Air purifiers aren’t enough to clean your home from wildfire smoke



Enlarge / San Francisco City view through the haze of smoke as seen from Treasure Island on September 20, 2023.

reader comments

51 with

When wildfire smoke turns the air brown and hazy, you might think about heading indoors with the windows closed, running an air purifier or even wearing a mask. These are all good strategies to reduce exposure to the particles in wildfire smoke, but smoky air is also filled with potentially harmful gases. Those gases can get into buildings and remain in the walls and floors for weeks.

Getting rid of these gases isn’t as simple as turning on an air purifier or opening a window on a clear day.

In a new study published in the journal Science Advances, colleagues and I tracked the life of these gases in a home exposed to wildfire smoke. We also found that the best way to get rid of the risk is among the simplest: start cleaning.

The challenge of smoke particles and gases

In December 2021, several of my friends and colleagues were affected by the Marshall Fire that burned about 1,000 homes in Boulder County, Colorado. The “lucky” ones, whose homes were still standing, asked me what they should do to clean their houses. I am an atmospheric and indoor chemist, so I started looking into the published research, but I found very few studies on what happens after a building is exposed to smoke.

What scientists did know was that smoke particles end up on indoor surfaces—floors, walls, ceilings. We knew that air filters could remove particles from the air. And colleagues and I were just beginning to understand that volatile organic compounds, which are traditionally thought to stay in the air, could actually stick to surfaces inside a home and build up reservoirs—invisible pools of organic molecules that can contribute to the air chemistry inside the house.

Advertisement
Volatile organic compounds, or VOCs, are compounds that easily become gases at room temperature. They include everything from limonene in lemons to benzene in gasoline. VOCs aren’t always hazardous to human health, but many VOCs in smoke are. I started to wonder whether the VOCs in wildfire smoke could also stick to the surfaces of a house.

Tracking lingering risks in a test house

I worked with researchers from across the US and Canada to explore this problem during the Chemical Assessment of Surfaces and Air, or CASA, study in 2022. We built on HOMEChem, a previous study in which we looked at how cooking, cleaning and occupancy could change indoor air.

In CASA, we studied what happens when pollutants and chemicals get inside our homes—pesticides, smog, and even wood smoke.

[embedded content]

Using a cocktail smoker and wood chips, we created a surprisingly chemically accurate proxy for wildfire smoke and released small doses into a test house built by the National Institute of Standards and Technology. NIST’s house allowed us to conduct controlled chemistry experiments in a real-world setting.

We even aged the smoke in a large bag with ozone to simulate what happens when smoke travels long distances, like the smoke from Canadian wildfires that moved into the U.S. in the summer of 2023. Smoke chemistry changes as it travels: Particles become more oxidized and brown, while VOCs break down and the smoke loses its distinctive smell.

https://arstechnica.com/?p=1976176