

Thirdhand Smoke Resource Center



Do electronic cigarettes create thirdhand chemical residue?

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.

Electronic cigarettes (also called e-cigarettes, vapes, or ENDS products) heat up a liquid that contains nicotine and other chemicals, becoming clouds of tiny aerosols. These clouds act like secondhand smoke, sticking to surfaces and household objects. They become thirdhand residue that exposes people to toxic chemicals.

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.

Electronic cigarettes (also called e-cigarettes, vapes, or ENDS products) do not burn tobacco. Instead, e-cigarettes heat a fluid that contains nicotine, nicotine by-products, a chemical solvent, and flavor chemicals. This heated fluid creates a vapor made up of tiny droplets called aerosols that look like cigarette smoke.

Aerosols from vaping act similarly to aerosols and gases from tobacco smoking. They move through the air, can spread to other rooms, and collect in dust. They also like to stick to surfaces and household objects, creating thirdhand residue and exposing people to the chemicals. These vaping aerosols can interact with other chemicals in the air to form new cancer-causing substances. They can also transfer from room to room, such as from a vape shop into a neighboring business. They can also be transported on people who vape into a smokefree and vapefree environment.

Researchers have found thirdhand residue on indoor surfaces days after vaping had stopped. In one study looking at residue from vapes in vape shops, the researchers found nicotine as well as additional toxic nicotine-related chemicals on surfaces in the shops. They also found the chemicals to stick to paper, clothing, and glass. Another study of JUUL e-cigarettes confirmed that exhaled vapor leaves toxic thirdhand residue on surfaces.

Children can inhale secondhand vaping aerosols and pick up thirdhand residue on their hands. Like thirdhand smoke residue, children are the most vulnerable to the toxic chemicals in thirdhand residue from vaping.

To prevent the build-up of thirdhand residue in your home and car, do not allow anyone to vape in those spaces.

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](#).

Updated: May 2024

Sources:

Goniewicz, M. L., & Lee, L. (2015). Electronic cigarettes are a source of thirdhand exposure to nicotine. *Nicotine & Tobacco Research*, 17(2), 256–258.

<https://doi.org/10.1093/ntr/ntu152>

Hua M, Luo W, Khachatoorian C, McWhirter KJ, Leung S, Martinez T, et al. Exposure, Retention, Exhalation, Symptoms, and Environmental Accumulation of Chemicals During JUUL Vaping. *Chemical Research in Toxicology*. 2023;36(3):492-507. doi: 10.1021/acs.chemrestox.2c00390.

Khachatoorian, C., Jacob III, P., Benowitz, N. L., & Talbot, P. (2019). Electronic cigarette chemicals transfer from a vape shop to a nearby business in a multiple-tenant retail building. *Tobacco Control*, 28(5), 519–525. <https://doi.org/10.1136/tobaccocontrol-2018-054316>

Li, D., Shi, H., Xie, Z., Rahman, I., McIntosh, S., Bansal-Travers, M., Winickoff, J. P., Drehmer, J. E., & Ossip, D. J. (2020). Home smoking and vaping policies among US adults: Results from the Population Assessment of Tobacco and Health (Path) study, wave 3. *Preventive Medicine*, 139, 106215.

<https://doi.org/10.1016/j.ypmed.2020.106215>

Marcham, C. L., Floyd, E. L., Wood, B. L., Arnold, S., & Johnson, D. L. (2019). E-cigarette nicotine deposition and persistence on glass and cotton surfaces. *Journal of Occupational and Environmental Hygiene*, 16(5), 349–354.

<https://doi.org/10.1080/15459624.2019.1581366>

Son, Y., Giovenco, D. P., Delnevo, C., Khlystov, A., Samburova, V., & Meng, Q. (2020). Indoor air quality and passive e-cigarette aerosol exposures in vape-shops. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 22(10), 1772–1779. <https://doi.org/10.1093/ntr/ntaa094>