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# Mold
# An Indoor Air Pollutant

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There are many substances that can pollute indoor air. One that has received much media coverage recently is mold. While some molds (such as the ones responsible for producing cheese and penicillin) are beneficial, others may be a serious health threat. Molds are fungi that produce microscopic cells called spores. Mold spores are present everywhere both outdoors and indoors and spread easily through the air.

The most common "problem" mold in indoor environments is *Stachybotrys atra* (also called *S. chartarum*).

It is a black mold that grows on wet materials containing cellulose. Stachybotrys is one of several molds that produce potent mycotoxins (toxic substances).

## How does mold affect health?

Most people have few difficulties when exposed to mold spores, but it is estimated that about 10 percent of the population is severely allergic to mold. Symptoms include respiratory problems, nasal and sinus congestion, watery eyes, sore throat, coughing and skin irritations. Mold also can trigger asthma attacks. In some cases reactions are fatal.

Children (especially infants), elderly persons, pregnant women, people with respiratory problems, and those whose immune systems are impaired are at higher risk from mold exposure. Even persons who have no ill effects at first may develop an allergy to mold after continued exposure. Therefore, everyone should avoid exposure to mold spores.

## How do you know if you have mold?

To grow, mold needs a food source, moisture, and mild to warm temperatures. When mold spores in the air find the right conditions they begin to grow.

The food source can be any organic material such as dust, books, papers, animal dander, soap scum, wood, particle board, paint, wallpaper, carpet and upholstery. When such materials stay damp (especially in dark areas with poor air circulation) mold will grow. Flooding, pipe leaks, leaky roofs, moisture in walls, high indoor humidity, condensation, and poor heating/air-conditioning system design and operation can create the damp environment mold needs to grow.

This antique bed and the wall behind it show significant mold damage.

If you can smell a musty odor or see mold, you have a mold problem. If you suspect you have a mold problem, you should thoroughly examine your home. It is important to know where to look.

Look for mold wherever there may be water damage—behind and under cabinets, around plumbing fixtures and appliances, under carpet, inside walls, behind baseboards and in attics. Moisture can seep through concrete walls and floors and cause mold growth on or in walls, carpeting and materials stored in a basement. Mold also can grow behind furniture (particularly if it is against an outside wall) and in closets with outside walls.

Signs of water damage include stains, peeling paint, and damp flooring or carpet. To prevent mold growth, water-soaked areas should be dried within 24 hours.

In some cases it may be worthwhile to have the air in your home tested for mold spores even if you find no visual evidence of mold. Accurate testing can be expensive because it requires special equipment and training. However, if a family member has an unexplained illness, testing can determine whether high levels of mold in the home might be the cause.

## How do you remove mold?

Small areas of mold (less than a few square feet) can be cleaned by the homeowner. Larger areas should be examined by an experienced health and safety professional and treated by personnel with training and experience in handling contaminated material.

The first step in cleaning up mold is to dampen moldy areas by misting them with water to minimize the number of spores that become airborne. Then, clean mold from hard surfaces such as hard plastic, glass, metal and counter tops by scrubbing with a non-ammonia soap or detergent. (Do not mix bleach and ammonia because the fumes are toxic.) It is impossible to remove mold completely from porous materials such as paper, sheetrock (drywall) and carpet padding, so these materials should be removed and discarded.

Scrubbing probably will not remove mold completely from structural wood such as wall studs, so these areas will need to be sanded and sealed.

After the mold has been removed from non-porous surfaces, disinfect the area with a solution of bleach and water (or another disinfectant). A solution of 1/4 cup bleach to 1 gallon of water should work for clean surfaces (those with no remaining mold). For surfaces that can not be completely cleaned, the solution should be about 1 1/4 cups bleach to 1 gallon of water. Apply the bleach solution with a sponge or spray bottle. Leave it on the surface for 15 minutes so that any remaining mold will be killed. Then rinse the area with clean water and dry it as rapidly as possible. Use fans, dehumidifiers or natural ventilation (if the outside air is dry). As a last step, contractors may seal the surface with a product containing a fungicide. This encapsulates any mold spores that remain on the surface. This sealing is especially important for wood beams, floor joists, wood studs, etc.

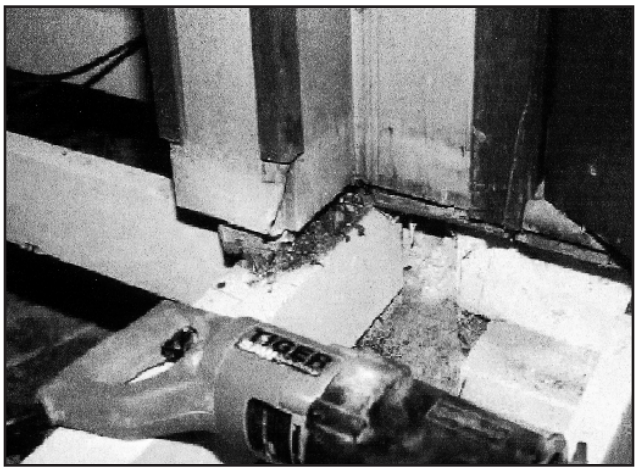
Throughout the mold removal process, protect your health by wearing a mask or respirator to filter out mold spores. Protective gear is usually designated as an N95, 3M #1860, or TC-21C particulate respirator. Wear eye protection, rubber gloves and clothing that can be laundered immediately or thrown away.

Thoroughly ventilate the work area with outside air. Seal off the mold removal area from other parts of the home that are not contaminated, and keep other people out of the work area.

## How do you control mold growth?

Studies have found that mold contamination can be greatly reduced if a home is kept dry and clean, and efforts are made to reduce the level of mold spores entering the home.

**Controlling moisture.** To control mold for good, you must solve any moisture problems in your home. Because there are mold spores everywhere, and mold grows on any wet, organic surface, the only way to prevent mold growth is to keep things dry.



The floor joists of homes on pier-and-beam foundations often become moldy because of exposure to moisture.

- Keep the relative humidity as low as possible, within a range of 30 to 50 percent.
- Clean and dry damp areas such as plumbing and floors under sinks, around washing machines, and around toilets and faucets. Dry condensate on window frames. Clean and dry refrigerator and freezer drip pans and door gaskets. Wipe up spills immediately. Keep the refrigerator clean and free of mold.
- Fix plumbing and roof leaks immediately, and inspect these areas routinely. Dry water-damaged areas within 24 hours. If flooding is extensive, obtain the help of a trained, certified restoration specialist. Wet drywall, insulation and carpet must be removed.
- Have your heating/air-conditioning system serviced annually. Make sure the technician checks for standing moisture and contamination and cleans the coils. He should also clean the ductwork and drain pan, and replace them when necessary.
- Make sure water drains away from the house, not under the slab or crawl space. The crawl space of a home on a pier-and-beam foundation should have cross ventilation to help keep the area dry. Check for plumbing leaks in the crawl space and repair any you find.

**Cleaning.** Regular cleaning and disinfecting can help prevent mold problems.

- Use a disinfectant on floors and countertops.
- After cleaning moisture-prone surfaces in kitchens and bathrooms, spray them with an alcohol-based spray or disinfectant.
- Dry tub, shower and shower curtains after each use, or apply a product that prevents mildew growth. If shower curtains and liners become mildewed, replace them.
- Clean and disinfect garbage and trash cans at least weekly, and use disposable liners.
- Have carpets and upholstery professionally steam cleaned periodically. Vacuum often using a vacuum cleaner with a HEPA (high-efficiency particulate air) filtered exhaust and double-wall dust collection bags. A central vacuum cleaner system is best because it exhausts pollutants outside the home.
- Launder area rugs frequently.
- Vacuum upholstery and mattresses at least twice a month.
- Vacuum blinds and curtains often.
- Clean behind stoves and refrigerators regularly.

These moldy pictures and frames have been removed for cleaning.

**Reducing mold spores in the home.** There are a number of things you can do to reduce the number of mold spores that enter your home.

- Place mats at each doorway to prevent mold-contaminated soil and debris from being tracked inside.
- Inspect building materials for mold before bringing them into the home. Lumber, drywall and other materials are often stored improperly and can harbor mold.
- Replace carpet with hard surface flooring.
- Replace upholstered furniture with leather or vinyl furniture.
- Use foam or rubber mattresses, or encase mattresses in plastic coverings that can be cleaned and disinfected.
- Eliminate houseplants and indoor pets. Soil contains mold spores, and pets track in mold. Pets' food and water trays also can harbor mold.
- Have the heating/air-conditioning ductwork inspected and sealed, especially if it is located in the crawl space under the house. A leaky system can pull mold spores into the house.
- Cover the soil in the crawl space, and make sure condensate and other water drains away from the house. For heating/air-conditioning systems located in attics or closets, check to make sure condensate drip pans drain into the plumbing system and that the emergency drain is open and operating.

## Will air cleaners remove mold spores?

Air cleaners will not solve a mold problem. A high-efficiency air filter may reduce the number of spores in the air, but it can not remove spores that have settled on floors and other surfaces. The Environmental Protection Agency reports that air cleaners that produce ozone are not effective at eliminating mold and other air contaminants. Furthermore, ozone is a lung irritant that should not be in an occupied space.

## Will ultraviolet light kill mold spores?

UV light does destroy any viruses, bacteria and fungi in air that passes through its path, but many mold spores are not airborne and will never pass through an air duct UV light system.

## For further information:


"Healthy Indoor Air for America's Homes—Bugs, Mold and Rot," Montana State University Cooperative Extension.

"Health Effects of Mold," publication AE-1202, North Dakota State University Extension Service.

"Are ozone generators effective in controlling pollution?" Environmental Protection Agency *http://www.epa.gov/iaq/pubs/ozonegen.html*

Texas Cooperative Extension, Housing and Environment Program on Indoor Air Quality *http://fcs.tamu.edu/housing*

Texas Cooperative Extension, Prevention of Household Mold *http://stephenville.tamu.edu/~clee/bmold.html*



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