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Mould Basics

What are Moulds?

Moulds are simple, microscopic organisms, present virtually everywhere, indoors and outdoors. Moulds, along with mushrooms and yeasts, are fungi and are needed to break down dead material and recycle nutrients in the environment. For moulds to grow and reproduce, they need only a food source – any organic material, such as leaves, wood, paper, or dirt— and moisture. Because moulds grow by digesting the organic material, they gradually destroy whatever they grow on. Sometimes, new moulds grow on old mould colonies. Mould growth on surfaces can often be seen in the form of discoloration, frequently green, gray, brown, or black but also white and other colors. Moulds release countless tiny, lightweight spores, which travel through the air.

How am I exposed to indoor moulds?

Everyone is exposed to some mould on a daily basis without evident harm. It is common to find mould spores in the air inside homes, and most of the airborne spores found indoors come from outdoor sources. Mould spores primarily cause health problems when they are present in large numbers and people inhale many of them. This occurs primarily when there is active mould growth within home, office or school where people live or work. People can also be exposed to mould by touching contaminated materials and by eating contaminated foods.

Can mould become a problem in my home?

Moulds will grow and multiply whenever conditions are right—sufficient moisture is available and organic material is present. Be on the lookout in your home for common sources of indoor moisture that may lead to mould problems:

- Flooding
- Leaky roofs
- Sprinkler spray hitting the house
- Plumbing leaks
- Overflow from sinks or sewers
- Damp basement or crawl space
- Steam from shower or cooking
- Humidifiers
- Wet clothes drying indoors or clothes dryers exhausting indoors

Warping floors and discoloration of walls and ceilings can be indications of moisture problems. Condensation on windows or walls is also an important indication, but it can sometimes be caused by an indoor combustion problem! Have fuel-burning appliances routinely inspected by your local utility or a professional heating contractor.

Should I be concerned about mould in my home?

Yes, if indoor mould contamination is extensive, it can cause very high and persistent airborne spore exposures. Persons exposed to high spore levels can become sensitized and develop allergies to the mould or other health problems. Mould growth can damage your furnishings, such as carpets, sofas and cabinets. Clothes and shoes in damp closets can become soiled. In time, unchecked mould growth can cause serious damage to the structural elements in your home.

Health Effects of Mould

What symptoms are commonly seen with mould exposure?

Moulds produce health effects through inflammation, allergy, or infection. Allergic reactions (often referred to as hay fever) are most common following mould exposure.

Typical symptoms that mould-exposed persons report (alone or in combination) include:

- Respiratory problems, such as wheezing, difficulty breathing, and shortness of breath
- Nasal and sinus congestion
- Eye irritation (burning, watery, or reddened eyes)
- Dry, hacking cough
- Nose or throat irritation
- Skin rashes or irritation

Headaches, memory problems, mood swings, nosebleeds, body aches and pains, and fevers are occasionally reported in mould cases, but their cause is not understood.

How much mould can make me sick?

It depends. For some people, a relatively small number of mould spores can trigger an asthma attack or lead to other health problems. For other persons, symptoms may occur only when exposure levels are much higher. Nonetheless, indoor mould growth is unsanitary and undesirable. Basically, if you can see or smell mould inside your home, take steps to identify and eliminate the excess moisture and to cleanup and remove the mould.

Are some moulds more hazardous than others?

Allergic persons vary in their sensitivities to mould, both as to the amount and the types to which they react. In addition to their allergic properties, certain types of moulds, such as Stachybotris chartarum, may produce compounds that have toxic properties, which are called mycotoxins. Mycotoxins are not always produced, and whether a mould produces mycotoxins while growing in a building depends on what the mould is growing on, conditions such as temperature, pH, humidity or other unknown factors.

When mycotoxins are present, they occur in both living and dead mould spores and may be present in materials that have become contaminated with moulds. While Stachybotrys is growing, a wet slime layer covers its spores, preventing them from becoming airborne. However, when the mould dies and dries up, air currents or physical handling can cause spores to become airborne.

At present there is no environmental test to determine whether Stachybotrys growth found in buildings is producing toxins. There is also no blood or urine test that can establish if an individual has been exposed to Stachybotrys chartarum spores or its toxins.

Who is at greater risk when exposed to mould?

Exposure to mould is not healthy for anyone inside buildings. Therefore, it is always best to identify and correct high moisture conditions quickly before mould grows and health problems develop.

Some people may have more severe symptoms or become ill more rapidly than others:

- Individuals with existing respiratory conditions, such as allergies, chemical sensitivities, or asthma.
- Persons with weakened immune systems (such as people with HIV infection, cancer chemotherapy patients, and so forth)
- Infants and young children
- The elderly

Anyone with health problems they believe due to moulds should consult a medical professional.

Detection of Mould

How can I tell if I have mould in my house?

You may suspect that you have mould if you see discoloured patches or cottony or speckled growth on walls or furniture or if you smell an earthy or musty odour. You also may suspect mould contamination if mould-allergic individuals experience some of the symptoms listed above when in the house. Evidence of past or ongoing water damage should also trigger more thorough inspection. You may find mould growth underneath water-damaged surfaces or behind walls, floors or ceilings.

Should I test my home for mould?

Testing is not recommended as a first step to determine if you have a mould problem. Reliable air sampling for mould can be expensive and requires expertise and equipment that is not available to the general public. Owners of individual private homes and apartment generally will need to pay a contractor to carry out such sampling, because insurance companies and public health agencies seldom provide this service. Mould inspection and cleanup is usually considered a housekeeping task that is the responsibility of homeowner or landlord, as are roof and plumbing repairs, house cleaning, and yard maintenance.

There are few available standards for judging what is an acceptable quantity of mould. In all locations, there is some level of airborne mould outdoors. If sampling is carried out in a home, an outdoor air sample also must be collected at the same time as the indoor samples, to provide a baseline measurement. Because individual susceptibility varies so greatly, sampling is at best a general guide.

The simplest way to deal with a suspicion of mould contamination is: If you can see or smell mould, you likely have a problem and should take the steps outlined below. Mould growth is likely to recur unless the source of moisture that is allowing mould to grow is removed and the contaminated area is cleaned.

General Clean-Up Procedures

The following is intended as an overview for homeowners or apartment dwellers. We recommend that you consult one of several more thorough documents currently available as guidance, listed in the USEFUL PUBLICATIONS section below. Elements of the Clean-up Procedures

- Identify and eliminate sources of moisture
- Identify and assess the magnitude and area of mould contamination
- Clean and dry mouldy areas – use containment of affected areas
- Bag and dispose of all material that may have mouldy residues, such as rags, paper, leaves, and debris.

Assessing the Size of a Mould Contamination Problem

There will be a significant difference in the approach used for a small mould problem – total area affected is less than 1 square metre – and a large contamination problem – more than 10 square metres. In the case of a relatively small area, the clean-up can be handled by the homeowner or maintenance staff, using personal protective equipment (see below). However, for cases of much larger areas, it is advisable that an experienced, professional contractor be used. For in-between sized cases, the type of containment and personal protection equipment to be used will be a matter of judgment.

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Can cleaning up mould be hazardous to my health?

Yes. During the cleaning process, you may be exposed to mould, strong detergents, and disinfectants. Spore counts may be 10 to 1000 times higher than background levels when mould-contaminated materials are disturbed. Take steps to protect you and your family's health during cleanup:

- When handling or cleaning mouldy materials, it is important to use a respirator to protect yourself from inhaling airborne spores. Respirators can be purchased from hardware stores; select one that is effective for particle removal (sometimes referred to as an N-95 particulate respirator). However, respirators that remove particles will not protect you from fumes (such as bleach). Minimize exposure when using bleach or other disinfectants by ensuring good ventilation of the area.
- Wear protective clothing that is easily cleaned or discarded.
- Use rubber gloves.
- Try cleaning a test area first. If you feel that this activity adversely affected your health, you should consider paying a licensed contractor or other experienced professional to carry out the work.
- Ask family members or bystanders to leave areas that are being cleaned.
- Work for short time periods and rest in a location with fresh air.
- Air out your house well during and after the work.

Never use a gasoline engine indoors (e.g., water pump, pressure washer or generator), as you could expose your family to toxic carbon monoxide.

Removal of Moldy Materials

Clean up should begin after the moisture source is fixed and excess water has been removed. Wear gloves when handling mouldy materials.

- Discard porous materials (for example, ceiling tiles, sheetrock, carpeting, and wood products).
- Bag and discard mouldy items; if properly enclosed, items can be disposed with household trash.
- Dry affected areas for 2 or 3 days.

Spores are more easily released when mouldy materials dry out, hence it is advisable to remove mouldy items as soon as possible.

If there was flooding, sheetrock should be removed to a level above the high-water mark. Visually inspect the wall interior and remove any mould-contaminated materials.

What can I save? What should I toss?

You should discard mouldy items that are porous and from which it will be difficult to remove mould completely: paper, rags, wallboard, rotten wood, carpet, drapes, and upholstered furniture. Contaminated carpet is often difficult to thoroughly clean, especially when the backing and/or padding can become mouldy. Solid materials – glass, plastic, and metal – can generally be kept after they are thoroughly cleaned.

Clean-up

When attempting to clean less porous items (i.e., solid items such as floors, cabinets, solid furniture), the first step is to remove as much mould as possible. A cleaning detergent is effective for this purpose. Wear gloves, mask and eye protection when doing this cleanup.

- Use non-ammonia soap or detergent, or a commercial cleaner, in hot water, and scrub the entire area that is affected by the mould.
- Use a stiff brush or cleaning pad on cement-block walls or other uneven surfaces.
- Rinse cleaned items with water and dry thoroughly. A wet/dry vacuum cleaner is helpful for removing water and cleaning items.

Disinfection of Contaminated Materials

Disinfecting agents can be toxic for humans, not just moulds. They should be used only when necessary and should be handled with caution.

Disinfectants are intended to be applied to thoroughly cleaned materials and are used to ensure that most microorganisms have been killed. Therefore, do not use disinfectants instead of, or before, cleaning materials with soap or detergent. Removal of mould growth from nonporous materials usually is sufficient. Wear gloves, mask and eye protection when using disinfectants

- After thoroughly cleaning and rinsing contaminated materials, a solution of 10% household bleach (for example, 1½ cup household bleach per gallon of water) can be used as a disinfectant.
- Using bleach straight from the bottle is actually LESS effective than diluted bleach.
- Keep the disinfectant on the treated material for the prescribed time before rinsing or drying; typically 10 minutes is recommended for a bleach solution
- Bleach fumes can irritate the eyes, nose, and throat, and damage clothing and shoes. Make sure working areas are well ventilated.
- When disinfecting a large structure, make sure that the entire surface is wetted (for example, the floors, joists, and posts).
- Properly collect and dispose extra disinfectant and runoff.

- Never mix bleach with ammonia; toxic fumes may be produced.

Can air ducts become contaminated with mould?

Yes. Air duct systems can become contaminated with mould. Duct systems may be constructed of bare sheet metal, sheet metal with fibrous glass insulation on the exterior, or sheet metal with an internal fibrous glass liner, or they may be made entirely of fibrous glass. Bare sheet metal systems and sheet metal with exterior fibrous glass insulation can be cleaned and disinfected. If water damaged, ductwork made of sheet metal with an internal fibrous glass liner or made entirely of fibrous glass will often need to be removed and discarded. Ductwork in difficult-to-reach locations may have to be abandoned. If you have other questions, contact an air duct cleaning professional or licensed contractor.

Can ozone air cleaners help remove indoor mould or reduce odours?

Sometimes air cleaners are promoted to remove indoor mould or associated odours, and some of these are designed to produce ozone. Ozone is a strong oxidizing agent that is used as a disinfectant in water and sometimes to eliminate odours. However, ozone is a known lung irritant. Ozone generators have been shown to sometimes produce indoor levels above the safe limit. Furthermore, it has been shown that ozone is not effective in controlling moulds and other microbial contamination, even at concentrations far above safe health levels. Also, ozone may damage materials in the home, for example, cause rubber items to become brittle.

How can I prevent indoor mould problems in my home?

Inspect your home regularly for the indications and sources of indoor moisture and mould listed on Page 1. Take steps to eliminate sources of water as quickly as possible. If a leak or flooding occurs, it is essential to act quickly:

- Stop the source of leak or flooding.
- Remove excess water with mops or wet vacuum.
- Whenever possible, move wet items to a dry and well ventilated area or outside to expedite drying. Move rugs and pull up areas of wet carpet as soon as possible.
- Open closet and cabinet doors and move furniture away from walls to increase circulation.
- Run portable fans to increase air circulation. Do NOT use the home's central blower if flooding has occurred in it or in any of the ducts. Do NOT use fans if mould may have already started to grow - more than 48 hours since flooding.
- Run dehumidifiers and window air conditioners to lower humidity.
- Do NOT turn up the heat or use heaters in confined areas, as higher temperatures increase the rate of mould growth.
- If water has soaked inside the walls, it may be necessary to open wall cavities, remove baseboards, and/or pry open wall paneling.

Useful Publications

Links to the following documents can be found at www.cal-iaq.org

General Information

Moulds, Toxic Moulds, and Indoor Air Quality. Detailed overview for the legislature by the California Research Bureau.

Mould in Workplace – CDHS-HESIS Infosheet. Useful overview with specific resources for workers.

Biological Pollutants in Your Home. Concise booklet by U.S. EPA and ALA aimed at affected homeowner.

Mould and Moisture. Appendix H in the U.S. EPA IAQ Tools for Schools

Clean-up Guidance

Repairing Your Flooded Home. Excellent resource by the American Red Cross and FEMA, with details on technical & logistical issues.

Guidelines on Assessment and Remediation of Fungi in Indoor Environments. Widely referenced guidelines developed by the New York City Department of Health.

Mould Remediation in Schools and Commercial Buildings. Valuable, new guidance by U.S. EPA, also applicable to residences.

Consultants, Laboratories & Clinics

CDHS Listing of Consultants Offering IAQ Services in California. Self-reported database of contractors.

CDHS List of Laboratories for Bioaerosol (Mould) Testing. Identifies labs providing bioaerosol testing.

Association of Occupational & Environmental Clinics. www.aoec.org.

Additional Information

U.S. EPA IAQ INFO, 800-438-4318, 9 am to 5 pm, Eastern Time, www.epa.gov/iaq/

CDHS Indoor Air Quality Section, 2151 Berkeley Way (EHLB), Berkeley, CA 94704, Phone: 510-540-2476, www.cal-iaq.org

IICRC: www.iicrc.org