse gas emissions.
- Energy-efficient methods to recycle Lithium-ion batteries from electric vehicles to recover precious metals.

Learn more about sustainability initiatives at Argonne National Labs:

Plastics Recycling: https://www.anl.gov/article/rethinking-the-science-of-plastic-recycling

What is Climate Resilience? https://www.youtube.com/watch?v=ylq9JJG0aJM

Protecting the Planet: https://www.youtube.com/watch?v=W8cln6gT4z4

- Decarbonizing the Argonne campus
- Smart grid and electric vehicle charging
- Using AI to monitor bird-solar interactions

DePaul University

DePaul University, located in the Lincoln Park neighborhood of Chicago, recently introduced a new interdisciplinary graduate program, **Master of Arts in Sustainable Urban Development** (MASUD). The program integrates academics with practical learning and draws on the city's rich resources to prepare students to solve problems related to today's urban communities and help create more sustainable urban communities for the future. Areas of focus include urban planning, public policy, geography, public service management, and environmental studies and incorporate an internship experience leading to a capstone or portfolio project. For the latest news and course schedules please visit the DePaul MASUD blog.

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Local Initiatives for a Sustainable Future

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Loyola University

The **School of Environmental Sustainability** (SES) at **Loyola University Chicago,** located on the city's North Shore, represents the university's overarching, campus-wide commitment to the environment and to ensuring a stable future for today's youth. The school, created in 2020 as the successor to its pioneering Institute for Environmental Sustainability, is the culmination of more than two decades of investment in education, research, and action to address the ecological crisis affecting our planet.

SES offers six undergraduate degree programs in the areas of environmental studies, environmental science, and environmental policy, as well as both graduate degrees and certificate programs in environmental science and sustainability. Interdisciplinary research is an integral part of Loyola's commitment to sustainability, with research efforts devoted to biodiversity, environmental health and toxicology, sustainable food systems, and climate and energy.

As reflected in the following statistics, Loyola students graduate with a deep understanding of environmental issues and their personal responsibility to respond.

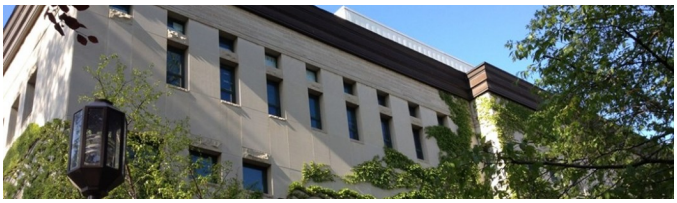
- 64% of academic departments offer at least one sustainability course
- 19.5% of students graduate with a degree that includes a sustainability-related learning outcome in its core requirements
- 81% of academic departments have a sustainability researcher

Learn more about the School of Environmental Sustainability and the values that inspire it: https://www.youtube.com/watch?v=JadpmqO_bjA.

Illinois Institute of Technology

The **Illinois Institute of Technology** (IIT) located in Chicago's historic Bronzeville neighborhood, just a few minutes south of downtown, offers a Master of Science in Environmental Management and Sustainability to prepare students with science and engineering backgrounds to manage environmental sustainability challenges. The program integrates business, science, management and the law to learn how to build economic models and develop strategies for pollution prevention and control. The unique **Elevate** program at IIT allows students to participate in hands-on internship experiences throughout their graduate education. Learn more at https://www.iit.edu/academics/programs/environmental-management-and-sustainability-ms.

Northwestern University



The **Institute for Sustainability and Energy** (ISEN) at **Northwestern University,** located in Evanston, Illinois, is leveraging the University's foundation of excellence in research, teaching, and experiential learning to meet our planet's climate and energy challenges. Strategic goals supporting the mission and vision of ISEN include:

- Interdisciplinary approaches for understanding climate change and carbon cycle dynamics and developing ecological, technological, economic, and policy solutions.
- Working with communities and stakeholders to address acute and chronic problems arising from global sustainability and energy challenges.
- Investing in solutions to public health, equity, and social justice problems.

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Local Initiatives for a Sustainable Future

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While work at the ISEN extends across the university, the heart of its scientific mission is localized in four research centers focused on solar energy and fuels, catalysis and sustainable materials, photo-sciences, and innovative nanomaterials.

The Center for Molecular Quantum Transduction at ISEN does basic research synthesize materials for quantum information science. The Northwestern University Center for Advanced Materials for Energy and the Environment is working to create new materials for clean energy production and environmental remediation. The Center for Catalysis and Surface Science, sponsored by the DOE, is a national center for catalysis research. Finally, scientists at the Photo-sciences Research Center are harnessing the power of light to push back the frontiers of chemistry, physics, and biology.

Visit the ISEN website to take a virtual tour of the institute, its mission and educational programs, and to learn more about its groundbreaking research accomplishments.

- https://isen.northwestern.edu/master-of-science-in-energy-and-sustainability-mses
- https://isenplan.northwestern.edu/

University of Illinois Chicago

The **University of Illinois Chicago** (UIC), located on the Near West Side adjacent to the Chicago Loop, has maintained a leading presence in sustainability programs and practices for almost 50 years.

Founded in 1973, the **Energy Resources Center** (ERC) at UIC is an interdisciplinary public service, research, and special projects organization working to improve energy efficiency and the environment. With expertise in energy generation and efficiency, utilities management, and biofuels and bioenergy, faculty, students, and staff at the Energy Resources Center are able to provide solutions to environmental problems affecting residential and commercial organizations across the city.

Reflecting the multicultural community in which it resides, the ERC comprises a team of engineers, economists, architects, computer scientists, database developers, and public policy analysts. From its roots serving the Chicago community, the ERC now serves as a model for educational institutions and governments across the globe to solve their energy challenges.

Invenergy

Invenergy Renewables is a privately owned, multinational renewable energy developer headquartered in Chicago. It is the largest private renewable energy company in North America, engaged in developing, building, and operating power generation and energy storage facilities across the world. Since its founding in 2002, **Invenergy** has overseen more than 190 projects totaling 30,000 megawatts in Asia, Europe, and North and Central America.

Currently, Invenergy is building both the largest wind and the largest solar projects in the United States, which are projected to deliver an additional 3 gigawatts of clean energy upon completion in 2023.

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Local Initiatives for a Sustainable Future

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In July 2022, Invenergy announced its first green hydrogen project, the 5-acre Sauk Valley Hydrogen Project in Nelson Township in western Illinois. The project will utilize power from the company's on-site solar energy plant to generate green hydrogen based on low-carbon, electrolyzer technology provided by Ohmium International. Projected to generate 52 tons of hydrogen per year, the Sauk Valley Hydrogen Project will also have the capacity to store 400 kilograms of hydrogen at the site, which will be used to power the 548-megawatt Nelson Energy Center.

Visit https://invenergy.com/what-we-do/overview to learn about these and other exciting sustainable energy projects being developed all across the world by a company based in Chicago, Illinois.

LanzaTech

LanzaTech is a global, green chemical company founded in 2005 and headquartered in Skokie, Illinois. Currently valued at almost $2.2 billion, the company was originally formed to convert carbon-containing waste gases into useful, value-added chemicals.

LanzaTech technology uses microbial gas fermentation to recycle carbon monoxide released by steel mills and other industrial manufacturing facilities and convert it to value-added commodity chemicals such as ethanol, acetone, and isopropyl alcohol. The technology can be adapted to using captured carbon dioxide emissions for chemical synthesis by adding hydrogen to the microbial fermentation process.

As another example of the versatility of its microbial gas fermentation technology, LanzaTech has partnered with a chemical company in Asia to convert syngas (synthesis gas – a mixture of carbon monoxide and hydrogen in different ratios) from municipal solid waste into ethanol. The company has put together an informative slide show explaining how this technology works and its many applications.

The University of Chicago

The University of Chicago, located in the beautiful Hyde Park neighborhood south of the city center, has developed a comprehensive, integrated Sustainability Plan to address environmentally responsible practices and operations across its campuses. Managing greenhouse gas emissions is the highest priority, and the University has committed to reducing emissions 20% by 2025. The university's data-driven approach encompasses reductions in energy consumption, LEED-certified increases in building efficiency, multi-modal transportation programs, waste reduction, water conservation, and green space management.

Credit: University of Chicago, photo by Jean Lachat, https://visit.uchicago.edu/explore-uchicago/

The Environmental Frontiers program is a key component of the university's sustainability plan. This program, which spans the sciences and humanities, provides research and educational opportunities to identify innovative ways for creating a more sustainable future. Recently, students, faculty, and staff teamed up to design and implement an action plan for saving energy in science laboratories. The detailed plan focuses on energy consumption in laboratory ventilation (hoods) and cold storage (freezers).

—IRENE CESA AND DAVID CRUMRINE

YOU ARE INVITED

ACS Chicago Section Reception

MEET THE GIBBS MEDALISTS

Please join us for an opportunity to mix and mingle with premier chemists who have been awarded the Willard Gibbs Medal!

AUGUST 22, 2022
6:00 pm - 8:00 pm

HYATT REGENCY
MCCORMICK PLACE HOTEL
Hyde Park Room (CC 11AB)

SECTION HISTORY

The Willard Gibbs Medal

The **Willard Gibbs Award** was founded in 1910 by William A. Converse (1862–1940), former Chair and Secretary of the Chicago ACS Section. The medal is named for Professor Josiah Willard Gibbs (1839–1903) of Yale University. The purpose of the award is "to publicly recognize eminent chemists who, through years of application and devotion, have brought to the world developments that enable everyone to live more comfortably and to understand this world better."

Medalists are selected by a national jury of eminent chemists representing a cross-section of chemistry disciplines. The nominee must be a chemist who, because of the preeminence of their work in and contributions to pure or applied chemistry, is deemed worthy of special recognition. The award recipients span more than a century of progress in the history of chemistry—their names will be familiar to most chemists regardless of specialty.

The Willard Gibbs Medalists

Svante Arrhenius	1911	Peter J.W. Debye	1949	Jack Halpern	1986
Theodore W. Richards	1912	Carl S. Marvel	1950	Allen J. Bard	1987
Leo H. Baekeland	1913	William Francis Glauque	1951	Rudolph A. Marcus	1988
Ira Remsen	1914	William C. Rose	1952	Richard Bernstein	1989
Arthur A. Noyes	1915	Joel H. Hildebrand	1953	Richard N. Zare	1990
Willis R. Whitney	1916	Elmer K. Bolton	1954	Günther Wilke	1991
Edward W. Morley	1917	Farrington Daniels	1955	Harry B. Gray	1992
William M. Burton	1918	Vincent du Vigneaud	1956	Peter B. Dervan	1993
William A. Noyes	1919	W. Albert Noyes, Jr.	1957	M. Frederick Hawthorne	1994
F.G. Cottrell	1920	Willard F. Libby	1958	Sir John Meurig Thomas	1995
Mme. Marie Curie	1921	Hermann I. Schlesinger	1959	Fred Basolo	1996
Julius Stieglitz	1923	George B. Kistiakowsky	1960	Carl Djerassi	1997
Gilbert N. Lewis	1924	Louis Plack Hammett	1961	Mario J. Molina	1998
Moses Gomberg	1925	Lars Onsager	1962	Lawrence F. Dahl	1999
Sir James Colquhoun Irvine	1926	Paul D. Bartlett	1963	Nicholas J. Turro	2000
John Jacob Abel	1927	Izaak M. Kolthoff	1964	Tobin J. Marks	2001
William Draper Harkins	1928	Robert S. Mulliken	1965	Ralph F. Hirschmann	2002
Claude Silbert Hudson	1929	Glenn T. Seaborg	1966	John I. Brauman	2003
Irving Langmuir	1930	Robert Burns Woodward	1967	Ronald Breslow	2004
Phoebus A. Levene	1931	Henry Eyring	1968	David A. Evans	2005
Edward Curtis Franklin	1932	Gerhard Herzberg	1969	Jacqueline K. Barton	2006
Richard Willstätter	1933	Frank H. Westheimer	1970	Sylvia T. Ceyer	2007
Harold Clayton Urey	1934	Henry Taube	1971	Carolyn R. Bertozzi	2008
Charles August Kraus	1935	John T. Edsall	1972	Louis E. Brus	2009
Roger Adams	1936	Paul John Flory	1973	Maurice Brookhart	2010
Herbert Newby McCoy	1937	Har Gobind Khorana	1974	Robert G. Bergman	2011
Robert R. Williams	1938	Herman F. Mark	1975	Mark A. Ratner	2012
Donald Dexter Van Slyke	1939	Kenneth S. Pitzer	1976	Charles M. Lieber	2013
Vladimir Ipatieff	1940	Melvin Calvin	1977	John E. Bercaw	2014
Edward A. Doisy	1941	W.O. Baker	1978	John F. Hartwig	2015
Thomas Midgley, Jr.	1942	E. Bright Wilson	1979	Laura L. Kiessling	2016
Conrad A. Elvehjem	1943	Frank Albert Cotton	1980	Judith L. Klinman	2017
George O. Curme, Jr.	1944	Bert Lester Vallee	1981	Cynthia Burrows	2018
Frank C. Whitmore	1945	Gilbert Stork	1982	Marcetta Y. Darensbourg	2019
Linus Pauling	1946	John D. Roberts	1983	Zhenan Bao	2020
Wendell M. Stanley	1947	Elias J. Corey	1984	Sharon Hammes-Schiffer	2021
Carl F. Cori	1948	Donald J. Cram	1985	Joseph S. Francisco	2022

66th Annual Scholarship Exam in Chemistry

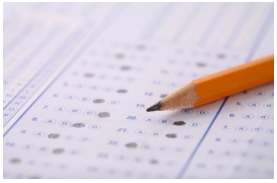
The Chicago Section of the ACS is pleased to announce the winners of the **2022 Scholarship Exam** in Chemistry. The exam was administered on Saturday, May 22, 2022, at Benedictine University in Lisle, Illinois. A total of 48 students enrolled in first-year chemistry at area high schools sat for the 2022 exam. Local high school chemistry teachers were allowed to nominate two students from their classes to take the exam. Congratulations to all the winners and their teachers!

Awards will be presented to students at the Chicago ACS Education Night meeting in September, currently scheduled for Friday, September 16, 2022 (location to be announced). Teachers of prize-winning students will receive a one-year membership in AACT (American Association of Chemistry Teachers). Award winners and their teachers will be contacted by the Chicago Section office with registration information. All teachers are invited to attend—please check chicagoacs.org for up-to-date information.

A special thank you to Professor Tim Marin of Benedictine University who wrote and proctored the exam, and to local teachers and section volunteers for their help administering the process. Funds for scholarship exam awards come from ACS Chicago Section endowment and investment funds contributed by individuals and the chemical industry.

—RUSS KOHNKEN

Chicago ACS High School Scholarships



The Chicago Section offers several scholarships to high school students in support of their college education. Every year in May, the High School Education Committee administers an exam to students nominated by their teachers, and scholarships are awarded based on their ranking in the results. High school students in the Chicago area who are presently enrolled in the first year of high school level chemistry are eligible. AP Chemistry is not considered a first year high school chemistry course.

For more information, please visit: https://chicagoacs.org/Scholarships

2022 Scholarship Exam Results

Prize	Winner	Teacher & School
FIRST $5,000 Award	ERIN REEVE	DESPINO MANDARINO Glenbrook South HS
SECOND $3,000 Award	SAMANTHA GASS	JAIME STASIOROWSKI Deerfield HS
THIRD $2,500 Award	BAVYA CHOWDAVA-RAPU	JEROMY BENTLEY Naperville North HS
FOURTH $1,500 Award	JENNY BRANT	BRANDON TUCKER Glenbrook South HS
FIFTH $1,250 Award	RACHANA KANATHUR	MARGARET STOKES Metea Valley HS
MARIE LISHKA* $2000 Award	ERIN REEVE	DESPINO MANDARINO Glenbrook South HS
MARSHALL S. SMOLER** $200 Award	NATALIE CHLEBUS	KAREN TRINE Whitney Young HS
BERNARD E. SCHAAR*** $500 Award	NATALIE CHLEBUS	KAREN TRINE Whitney Young HS

*To the highest scoring female student. The award honors Marie Lishka, who was an active ACS Chicago Section volunteer for many years. Additional funding for the award was provided in memory of Stan Drigot.

**To the highest scoring Chicago Public High School student. The award was established in 1972 in memory of Marshall S. Smoler by his sister Rachel. Marshall Smoler was a teacher for many years in the Chicago Public Schools.

***To the highest scoring Chicago high school student. The award was established in memory of Bernard E. Schaar by his widow. Mr. Schaar was a long-time active member of the American Chemical Society, the Chicago Section, and the Chicago Chemists' Club.

In addition to the scholarship winners, the Chicago Section is pleased to recognize the following students for **Honorable Mention** based on their performance on the exam (in alphabetical order).

Cooper Evans, Highland Park HS
Randolph Ha, Metea Valley HS
Katie Stabb, Oak Park and River Forest HS

Chicago Sites Inspired by Women

There is more to Chicago than gangsters, the legendary winds, and deep-dish pizza. For Oprah Winfrey, Michele Obama, Joan Cusack, and Dr. Fannie Emanuel, the first African American physician in Illinois, Chicago is a bold destination where women have made a home, succeeded in their careers, and left their mark. If you manage a few minutes to visit storied Chicago sites during the ACS meeting, here are some suggestions close to the downtown area inspired by women.

- **Hull House:** The American Chemical Society designated Jane Addams Hull-House Museum as a National Historic Chemical Landmark recognizing the groundbreaking work of Alice Hamilton. Considered the first lady of Industrial Medicine, Hamilton joined Jane Addams to serve immigrants and the poor. Hamilton's work included developing effective sewage disposal to eliminate transmission of disease by flies, particularly typhoid fever. (800 S. Halsted Street)

- As hostess for visitors to the World's Columbian Exposition, Bertha Palmer requested the chef of the famed **Palmer House** to create a small treat which could be easily transported and served to women attendees. The brownie was born and is still available at the Palmer House. (17 E. Monroe)
- Art enthusiasts, Bertha Palmer and her husband Potter began collecting art by French Impressionists Claude Monet and Pierre-Auguste Renoir. The Palmers even shocked Chicago's sensibilities by including Auguste Rodin's nudes. These works are a major part of the Art Institute's Impressionist collection. Don't forget to take a selfie with the Art Institute of Chicago Lions, and to enjoy the current exhibition of Paul Cezanne works.
- In the nineteenth century, ladies would not dine alone. After an exhausting round of fittings, Marshall Field's unaccompanied women customers required refreshment. Mrs. Herring, an employee, would share her chicken pot pie lunch with them. As a result, Field's opened the first tearoom inside a department store. The pot pie is still served in the 5. Walnut Room on the seventh floor of Macy's. (111 North State Street)

- Check out Gwendolyn Brooks's *Annie Allen* at the **Harold Washington Library Center,** the main branch of the Chicago Public Library. Brooks received the Pulitzer Prize in 1950 for the book-size poem about the life of a young black girl growing up on Chicago's South Side. Brooks was the first African American to earn the award. (400 South State Street)
- Named after one of the first ladies of Chicago, **Maggie Daley Park** is a 20-acre community playscape boasting a playground, climbing complex, an enchanted forest, and marvelous views of the lakefront. The space honors Mayor Richard M. Daley's wife, who was devoted to the city and its youngest citizens. (337 W. Randolph)

No matter what you choose to do in Chicago, the whimsical, the historical or the extravagant, you are certain to realize a woman helped to create: **My Kind of Town.** —AMY BALIJA

Member Recommendation:

My favorite place in Chicago is to sit on the alcove benches at the Lurie Garden. Attached is a picture from spring. The garden is tucked in a corner of Millennium Park, at Monroe and Columbus."
—RAELYNN MILLER

Students Reflect on Project SEED Experiences

Project SEED provides high school students from economically disadvantaged circumstances with paid summer research experiences in chemistry labs at local institutions. The program is funded by the American Chemical Society at the national level and administered locally by the Chicago Section, which connects students with local research labs and distributes the stipends. The Project SEED Committee for the Chicago ACS is led by Paul Brandt and Raelynn Miller.

In 2017, the Chicago ACS began a scholarship program to recognize area students who have completed Project SEED internships. Money for **Project SEED Scholarships** comes from the section's investment funds and is awarded over the course of four years of study at a college or university. Selection criteria for Project SEED Scholarships are based on an application provided by the student, a letter of recommendation from the Project SEED mentor, a poster presentation at a dinner meeting of the ACS Chicago Section, and a personal interview.

Project SEED Scholarship Recipients

Student	Year	School
Faiz Rehman	2018	University of Illinois at Chicago
Rocco Molinelli	2018	University of Chicago
Brielle Ross	2018	University of Illinois at Urbana-Champaign
Megan Lay	2019	Bradley University
Kristine Hwang	2019	University of Illinois at Urbana-Champaign

Earlier this year we asked Project SEED scholarship recipients to tell us about their experiences. Their words* are testimony to the enduring value of this landmark program!

From Megan Lay:

"Four years ago, I had the opportunity to intern at Loyola University Chicago with Professor Hee Yeon Cho for two summers through ACS Project SEED. The internship was an amazing learning experience that fueled my interest in research! I went on to attend Bradley University to pursue a Bachelors of Science in Mechanical Engineering with a Biomedical Engineering concentration."

Megan Lay at Abbott Internship/Co-op.

"Last year, I was a Biomedical Engineering REU** intern at Wake Forest University, where I [helped] develop a robotic system to simulate and track clinical patient lung tumor motion for surgical applications. In the past six months, I've been working as a manufacturing engineering Co-Op at Abbott in the Cardiac Rhythm Management Division to support manufacturing for implantable medical devices."

"I plan to return to school in the fall to finish my undergraduate studies and graduate in December of 2023. As a first generation Asian American woman from an economically disadvantaged background, I'm extremely grateful for Project SEED, as it opened up doors to many research and internship opportunities for me and thousands of others. In the future, I hope to work in the medical device industry, and give back to those from a similar background as me."

From Rocco Molinelli:

Rocco Molinelli.

"I began my academic research journey in high school through Project SEED. This program paired me with Dr. Wei-Tsung Lee at Loyola University. It provided me the opportunity to engage in research in synthetic inorganic chemistry. During the two years I spent doing research under Dr. Lee's guidance, I gained the experience necessary to conduct research and communicate my work to a broader audience. Project SEED not only allowed me the opportunity to be a contributing member of an academic laboratory but also the chance to present my work [at] ACS conferences and meetings.

**Lightly edited for brevity. **Research Experience for Undergraduates.*

(Continued on following page)

OUTREACH

Students Reflect on Project SEED Experiences

(Continued from page 16)

"These opportunities helped prepare me for rigorous studies at the University of Chicago, [where] I studied Biological Chemistry and minored in Astronomy & Astrophysics."

"At the end of my junior year of college, I joined Dr. Anna Wuttig's electrochemistry research team at the University of Chicago. Dr. Wuttig was a new professor at the university and I was fortunate to apply the knowledge that I learned from my time working with Dr. Lee to assist in beginning her research projects [into] electrochemical systems."

"After college, I will be working at EN Engineering as an associate corrosion engineer and will continue to apply the knowledge that I have gained from my experiences in Project SEED and the University of Chicago. Soon, I will also apply to graduate programs to attain my Ph.D. in chemistry [and] electrochemistry. I hope to help progress the field to make the synthesis of value-added products such as pharmaceutical drugs a more green and sustainable process."

From Brielle Ross:

"I was introduced to Project SEED during my sophomore year of high school by my honors chemistry teacher. Fortunately, I was accepted to the program two summers straight. My projects with Professor Dali Liu focused on [protein] crystallography. During my time at Loyola, I learned a lot from the [graduate] students. I would often ask what are some tips for excelling in college. Many would say time management and advocating for yourself. These tips were very helpful for my time in college. Moreover, I learned a lot about presenting research! Project SEED helped shaped my college career and guided me to achieve many goals."

"The University of Illinois Urbana-Champaign is one of the top universities in the world. I chose U of I because of it being close to home and its accreditation. At the university, I studied community health on the premed track. While studying community health, I got to learn about health disparities, prevention, health administration, and more. During my freshman year, I learned a lot about myself and how to excel in classes by being a major advocate for myself. Doing this helped me through tough courses such as chemistry and biology."

Brielle Ross.

"I [also] got involved with a service fraternity known as Alpha Phi Omega to gain service skills. During my sophomore year, I joined the Illini Medical Screening Society (IMSS) and got accepted into a medical fraternity known as Phi Delta Epsilon. IMSS is a student organization that provides free medical screening to the Champaign-Urbana community. Before COVID-19 began, I became a personal assistant for students with disabilities at a residence hall. I enjoyed this experience tremendously as I gained more clinical experience. I was [also] accepted to a research program in applied health sciences that focused on aging research. My research focuses on how medical cannabis helps veterans with various conditions such as pain, cancer or PTSD. I loved my research and got to present virtually at the undergraduate research symposium. My junior year was completely remote [but] thankfully I got to work as a personal assistant during that year with safety precautions."

"I am blessed to graduate with high honors from the university [and] I look forward to the future endeavors that I have for myself. I was accepted into the joint degree program at U of I for my Master's in Public Health (MPH). However, it is very expensive. So I hope to get my MPH from the University of Illinois at Chicago [and then apply] to medical school. First, I am awaiting my baby's arrival at the beginning of October!" —IRENE CESA AND RAELYNN MILLER

Information about Project SEED and the scholarship program may be found on the Chicago ACS website at https://chicagoacs.org/Project_SEED_Committee.

Art of Storytelling in Creating a Safety First! Culture

In 2019 the Chicago ACS adopted the best practice of "starting with safety," beginning meetings with safety moment reflections led by the Environmental and Lab Safety Committee. These **Safety First!** reports are also published in *The Chemical Bulletin* to bring the reflections to the attention of the entire section membership. Our goal is simple yet vital—to model awareness of safety at the forefront of section activities and embed that awareness within a culture of safety. Since we started this program in 2019, more than **35 Safety First! reports have been shared through the pages of this monthly newsletter publication.**

Reflections of Chicago in the Cloud Gate Sculpture, Millennium Park

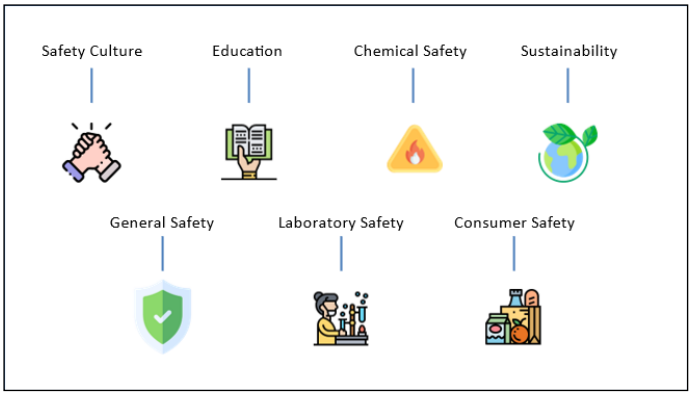
Safety First! is about creating a culture and, as with any culture, it is built on a foundation of communication of shared knowledge, experience, and values. Through this medium we hope to establish a safe space where members feel not only welcome but also empowered to share their own stories and ask questions. Sharing stories often evokes powerful and highly personal individual responses that cause us to reflect on our own experiences with safety (or its absence). Storytelling is an art in creating a Safety First culture!

Let's look at one story we shared early on in this journey. Our April 2019 story was shared by a local professor with ties to the University of St. Andrews in Scotland, where earlier that year a fire that started during a routine clean-up procedure in a chemistry lab severely damaged the biomedical sciences building, causing it to be shut down for more than a year.

"...model awareness of safety at the forefront of section activities and embed that awareness within a culture of safety."

Describing this event, the professor wrote: *"If faced with an incident involving fire, raise the alarm immediately, make sure everyone in the area evacuates and then, and only if it does not place you at excessive risk, try to contain the fire."* These words led me in turn to reflect on my own experiences with "small" or incidental fires in the lab. When is the "right" time to call an alarm? An event that may seem trivial at first can quickly spiral out of control. How does this reflection inform your own experience, at home or at work?

While it is important to reflect on safety incidents and accidents, an effective safety culture requires more than an "accident du jour" approach. The **Safety First!** program reveals this in the number and variety of stories that have been shared since its inception almost four years ago. Safety First! stories cover a broad range of general topic areas including chemical and lab safety, chemistry education, consumer safety, and environmental safety and sustainability, as illustrated in the adjacent graphic. **See the table on the following page for a list of selected topics and their URLs.**
—IRENE CESA



Safety First! articles cover a broad range of topics.

(Continued on following page)

SAFETY FIRST

Art of Storytelling in Creating a Safety First! Culture

(Continued from page 18)

Catalog of Safety First! Articles

Safety Culture		
Reproductive Health Safety	04/2022	https://chicagoacs.org/news.php?id=100#Safety_First
Safety Is a Team Effort	05/2022	https://chicagoacs.org/news.php#Safety_First
General Safety		
Chemical Safety in the News	10/2019	https://chicagoacs.org/news.php?id=72#Safety_First_Minute
Evaluating Gas Hazards	10/2020	https://chicagoacs.org/news.php?id=84#Safety_First_Minute
Perceiving and Understanding Risk	05/2021	https://chicagoacs.org/news.php?id=92#Safety_First_Minute
Chemical Safety		
Spring, Seasonal Allergies, and Sensitizers	05/2019	https://chicagoacs.org/news.php?id=67#Safety_Feature
Chemical Reactivity Is NOT Unexpected!	12/2019	https://chicagoacs.org/news.php?id=76#Safety_First_Minute
Hydrogen Gas – Properties and Precautions	03/2020	https://chicagoacs.org/news.php?id=79#Safety_First_Minute
Chemical Exposure – A Special Case	04/2020	https://chicagoacs.org/news.php?id=80#Safety_First_Minute
Advances in Toxicology Testing	10/2021	https://chicagoacs.org/news.php?id=94#Safety_First
Chemical Hazards and the Effect of Particle Size	03/2022	https://chicagoacs.org/news.php?id=99#Safety_First
A Short Primer on Exposure Limits	05/2022	https://chicagoacs.org/news.php?id=101#Safety_First
Laboratory Safety		
Wear Protective Gloves	03/2019	https://chicagoacs.org/news.php?id=65#Safety_Feature
Emergency Response	04/2019	https://chicagoacs.org/news.php?id=66#Safety_Feature
Safe Hazardous Waste Disposal	11/2019	https://chicagoacs.org/news.php?id=74#Safety_First_Minute
Ventilation Safety in the Age of COVID-19	09/2020	https://chicagoacs.org/news.php?id=83#Safety_First_Minute
Safety Education		
Safety Guidelines for Chemical Demonstrations	09/2019	https://chicagoacs.org/news.php?id=71#Safety_First_Minute
Are Common Chemicals Always Safe?	11/2020	https://chicagoacs.org/news.php?id=85#Safety_First_Minute
Kinetics, Thermodynamics – and Safety!	12/2020	https://chicagoacs.org/news.php?id=86#Safety_First_Minute
Consumer Safety		
Disposing of Unused Medications	02/2019	https://chicagoacs.org/news.php?id=64#Safety_Feature
Battery Disposal and Recycling	05/2019	https://chicagoacs.org/news.php?id=70#Safety_Feature
Aerosol Can Hazards	04/2021	https://chicagoacs.org/news.php?id=90#Safety_First_Minute
The Environment and Sustainability		
What are PFAS, and Why are They Everywhere?	02/2021	https://chicagoacs.org/news.php?id=88#Safety_First_Minute
Chemical Risk Management and the EPA	03/2021	https://chicagoacs.org/news.php?id=89#Safety_First_Minute
Chemical Safety and Climate Change	11/2021	https://chicagoacs.org/news.php?id=95#Safety_First
Electronics Recycling and Sustainability	12/2021	https://chicagoacs.org/news.php?id=96#Safety_First

CHEMSHORTS FOR KIDS

The Greenhouse Effect

Have you heard of a greenhouse before? How about the Greenhouse Effect? Let's investigate what effect a greenhouse has on temperature.

Materials

Glasses, two
Measuring cup, 1/2-cup size
Thermometer—*see the* ***Note*** *below*
Water
Zipper-lock plastic bag, gallon-size
Sunny day!

Note: *A digital lab thermometer is best, but you can also use an oral thermometer or infrared noncontact forehead thermometer. Those thermometers may not display a temperature below about 90°F, but instead will just read "Lo."* ***That's ok!*** *You will still see a* ***difference*** *in temperature if there is one.*

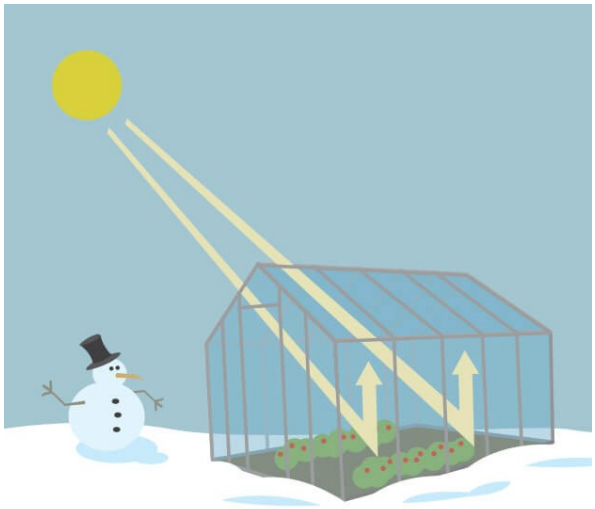
Experiment

To make sure that the water in each glass is at the same temperature initially, fill a large container with water. Pour one-half cup of water from the container into each glass, and measure the temperature of water in each, if possible. *(See the note above.)*

Carefully place one glass into the large zipper-lock bag and seal the bag. Put both glasses next to each other somewhere where they will receive direct sunlight. If the sunlight is from a window inside the house it may take several hours to get a readable temperature with a fever-type oral thermometer. **For better results, place the glasses outside on a sunny day.** You should get temperature readings in about 30 minutes. Check the temperature of the water in the glass that is NOT in the plastic bag every half hour until you get a reading. Once you do, measure the temperature of the water inside the plastic bag at the same time. Are the temperatures the same or different?

What's happening?

A greenhouse is made of glass or plastic that allows visible light to pass through it. Visible light travels in waves that are relatively short, which is why glass or plastic can't stop them. What we feel as heat is a different kind of light that also travels in waves. Heat waves, also known as infrared light, are longer than the visible light waves that we can see with our eyes. Those longer heat waves cannot travel through glass or plastic in a greenhouse.



The walls of a greenhouse capture the Sun's heat, which keeps plants inside the greenhouse warm. Credit: NASA/ JPL-Caltech.

Visible light entering a greenhouse interacts with matter inside it, including air, water, soil, plants, etc. As matter absorbs visible light it heats up, releasing heat waves (infrared light). The longer infrared waves get trapped inside the greenhouse, which warms up as a result.

The Earth has a layer of gases in the air around it. (A good thing, as we depend on oxygen in the air to breathe!) Some gases in the air act like the glass or plastic of a greenhouse. They prevent infrared light (heat) waves from leaving the Earth, causing it to heat up. This is known as the Greenhouse Effect. You may have seen only a small temperature difference between the two glasses of water in the sun. All the extra "greenhouse gases" that human activity releases into the Earth's atmosphere also don't cause a big temperature change, maybe one or two degrees. Even small temperature differences have a very large impact on our climate. That's why it's important to reduce the amount of greenhouse gases that humans release and to find ways to remove those gases from the atmosphere.

References

https://www.education.com/science-fair/article/greenhouse-effect/
https://www.livescience.com/64825-why-earth-has-an-atmosphere.html
https://climatekids.nasa.gov/greenhouse-effect/

To view past "ChemShorts for Kids" activities, go to: https://chicagoacs.org/ChemShorts

—PAUL BRANDT

Discover ChemShorts for Kids

Kathleen Carrado Gregar

Paul F. Brandt

ChemShorts for Kids are a series of popular chemistry and physical science activities created for *The Chemical Bulletin* in 1992 by Chicago Section volunteer Kathleen Carrado Gregar, Associate Director, Center for Nanoscale Materials, Argonne National Laboratory. In 2016, Paul F. Brandt (Professor of Chemistry, North Central College), then editor of the *Bulletin,* took over the series from Kathleen, and he continues to write the feature articles to the present day. The monthly activities, which are written for K–5 elementary school children, ages 5–10, explore common, real-life phenomena or mysteries that often cause young children to exclaim, "but why" or "how do they do that."

Why does a bath bomb fizz in water? What causes leaves to turn color in the fall? How do clouds form? These are just three of the many, many questions that have been explored by children in the 30 years since ChemShorts for Kids began. Since then, an amazing (literally and figuratively!) 284 activities have appeared in the pages of *The Chemical Bulletin.* The articles have also been collected on the Chicago Section website and on an archived site at http://chicagoacs.net/archive/ChmShort/kidindex.html. The table of select activities that appears below provides a small taste of the range of topics that have been featured over the past few years in this popular series.

Selection of Past ChemShorts for Kids Articles

ARTICLE TITLE	ISSUE	LINK TO ARTICLE
Is Soda Bad for your Teeth?	Jun 2022	https://chicagoacs.org/news.php#ChemShorts_for_Kids
Static Electricity Fun	Apr 2022	https://chicagoacs.org/news.php?id=100#ChemShorts_for_Kids
Electrolysis	Oct 2021	https://chicagoacs.org/news.php?id=94#ChemShorts_for_Kids
Marbling Paper	Sep 2021	https://chicagoacs.org/news.php?id=93#ChemShorts_for_Kids
Forever Floating Bubbles	Jan 2020	https://chicagoacs.org/news.php?id=77#ChemShorts_for_Kids
Amazing Penny	May 2019	https://chicagoacs.org/news.php?id=67#ChemShorts_for_Kids
Energy in Rubber Bands	Feb 2019	https://chicagoacs.org/news.php?id=64#ChemShorts_for_Kids
Cartesian Diver	May 2018	https://chicagoacs.org/articles/391
My Cup Overflows	Feb 2017	https://chicagoacs.org/articles/357
Underwater Volcano	Apr 2016	https://chicagoacs.org/articles/351
Colorful Ice Sculptures	Dec 2015	https://chicagoacs.org/articles/332

23rd Annual ChemLuminary Awards

AWARDS CEREMONY

"ACS Volunteers – Sustained Excellence"

TUESDAY, AUGUST 23, 2022 | 8:00 PM CDT
Hyatt Regency Chicago

Please join the Chicago Section at the Awards Ceremony

The Chicago ACS is a ChemLuminary Award finalist for

- Best activity or program highlighting ACS Change Driver(s) or Strategic Planning
- Outstanding American Association of Chemistry Teachers (AACT) Support Award
- Outstanding Community Involvement in CCEW
- Outstanding Ongoing NCW Event
- Outstanding Performance by a Local Section – Very Large Size Category

Keynote address by Amber Hinkle
2022 Volunteer Service to the ACS Awardee

This event is open to all ACS Fall 2022 registrants.

ACS Chemistry for Life®

UPCOMING EVENTS

August 21–25	ACS National Meeting, Chicago, IL
August 22	ACS Chicago Section Reception
August 23	ChemLuminary Awards Ceremony
September 8	Chicago Board of Directors Meeting
September 10	Articles due for the October *Bulletin* issue
September 16	"Education Night" Chicago Section Dinner Meeting
October 14	Basolo Medal Symposium, Northwestern University
October 16–22	National Chemistry Week
October 19–21	ACS Midwest Regional Meeting Iowa City IA

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