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AN UPDATE ON  
**FORMALDEHYDE**

**1997 REVISION**



**U.S. CONSUMER PRODUCT SAFETY COMMISSION  
WASHINGTON, DC 20207**

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## **What is Formaldehyde?**

Formaldehyde is an important industrial chemical used to make other chemicals, building materials, and household products. It is one of the large family 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, hard-wood plywood, and medium density fiberboard (MDF));
- \* 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 and fiberglass 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.

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The U.S. Consumer Safety Commission has produced this booklet to tell you about formaldehyde found in the indoor air. This booklet tells you where you may come in contact with formaldehyde, how it may affect your health, and how you might reduce your exposure to it.

### **Why Should You Be Concerned?**

Formaldehyde is a colorless, strong-smelling gas. When present in the air at levels above 0.1 ppm (parts in a million parts of air), it can cause watery eyes, burning sensations in the eyes, nose and throat, nausea, coughing, chest tightness, wheezing, skin rashes, and allergic reactions. It also has been observed to cause cancer in scientific studies using laboratory animals and may cause cancer in humans. Typical exposures to humans are much lower; thus any risk of causing cancer is believed to be small at the level at which humans are exposed.

Formaldehyde can affect people differently. Some people are very sensitive to formaldehyde while others may not have any noticeable reaction to the same level.

Persons have developed allergic reactions (allergic skin disease and hives) to formaldehyde through skin contact with solutions of formaldehyde or durable-press clothing containing formaldehyde. Others have developed asthmatic reactions and skin rashes from exposure to formaldehyde.

Formaldehyde is just one of several gases present indoors that may cause illnesses. Many of these gases, as well as colds and flu, cause similar symptoms.

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## **What Levels of Formaldehyde Are Normal?**

Formaldehyde is normally present at low levels, usually less than 0.03 ppm, in both outdoor and indoor air. The outdoor air in rural areas has lower concentrations while urban areas have higher concentrations. 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 flooring underlayment, shelving, furniture and cabinets; MDF in cabinets and furniture; hardwood plywood wall panels, and urea-formaldehyde foam used as insulation. As formaldehyde levels increase, illness or discomfort is more likely to occur and may be more serious.

Efforts have been made by both the government and industry to reduce exposure to formaldehyde. CPSC voted to ban urea-formaldehyde foam insulation in 1982. That ban was over-turned in the courts, but this action greatly reduced the residential use of the insulation product. CPSC, the Department of Housing and Urban Development (HUD) and other federal agencies have historically worked with the pressed wood industry to further reduce the release of the chemical from their products. A 1985 HUD regulation covering the use of pressed wood products in manufactured housing was designed to ensure that indoor levels are below 0.4 ppm. However, it would be unrealistic to expect to completely remove formaldehyde from the air. Some persons who are extremely sensitive to formaldehyde may need to reduce or stop using these products.

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## **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 indoor air.

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

The formaldehyde levels in a residence change with the season and from day-to-day and day-to-night. Levels may be high on a hot and humid day and low on a cool, dry day. Understanding these factors is important when you consider measuring the levels of formaldehyde.

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.

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

1. 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 released 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.
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. 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.

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4. **Pressed wood products:** Pressed wood products, especially those containing urea-formaldehyde glues, are a source of formaldehyde. These products include particleboard used as flooring underlayment, shelves, cabinets, and furniture; hardwood plywood wall panels; and medium density fiberboard used in drawers, cabinets and furniture. When the surfaces and edges of these products are unlaminated or uncoated they have the potential to release more formaldehyde. Manufacturers have reduced formaldehyde emissions from pressed wood products by 80-90% from the levels of the early 1980's.
  5. **Combustion sources:** Burning materials such as wood, kerosene, cigarettes and natural gas, and operating internal combustion engines (e.g. automobiles), produce small quantities of formaldehyde. Combustion sources add small amounts of formaldehyde to indoor air.
  6. **Products such as carpets or gypsum board** do not contain significant amounts of 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.

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## **Do You Have Formaldehyde-Related Symptoms?**

There are several formaldehyde-related symptoms, such as watery eyes, runny nose, burning sensation in the 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 home or office but reappear upon your return, they may be caused by indoor pollutants, including formaldehyde. Examine your environment. Have you recently moved into a new or different home or office? Have you recently remodeled or installed new cabinets or furniture? Symptoms may be due to formaldehyde exposure. You should contact your physician and/or state or local health department for help. Your physician can help to determine if the cause of your symptoms is formaldehyde or other pollutants.

## **Should You Measure Formaldehyde?**

Only trained professionals should measure formaldehyde because they know how to interpret the results. If you become ill, and the illness persists following the purchase of furniture or remodeling with pressed wood products, you might not need to measure formaldehyde. Since these are possible sources, you can take action. You may become ill after painting, sealing, making repairs, and/or applying pest control treatment in your home or office. In such cases, indoor air pollutants other than formaldehyde may be the cause. If the source is not obvious, you should consult a physician to determine whether or not your symptoms might relate to indoor air quality problems. If your physician believes that you may be sensitive to formaldehyde, you may want to make some measurements. As discussed earlier, many factors can affect the level of formaldehyde on a given day in an office or residence. This is why a professional is best suited to make an accurate measurement of the levels.

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Do-it-yourself formaldehyde measuring devices are available, however these devices can only provide a “ball park” estimate for the formaldehyde level in the area. If you use such a device, carefully follow the instructions.

### **How Do You Reduce Formaldehyde Exposure?**

Every day you probably use many products that contain formaldehyde. You may not be able to avoid coming in contact with some formaldehyde in your normal daily routine. If you are sensitive to formaldehyde, you will need to avoid many everyday items to reduce symptoms. For most people, a low-level exposure to formaldehyde (up to 0.1 ppm) does not produce symptoms. People who suspect they are sensitive to formaldehyde should work closely with a knowledgeable physician to make sure that it is formaldehyde causing their symptoms.

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You can avoid exposure to higher levels by:

- \* Purchasing pressed wood products such as particleboard, MDF, or hardwood plywood for construction or remodeling of homes, or for do-it-yourself projects, that are labeled or stamped to be in conformance with American National Standards Institute (ANSI) criteria. Particleboard should be in conformance with ANSI A208.1-1993. For particleboard flooring, look for ANSI grades “PBU”, “D2”, or “D3” actually stamped on the panel. MDF should be in conformance with ANSI A208.2-1994; and hardwood plywood with ANSI/HPVA HP-1-1994. These standards all specify lower formaldehyde emission levels.
- \* Purchasing furniture or cabinets that contain a high percentage of panel surface and edges that are laminated or coated. Unlaminated or uncoated (raw) panels of pressed wood products will generally emit more formaldehyde than those that are laminated or coated.
- \* Using alternative products such as wood panel products not made with urea-formaldehyde glues, lumber or metal.
- \* Avoiding the use of foamed-in-place insulation containing formaldehyde, especially urea-formaldehyde foam insulation.
- \* Washing durable-press fabrics before use.

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

The choice of methods to reduce formaldehyde is unique to your situation. People who can help you select appropriate methods are your state or local health department, physician, or professional expert in indoor air problems. Here are some of the methods to reduce indoor levels of formaldehyde.

1. Bring large amounts of fresh air into the home. Increase ventilation by opening doors and windows and installing an exhaust fan(s).
2. Seal the surfaces of the formaldehyde-containing products that are not already laminated or coated. 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. Many paints and coatings will emit other VOCs when curing, so be sure to ventilate the area well during and after treatment.
3. Remove from your home 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.

One method **NOT** recommended by CPSC is a chemical treatment with strong ammonia (28-29% ammonia in water) which results in a temporary decrease in formaldehyde levels. **We strongly discourage such treatment since ammonia in this strength is extremely dangerous to handle.** Ammonia may damage the brass fittings of a natural gas system, adding a fire and explosion danger.

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**For more information about biological pollutants, combustion pollutants, asbestos, and indoor air quality in your home, write to:**

U.S. Consumer Product Safety Commission  
Washington, DC 20207  
CPSC's toll-free hotline: 800-638-2772  
CPSC's web site: <http://www.cpsc.gov>

American Lung Association  
1740 Broadway  
New York, NY 10019-4374  
(local ALA offices also have information)

Local and State Health Departments

**For a copy of "The Inside Story: A Guide to Indoor Air Quality,"  
send 50¢ to:**

Consumer Information Center  
Dept. 434-W  
Pueblo, CO 81009