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Formaldehyde allergy

What is formaldehyde and where is it found?

Formaldehyde is a chemical that is used widely across many products in our environment. It would be difficult to list all the possible sources of formaldehyde; the table below shows some of the more common sources of formaldehyde exposure.

Sources of formaldehyde

- Fabrics treated with formaldehyde resins and in which some free formaldehyde remains. Formaldehyde resins provide the unique qualities of the following fabrics:
 - Permanent press
 - Anti-cling, anti-static, anti-wrinkle and anti-shrink finishes
 - Chlorine-resistant finishes
 - Stiffening on lightweight nylon knits
 - Waterproof finishes
 - Perspiration proof finishes
 - Moth proof and mildew resistant finishes
 - Suede and chamois
- Cosmetics and toiletries including fingernail polishers and hardeners, antiperspirants, makeup, bubble bath, bath oils, shampoos, creams, mouthwashes and deodorants. In many cases formaldehyde is used as a preservative.
- Household cleansers, disinfectants and polishes
- Paper products — formaldehyde is used to improve the water resistance, grease resistance, shrink resistance and other characteristics of paper
- Building materials — urea-formaldehyde glue or adhesive is used in pressed wood products such as particle board, plywood and MDF
- Medications including wart remedies, anhidrotics, medicated creams, orthopaedic casts and root canal preparation disinfectant
- Paints, primers and paint-stripping agents
- Embalming fluid and as a preservative for laboratory specimens
- Formaldehyde is released in the smoke from burning wood, coal, charcoal, cigarettes, natural gas and kerosene

What are the reactions to formaldehyde allergy?

Reactions to formaldehyde depend on the type of exposure that has occurred. Formaldehyde is not only a sensitiser but also a potent primary irritant. Exposure to formaldehyde gas may cause burning sensations in the eye, nose and throat, skin rashes, tightness of the chest and wheezing, fatigue and headaches. These symptoms may be a result of a primary irritant effect or an allergic sensitisation to formaldehyde.

Frequent or prolonged exposure may cause hypersensitivity, leading to the development of [allergic contact dermatitis](#). This may occur through skin contact with formaldehyde containing products or with clothing made from fabrics containing formaldehyde. Dermatitis caused by clothing tends to affect parts of the body where there is greatest friction between the skin and fabric, for example "trouser dermatitis" is usually apparent on the inner thighs, gluteal folds and backs of the knees. Sweating may also be a factor in causing the allergic dermatitis as sweat or sebum appears to leach free formaldehyde from formaldehyde resins. Individuals sensitive to formaldehyde are not necessarily hypersensitive to formaldehyde resins. Clothing dermatitis appears to affect women more than men.

In individuals who are highly sensitive, contact with minute amounts of formaldehyde or being in a room where a bottle of formaldehyde may have been open previously thus leaving residual gas, can cause dermatitis.



Positive patch test to formaldehyde

Am I allergic to formaldehyde?

Formaldehyde allergy is diagnosed from the clinical history and by performing special allergy tests, i.e. [patch tests](#).

Patch testing of formalin (40% solution of formaldehyde gas) is performed using a 2% aqueous solution of formalin. Some investigators have stated that 75% of positive patch tests have no clinical significance and only 20% of these can be related with actual instances of formaldehyde dermatitis.

The diagnosis of clothing dermatitis due to free formaldehyde can only be confirmed if the following standard criteria are fulfilled. In some cases, clothing dermatitis may not be a problem, even if the suspected fabric tests positive for free formaldehyde and an individual has a positive patch test reaction to 2% formalin.

Formaldehyde clothing dermatitis — criteria to fulfill

- Suspected fabric shows the presence of free formaldehyde
- Patient shows a positive patch test reaction to 2% formalin
- Formaldehyde resin impregnated fabric show a positive patch test reaction — the piece of fabric tested should have been worn and subjected to sweat, sebum and friction
- Wearing the fabric causes a clinical allergic contact dermatitis

Patch testing of products for formaldehyde resins is performed using 10% urea formaldehyde in petrolatum, 10% melamine formaldehyde in petrolatum and 1% other formaldehyde resins in petrolatum or isopropyl alcohol.

Self-testing a product for formaldehyde is possible but should be done only after first talking with your doctor. This should be done only with products that are designed to stay on on the skin such as cosmetics and lotions. Apply a small amount of the product to a small tender area of skin such as the bend of your arm or neck. Examine the area each day for several days and if no reaction occurs, the product is most probably suitable for you to use.

Treatment of contact dermatitis due to formaldehyde exposure

If you are diagnosed with formaldehyde allergy then if at all possible avoid exposure to formaldehyde containing products, otherwise take means to reduce potential exposure.

Once the dermatitis appears on the skin, treatment is as for any acute [dermatitis/eczema](#), i.e. [topical corticosteroids](#), [emollients](#), treatment of any secondary bacterial infection (*Staphylococcus aureus*), etc.

What should I do to avoid formaldehyde allergy?

It is difficult to avoid all exposure to formaldehyde because it is normally present at low levels (usually <0.03 ppm) in both indoor and outdoor air. For most people low-level exposure (up to 0.1 ppm) does not cause any problems. Methods to avoid or minimize exposure are described in the table below.

Methods to avoid or minimize exposure to high levels of formaldehyde

- Wear clothing made of 100% cotton, polyester, nylon or acrylic; these fabrics generally contain less formaldehyde and are usually well tolerated by sensitive individuals
 - Avoid all clothing made with fabrics that have been treated with formaldehyde (see above)
- In general, machine wash all new clothing and bedding in hot, soapy water several times before use
- Purchase furniture made of pressed wood products only if the surfaces and edges are laminated or coated
- Occupational exposure can be reduced by identifying potential sources of exposure (material safety data sheets should be available to employees) and taking precautions to minimize exposure by wearing suitable protective garments
- To reduce the formaldehyde content in the air, increase ventilation by opening doors and windows and/or installing exhaust fans in closed areas
- Read product labels and avoid not only formaldehyde itself but also formaldehyde-releasing preservatives. Some of these are known by the following names:
 - Quaternium-15
 - 2-bromo-2nitropropane-1,3-diol
 - imidazolidinyl urea
 - diazolidinyl urea

Alternative names for formaldehyde

Formaldehyde is also known by several other names. These include:

- Formalin
- Methanal
- Methyl aldehyde
- Methylene oxide
- Morbacid acid
- Oxymethylene

Avoid all of these. At work, request a material safety data sheet to help identify potential sources of exposure.

Further information

Formula: CH₂O

CAS number: 50-00-0

Cross reactions: possibly glutaraldehyde

Appearance: clear, colourless liquid

Sensitiser: free formaldehyde, formaldehyde resins

Patch Test:

2% aqueous solution of formalin (40% solution of formaldehyde gas)

10% urea formaldehyde in petrolatum

10% melamine formaldehyde in petrolatum

1% other formaldehyde resins in petrolatum or isopropyl alcohol.

Sources of Exposure to Formaldehyde

<ul style="list-style-type: none"> • Anhidrotics and antiperspirants • Building materials —pressed wood products such as particle board, plywood and MDF • Canned ice • Cellulose esters • Clothing made from fabrics finished with formaldehyde resins • Coatings — melamine, urea, sulfonamide, phenol resins • Cosmetics and toiletries • Disinfectants and cleaning agents 	<ul style="list-style-type: none"> • Embalming fluid and fixatives • Fabric and textiles • Glues, pastes • Medications • Mildew preventative in fruits and vegetables • Paints and primers • Paper products • Phenolic resins and urea plastics found in buttons, footwear and jewelry 	<ul style="list-style-type: none"> • Photographic plates • Polishes • Preservatives • Printing/etching materials • Rubber cements • Smoke • Tanning agents • Toxoids and vaccines
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Reference

Book: [Fisher's Contact Dermatitis. Ed Rietschel RL, Fowler JF. Lippincott Williams & Wilkins 2001](#)

Related information

On DermNet NZ:

- [Dermatitis](#)
- [Allergic contact dermatitis](#)
- [Patch testing](#)

Other websites:

- [T.R.U.E. Tests](#): This site provides a wide range of information on contact dermatitis and contact allergy testing
 - [Fragrance Mix](#)
- [AllAllergy.Net](#): allergy and intolerance information resource
- [Allergy New Zealand](#)
- [U.S. Consumer Product Safety Commission](#): an update on formaldehyde: 1997 revision
- [J.T.Baker](#) Material Safety Data Sheet — formaldehyde
- [Allergic contact dermatitis](#) - emedicine dermatology, the online textbook

Books:

See the [DermNet NZ bookstore](#)

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DermNet does not provide an on-line consultation service.
If you have any concerns with your skin or its treatment, see a [dermatologist](#) for advice.

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