

How Do Air Purifiers Work?

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How Do Air Purifiers Work, Anyway?

Wildfires, smog, pollen, pet dander, mold, and dust can all affect the quality of the air you breathe. Here's how air purifiers work to improve the air inside your home.



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Wildfires across Canada earlier this month produced an orange haze that traveled far and wide, keeping people inside and blurring out world-famous landmarks like the Empire State Building. It affected millions of people, with New York City achieving the unenviable title of worst air quality in the world.

These incidents are likely to continue as a direct impact of climate change, a fact that the United Nations underlined in February 2022 with a report that stated we're living in a "global wildfire crisis."

In the long run, macro-level government solutions—like policies that address the causes of climate change, and implementing ecosystem restoration—are essential, but you can take matters into your own hands with cheap micro hacks that directly improve the air quality in your home. Start with an air purifier.

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Why You Need an Air Purifier During Wildfire Season

The smoke from wildfires is particularly dangerous to human health due to its composition. Containing ultrafine particulate matter, wildfire smoke gets into the lungs and bloodstream. Older adults, children, and people with compromised immune systems are most affected. The advice during these poor air-quality events is to stay inside with the windows closed. And, if possible, you should be using an air purifier.

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Why Wildfire Smoke Is a Devastating Health Risk

Why You May Need an Air Purifier Year-Round

However, large-scale climate events aren't the only reason to be concerned about air quality, and if the air quality *inside* your home is the issue, keeping the windows closed will only exacerbate the problem.

Smog, pollen, pet dander, mold, cigarette smoke, and good old-fashioned dust can all affect the quality of the air you breathe inside your home. Poor air quality affects us all, causing uncomfortable symptoms like itchy eyes or a scratchy throat. However, for people with asthma or emphysema, poor air quality can drastically affect their quality of life.

You likely already have a type of air purifier in your home in the form of filters in your heating, ventilating, and air conditioning (HVAC) system that work to trap harmful allergens. However, a dedicated air purifier can supplement your current air purification setup. As they are portable, you can move them from room to room, although they only work in one room at a time.

Air purifiers contain a fan that pulls in the air and a filter that sifts through the potentially harmful particles. That air is then circulated back into the room, and the process continues on a regular schedule.

No air purifier can remove every single toxin or pollutant, and they don't work on particles that have already fallen to the floor or onto furniture. To keep the air clean and safe in your home, regularly replace or clean the filters in your HVAC system, use an air purifier in high-traffic rooms where you spend the most time, and regularly vacuum and mop to clean particles that have settled. If you've ever wondered if the pleated style of high-efficiency particulate air (HEPA) filters have any practical purpose, know that the design creates dense, randomly arranged fibers that are ideally engineered to maximize the filtration of pollutants.



Get to Know the Different Types of Air Purifiers

The best portable air purifiers all work on the same principle, but come in a range of different formats that operate in slightly different ways. They also come in different sizes and work in varying square footages.

HEPA Air Purifiers: High-efficiency particulate air (HEPA) filters can collect 99.97 percent of particles in the air, including pollen, dust, bacteria, and mold. HEPA filters are also found inside your home's HVAC system, and are a popular air purifier choice.

Ionic Air Purifiers: This filterless option works by producing ions that attach to pollutants and fall to the floor or on top of surfaces. They then need to be wiped up. Although they can remove small particles, they are ineffective for pollen and allergens, according to the [United States Environmental Protection Agency](#).

Absorbent Air Purifiers: Using activated charcoal, these air purifiers trap unwanted odors and air pollutants, and are usually used in combination with a HEPA filter.

UV Air Purifiers: This option uses UV light to neutralize viruses and bacteria in the air, but isn't very effective at trapping allergens, dust, or gases.

The differently sized fibers help efficiently catch particles of varying sizes. Very small gas particles, less than 0.1 microns in size, are prevented from penetrating the filter through a diffusion process. Larger particles will stick to the fibers in the filter, known as interception, while other air particles will become embedded into the fibers, through impaction.

You can choose between air purification models that have disposable filters or those that can be cleaned and replaced. Despite some manufacturers' claims, air purifiers cannot remove moisture from the air or help with humidity. For that, you'll need a [dehumidifier](#), instead.

How to Choose the Right Air Purifier for You

To select the best air purifier for your home, choose a model suitable for the room size in which it will be used, and consider the cost of [replacement air filters](#).

Check your chosen model's stated clean air delivery rate (CADR), which lets you know how much clean air it can produce; it's a number that should equate to roughly two-thirds of the square footage of the room. You'll also want to choose a machine that runs quietly, especially because air purifiers often run for hours at a time or indefinitely.



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Contributor

Fiona Tapp is a British award-winning writer and former science teacher. She is a graduate of the University of London and holds both a BA and a master's degree in education. Her work has appeared in National Geographic, The Washington Post, The Atlantic, The Sunday Times, and others. She's very fond of all things kawaii and is partial to a marmalade sandwich just like her hero, Paddington.

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