

THIRDHAND

SMOKE Resource Center

Can you test for thirdhand smoke?

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 break down and interact with the environment. Scientists have developed sensitive tests¹ using those chemical markers that can detect thirdhand smoke chemicals in the air, in house dust, on surfaces of indoor environments, and on people. However, these tests are expensive to conduct and few are available outside of university laboratories available at this time.

[EMSL](#) produces a test kit for nicotine on surfaces, but this test is only sensitive enough to detect high levels of nicotine. A report of “no nicotine detected” from this test kit may give a false sense of security, as only the most polluted surfaces would be reported as having detectable levels of nicotine. According to the information on their website, the “reporting limit” is about 15 times higher (15 $\mu\text{g}/\text{m}^2$) than typically found in the homes of nonsmokers with indoor smoking bans (1 $\mu\text{g}/\text{m}^2$) as determined in San Diego homes).

[Knowsmoke](#) produces a test kit that is marketed to the automobile and rental car industry. It is designed to measure nicotine in upholstery and carpeting. Little is currently known about its level of detection, reliability, or validity. Further study is needed to understand the implications of its test results.

The Home [Air Check](#) measures nicotine in the air. This test is not specific to thirdhand smoke, and a report of “detect” could come from secondhand smoke or thirdhand smoke. Its reported lower limit of detection is 1 ng/liter or 1 $\mu\text{g}/\text{m}^3$. This detection limit is much too high to serve as a sensitive test for secondhand smoke or thirdhand smoke.



For a test of thirdhand smoke to be useful to a nonsmoker who wants assurance that a home is free of tobacco smoke pollutants, a test must be significantly more sensitive than what is currently commercially available. In addition, we need to be able to compare test results to reference settings with a known smoking history to evaluate whether measured thirdhand smoke levels are consistent with smoke free nonsmoker spaces. At the Thirdhand Smoke Resource Center, we are currently developing tests that are more sensitive to detecting thirdhand smoke. If you are in urgent need of a test, we recommend reaching out to us and sharing your concerns: contact@thirdhandsmoke.org.

Several chemical markers are used to measure thirdhand smoke: nicotine (a compound that increases the risk of cardiovascular, respiratory, and gastrointestinal disorders), tobacco specific nitrosamines (powerful carcinogens produced when tobacco burns), and nicotelline (a byproduct of nicotine that is easier to measure).

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Sources:

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