

Nation's Largest, Most Comprehensive Indoor Chemistry Study Now Underway

HOMEChem field experiment seeks to understand how daily activities impact the home environment

(Austin, Texas) In the United States, as well as in most of the developed world, people spend about 90 percent of their time indoors. In homes, workplaces, schools and every indoor environment, we are impacted by the air we breathe and the surfaces we touch, as well as by the constantly changing influence of the indoor environment around us. A new, unique study will analyze these chemical interactions with the tools used for studying outdoor air pollution with the hope of learning what role they may play in human health.

“HOMEChem is a deep, multifaceted field study into how indoor chemical compounds may interact and transform throughout a normal day of activities like cooking, cleaning and even during family gatherings” says Marina Vance, PhD, principal investigator, assistant professor, Department of Mechanical Engineering and Environmental Engineering Program, University of Colorado Boulder. “We expect to answer important scientific questions on the chemistry of indoor environments in a real-world experimental setting.”

The month-long project, called HOMEChem (**H**ouse **O**bservations of **M**icrobial and **E**nvironmental **C**hemistry), incorporates measurements from more than 15 research groups from 13 universities. Experiments are taking place inside the University of Texas' one-of-a-kind UTest House facility.

“The UTest House is a premanufactured home that has been retrofitted for experimentation,” says Atila Novoselac, Ph.D., professor, Department of Civil, Architectural, and Environmental Engineering University of Texas at Austin. “The house is exceptionally flexible but it still took two months to adjust, reconfigure, and build the logistical support for the HOMEChem experiments.”

“This is a first-of-its-kind, multidisciplinary field experiment,” says Paula Olsiewski, PhD, Chemistry of the Indoor Environments program director, Alfred P. Sloan Foundation. “It's exciting to see engineers, chemists and microbiologists working together on the frontier of scientific inquiry.”

The HOMEChem experiment is centered around three science questions:

- What are the sources of chemical oxidants in the indoor environment, and how are they impacted by changes in light conditions and human activities? Examples of chemical oxidants are hydroxyl radicals (OH), nitrate radicals (NO_3^-), and ozone (O_3), which are very reactive.
- What are the main sources of organic compounds in the indoor environment? How does the physical and chemical transformation of organic compounds from gaseous state into particulate phase (also known as "secondary organic aerosol") and other chemical compounds present in minute amounts (also known as trace gas species) change in response to human activities
- What are the sources of indoor reactive nitrogen species, and to what extent is their presence indoors influenced by outdoor pollution?

HOMEChem researchers are from the University of Colorado Boulder; Colorado State University; the University of Texas at Austin; Drexel University; Syracuse University; Indiana University Bloomington; the



University of Toronto; the University of California, Berkeley; the University of California, San Diego; the University of Massachusetts; Harvard University; Washington University in St. Louis Engineering; and The College of William & Mary.

Instruments being used during the experiment have been loaned by Handix Scientific, Airmodus, Airboxlab, and the National Institute for Occupational Safety and Health (NIOSH).

“The HOMEChem teams have set up trailers around the UTest House equipped with some of the most sophisticated instruments available, specifically designed to detect oxidants, the vast diversity of volatile organic compounds (VOCs), and particulate matter,” says Delphine Farmer, PhD, principal investigator, associate professor, Department of Chemistry, Colorado State University. “Each measurement will provide one piece of the puzzle that describes the chemistry of indoor environments; together, these clues will begin to reveal a picture that can help us better understand this complex chemistry.”

The HOMEChem field study is funded by a grant from the Alfred P. Sloan Foundation in its Chemistry of Indoor Environments program. To follow the field experiment in real time, follow @IndoorChem and #HOMEChem on Twitter.

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