

Why Indoor Chemistry Matters

Summary for Building Professionals and Other Stakeholders

Chemicals found indoors can modify or degrade indoor environments. Indoor sources of chemicals include the materials used to construct buildings (e.g., wood, insulation, wall coverings, flooring, and wiring) and the products that are brought into those buildings. Chemicals from such sources create complex mixtures that may adversely impact indoor air quality and/or human health. A report from the National Academies of Sciences, Engineering, and Medicine explores the dynamic systems that connect humans, nonindustrial built environments, and indoor chemistry.

Building materials continuously emit chemicals into indoor environments and strongly influence the chemical composition of indoor air. Many commonly used building materials, including wood and wood composites, insulation, plastic piping, electrical cables and wiring, adhesives, paint, surface treatments and coatings, carpeting, and vinyl flooring, emit volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), which are associated with human health impacts. Emission rates from these building material sources vary depending on such factors as material quality.

The types of materials used, and therefore the chemicals emitted into indoor environments, have changed over time. Recent material changes can be attributed to new or updated building codes and standards, the desire for improved performance, or the use of recycled building materials. Building material substitutions can have a variety of intended or unintended consequences.

Thousands of chemicals are present in indoor environments. Creating an inventory of these chemicals and their concentrations would allow researchers to better understand human exposure to chemicals indoors. Importantly, there is limited information on the detailed composition of building materials across the building stock. Additionally, the materials that are present in buildings or that comprise buildings are not physically or chemically well characterized. This report lays out research needs and recommendations to address these challenges.

A PATH FORWARD FOR INDOOR CHEMISTRY

The report identifies research needs and provides recommendations to improve the understanding of indoor chemistry, coordinate and collaborate across communities to enhance discovery, and implement new research into practice in indoor environments. The consideration and implementation of these research needs and recommendations by **building professionals** and **other stakeholders** will be critical to translate the emerging science of indoor chemistry into a practice that benefits indoor environments and human health.

RESEARCH NEEDS:

- Prioritize acquisition of actionable data and research to link chemical sources with exposures.
- Increase transparency in the use of building materials to minimize time and effort needed to establish evidence of exposure and health risks.
- Develop and maintain harmonized chemical information databases.
- Broaden our understanding of chemistry taking place on and within the complex surface materials and interfaces present within buildings.
- Conduct controlled field experiments to better understand the fundamental chemistry of emerging air-cleaning technologies, as well as mold and smoke remediation schemes.

RECOMMENDATIONS:

- Researchers and their funders should devote resources to creating emissions inventories specific to building types and to identifying indoor transformations that impact outdoor air quality.
- Researchers and engineers should integrate indoor chemistry considerations into their building system design and mitigation approaches. This can be accomplished in different ways, including by consulting with indoor air scientists.
- All stakeholders should proactively engage across disciplines to further the development of knowledge on the fundamental aspects of complex indoor chemistry and its impact on indoor environmental quality, exposure assessment, and human health.

This document is based on the Consensus Study Report *Why Indoor Chemistry Matters* (2022). The study was sponsored by the Environmental Protection Agency, National Institutes of Health, Department of Health and Human Services, Centers for Disease Control and Prevention, and SLOAN. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project.

This Consensus Study Report is available from the National Academies Press (800) 624-6242 | <http://www.nap.edu> | <http://www.nationalacademies.org>

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