



## Building Air Quality

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### Formaldehyde

Formaldehyde is an important industrial chemical used to make other chemicals, building materials, and household products. It is one of the large families of chemical compounds called volatile organic compounds or 'VOCs'. The term volatile means that the compounds vaporize, that is, become a gas, at normal room temperatures. Formaldehyde serves many purposes in products. It is used as a part of:

- the glue or adhesive in pressed wood products (particleboard, hardwood plywood, and fiberboard)
- preservatives in some paints, coatings, and cosmetics
- the coating that provides permanent press quality to fabrics and draperies
- the finish used to coat paper products; and
- certain insulation materials (urea-formaldehyde foam insulation).

Formaldehyde is released into the air by burning wood, kerosene or natural gas, by automobiles, and by cigarettes. Formaldehyde can off-gas from materials made with it. It is also a naturally occurring substance.

### Health Effects of Formaldehyde

Formaldehyde, a colorless, pungent-smelling gas, can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans.

### What Levels of Formaldehyde Are Normal?

Formaldehyde is normally present at low levels, usually less than 0.03 ppm, in both out door and indoor air. Residences or offices that contain products that release formaldehyde to the air can have formaldehyde levels of greater than 0.03 ppm. Products that may add formaldehyde to the air include particleboard used as sub-flooring or shelving, fiberboard in cabinets and furniture, plywood wall panels, and urea-formaldehyde as insulation. As formaldehyde levels increase, illness or discomfort is more likely to occur and may be more serious.

### What Affects Formaldehyde Levels?

Formaldehyde levels in the indoor air depend mainly on what is releasing the formaldehyde (the source), the temperature, the humidity, and the air exchange rate (the amount of outdoor air entering or leaving the indoor area). Increasing the flow of outdoor air to the inside decreases the formaldehyde levels. Decreasing this flow of outdoor air by sealing the residence or office increases the formaldehyde level in the in door air.

As the temperature rises, more formaldehyde comes off from the product. The reverse is also true; less formaldehyde comes off at lower temperature. Humidity also affects the release of formaldehyde from the product. As humidity rises more formaldehyde is released.

Some sources -- such as pressed wood products containing urea-formaldehyde glues, urea-formaldehyde foam insulation, durable press fabrics, and draperies -- release more formaldehyde when new. As they age, the formaldehyde release decreases.

### **What are the Major Sources?**

1. **Pressed Wood Products:** Pressed wood products, especially those containing urea formaldehyde glues, are a source of formaldehyde. These products include particleboard used in sub floors, shelves, cabinets, and furniture; plywood wall panels, and medium-density fiberboard used in drawers, cabinets, and furniture. Medium-density fiberboard, which contains higher glue content, has the potential to release the most formaldehyde.
2. **Durable-press fabrics, draperies, and coated paper products:** In the early 1960s, there were several reports of allergic reactions to formaldehyde from durable press fabrics and coated paper products. Such reports have declined in recent years as industry has taken steps to reduce formaldehyde levels. Draperies made of formaldehyde treated durable press fabrics may add slightly to indoor formaldehyde levels.
3. **Combustion Sources:** Burning materials such as wood, kerosene, cigarettes, and natural gas, and operating internal combustion engines (e.g. automobiles), produces small quantities of formaldehyde. Combustion sources add small amounts of formaldehyde to indoor air.
4. **Cosmetics, paints, coatings, and some wet-strength paper products:** The amount of formaldehyde present in these products is small and is of slight concern. However, persons sensitive to formaldehyde may have allergic reactions.
5. **Urea-formaldehyde foam insulation:** During the 1970s, many homeowners installed this insulation to save energy. Many of these homes had high levels of formaldehyde soon afterwards. Sale of urea formaldehyde foam insulation has largely stopped. Formaldehyde release from this product decreases rapidly after the first few months and reaches background levels in a few years. Therefore, urea-formaldehyde foam insulation installed 5 to 10 years ago is unlikely to still release formaldehyde.
6. **Products such as carpets or gypsum board do not contain formaldehyde when new.** They may trap formaldehyde emitted from other sources and later release the formaldehyde into the indoor air when the temperature and humidity change.

### **What are Formaldehyde-Related Symptoms?**

There are several formaldehyde-related symptoms, such as watery eyes, runny nose, burning sensation in eyes, nose, and throat, headaches, and fatigue. These symptoms may also occur because of the common cold, the flu or other pollutants that may be present in the indoor air. If these symptoms lessen when you are away from the office but reappear upon your return, indoor pollutants, including formaldehyde, may cause them.

### **How Do You Reduce Existing Formaldehyde Levels?**

The choice of methods to reduce formaldehyde is unique to each situation. Here are some of the methods to reduce indoor levels of formaldehyde.

- Bring large amounts of outside air into the building. Increases outside air deliveries to their maximum allowable levels in an effort to better dilute the presence of formaldehyde.
- Ensure that the building's exhaust systems are operating to their maximum levels. This will help to remove gases from the building.
- Reduce the humidity level in your building.

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- Seal the surfaces of the formaldehyde-containing product. You may use a vapor barrier such as some paints, varnishes, or a layer of vinyl or polyurethane-like materials. Be sure to seal completely, with a material that does not itself contain formaldehyde.

Remove the product that is releasing formaldehyde in the indoor air. When other materials in the area such as carpets, gypsum boards, etc., have absorbed formaldehyde, these products may also start releasing it into the air. Overall levels of formaldehyde can be lower if you increase the ventilation over an extended period.