Thirdhand Smoke Resource Center

Can you test for thirdhand smoke?

The Short Answer

Thirdhand smoke is the chemicals left behind when someone smokes tobacco. Thirdhand smoke is unhealthy for people and pets. It can stick around for a long time in homes and cars. It gets into your body if you inhale, swallow, or touch the chemicals. Getting rid of it is really hard and can cost a lot of money.

Scientists have created sensitive tests for research studies that detect thirdhand smoke chemicals in air, on surfaces, and in dust. Thirdhand smoke chemicals include nicotine, tobacco-specific nitrosamines, and lead. These chemicals can cause health effects, including cancer. Unfortunately, these sensitive tests are currently not available for sale to the public and remain available only to researchers in labs.

Several commercial companies are selling tests to the public to measure thirdhand smoke chemicals. However, these tests are currently not sensitive enough to accurately measure thirdhand smoke residue, or they may not yet have been thoroughly investigated to trust the results. Importantly, they may create a false sense of security when they report, “not detected.” To better measure thirdhand smoke residue, commercial tests must be developed that are more sensitive and have been shown to give correct results.

The Long Answer

Thirdhand smoke is the chemical residue from tobacco smoke. It is also called “tobacco smoke residue” or “stale tobacco smoke.” The chemicals in thirdhand smoke are toxic to humans, especially children. It can linger for years in dust and on household surfaces. It can also become embedded in carpets, furniture, clothes, and building materials. It is difficult and expensive to remove.

Tobacco smoke contains thousands of chemicals that can stick to surfaces, collect in dust, and interact with the environment. Some of the most studied chemicals are nicotine (an addictive compound in tobacco products that causes health effects), tobacco-specific nitrosamines (cancer-causing chemicals formed when tobacco burns), and nicotelline (a chemical found in tobacco smoke that remains as particulate matter), and lead.

Scientists have developed sensitive tests using these chemicals to identify thirdhand smoke chemicals in the air, house dust, and on surfaces of indoor environments, such as

furniture, pillows, car interiors, and walls. Currently, these tests require expensive equipment and are limited to research laboratories.

Commercial tests are available to identify highly contaminated environments (e.g., homes of people who currently smoke). However, they are not sufficiently sensitive to conclude that no thirdhand smoke is present in a home or that it does not exceed unavoidable background levels.

For example, EMSL produces a test kit for nicotine on surfaces, but this test is only sensitive enough to detect very high levels of nicotine. A "no nicotine detected" result from this test kit may be inaccurate because only the most polluted surfaces would report positive for nicotine. The test's lowest nicotine detection level (i.e., reporting limit) is about 15 times higher (15 $\mu g/m^2$) than typically found in homes of people who do not smoke and have indoor smoking bans (1 $\mu g/m^2$).

Similarly, Knowsmoke produces a test kit for the automobile and rental car industry. It measures nicotine in upholstery and carpeting. Initial findings suggest that it may be sufficiently sensitive, but basic validation results have not yet been published.

Finally, the Home Air Check measures nicotine in the air. Nicotine in the air is not specific to thirdhand smoke, and positive nicotine results could come from second- or thirdhand smoke. Its lowest detection level is 1 ng/liter (1 $\mu g/m^3$). This detection limit is too high to test second- or thirdhand smoke sensitively.

For a thirdhand smoke test to accurately measure if a home is free of tobacco smoke pollutants, the test must be significantly more sensitive than what is currently commercially available. At the Thirdhand Smoke Resource Center, we are currently developing sensitive tests to detect thirdhand smoke and to compare levels to different environments (e.g., homes where no smoking is allowed, homes where smoking is allowed outdoors, and homes where smoking is allowed indoors). If you are in urgent need of a test, we recommend reaching out to us to determine if you qualify to participate in our pilot study: contact@thirdhandsmoke.org.

Do you have more questions about the toxic legacy of tobacco smoke, how it affects human health, and what we can do about it? Learn more here.

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Sources:

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