

Buying a home? Research identifies 55 dangerous chemicals in building materials

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The next time you purchase a new home, you might consider waiting a few weeks to move in.

Many of the chemicals in a home's building materials—in the scent of new carpet, the chalky smell of newly hung drywall and of recently refinished floors—might not be great for your health.

University of Michigan researchers have identified 55 chemicals of concern found in the walls, floors, ceilings and furniture in homes across the United States, including some that have concentrations that are 1,000 times higher than recommended.

Among the worst offenders was formaldehyde, which is often included in wooden furniture, base cabinetry and wood, cork, and bamboo flooring. Formaldehyde is considered a carcinogen and has also been linked to leukemia.

Researchers also found that butylated hydroxyanisole (BHA), an antioxidant found in carpet flooring, has actual content 800 times higher than recommended. And the content of hexamethylene diisocyanate, found in carpeting, was thousands of times higher than the recommended maximum content of 0.2ppm. According to the EPA, hexamethylene diisocyanate is extremely irritating to the eyes, nose and throat and chronic long-term exposure to hexamethylene diisocyanate may cause lung problems.

Researchers say they hope the findings will provide practitioners and manufacturers with actionable information to develop more sustainable products, and also raise awareness among consumers.

"People are inside buildings more than 90% of their time, breathing and touching those chemicals in building materials, so it's very important to know whether there are harmful chemicals that could affect their health," said the study's first author, Lei Huang, a research specialist in the Department of Environmental Health Sciences at the U-M School of Public Health.

To assess the potential human exposures and [risks](#), the researchers screened more than 500 unique [chemical](#)-product combinations from chemical composition data reported in the Pharos Project database. Then they used a risk assessment approach to determine the amount of chemicals used in building products, the corresponding human exposure and the associated cancer and noncancer risks of the chemicals. Finally, they listed the chemicals from most to least concerning by their "hazard content ratios."

While the researchers acknowledge the study has some limitations as a high throughput screening covering a large number of compounds—exposure rates could vary greatly, for example—they say the study clearly demonstrates the need for future research on exposures to chemicals in building materials and the need for further regulation to ensure the safety of chemicals in products in general and in building products in particular.

"These results show that a significant number of chemical-products combinations used in building materials pose a risk to human occupants," said senior author Olivier Jolliet, a professor of environmental health sciences at U-M's School of Public Health. "We need to get rid of some of these compounds that sometimes are 1,000 times too high."

"We are using typically 30,000 of these [compounds](#) on a daily basis but we only have reasonably good data for 2,000 of them. So even if we say a chemical needs to be phased out, we often have little idea of what is used to replace it. Is it really better, or could it be worse?" he said.

"What our USEtox model provides is a [tool](#) to enable manufacturers to assess and check various alternatives."

Jolliet said he was concerned about the levels of formaldehyde in buildings and that it continued to be commonly used despite its well-

known carcinogenic effects, even at low levels. He said because the substance is highly volatile, allowing a new construction to air out would probably help decrease its concentrations considerably.

Huang, who is from China, said the U.S. lags behind other countries in regulation and consumer awareness of the dangers of certain chemicals in building materials.

"In China, we're very aware of those harmful chemicals," she said.

"When they buy a home, people wait three or four months to move in. In the U.S., people don't care about it and there's actually less regulation in the U.S. than in Europe."

The research was carried out in close collaboration with Technical University Denmark and the United Nations and is part of a project on "Global Best Practices on Emerging Chemical Policy Issues of Concern" under U.N.

More information: Lei Huang et al, Chemicals of concern in building materials: A high-throughput screening, *Journal of Hazardous Materials* (2021). [DOI: 10.1016/j.jhazmat.2021.127574](https://doi.org/10.1016/j.jhazmat.2021.127574)

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