Public Health England

Protecting and improving the nation's health

# Formaldehyde

## General Information

## Key Points

- formaldehyde is a colourless, corrosive, flammable gas with a pungent odour
- it occurs naturally in the environment following the burning or degradation of organic material and following natural process in living cells (including human cells)
- it is used in the manufacture of polymers such as resins for adhesion in plywood, fibreboard and carpets and in building insulation
- formaldehyde is used at 5% solution with water as a disinfectant as it is affective in killing bacteria, fungi and viruses
- it is also used in a solution called formalin for preserving tissues in laboratories and museums
- inhalation can lead to irritation in the nose, throat and mouth; in severe cases, this may lead to respiratory distress and swelling on the larynx and lungs
- ingestion can cause burns and ulcers in the stomach or intestines. It may also cause chest or abdominal pain, nausea, vomiting, diarrhoea and gastrointestinal tract haemorrhage and kidney failure
- skin exposed to formaldehyde vapours can cause burns, and contact through solutions of formaldehyde can cause redness, itching, a rash and swelling of the skin
- eye exposure can cause irritation, stinging, burning, tearing and eyelid spasms
- formaldehyde can cause cancer in humans

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# Public Health Questions

## What is formaldehyde?

Formaldehyde is a colourless, corrosive, flammable gas with a pungent, suffocating odour.

## What is formaldehyde used for?

Formaldehyde is produced in large quantities industrially. It is mainly used to produce other chemicals and in the production of resins. Formaldehyde resins are used as adhesives and binders in many different industries that produce wood products, pulp and paper, synthetic fibres, plastics and coating and textiles. Formaldehyde –urea resin is used as an insulating material in building construction. Formaldehyde may also be used under restriction in the EU as a preservative in cosmetics and nail hardening products.

Formaldehyde at approximately 5% in a solution with water is used as a disinfectant and fumigant in hospitals, ships, dwellings and animal handling facilities, as it is effective in killing most bacteria, viruses and fungi.

A solution of approximately 37% formaldehyde is commonly known as formalin and is used to store and preserve tissue samples in laboratories and museums.

## How does formaldehyde get into the environment?

Formaldehyde can occur naturally in the environment from the breakdown of methane by sunlight, as a result of forest and bush fires, and from volcanic activity. Formaldehyde breaks down quickly in the environment and is removed from the air by sunlight, rain and biodegradation.

Formaldehyde is released during the combustion of organic materials, and as such may be present in smoke from wood fires, automobile emissions, tobacco smoke and from burning incense. It can also be released into the environment following formaldehyde –urea resin building materials during construction and installation.

Formaldehyde may also be released into the environment from clothing, carpets, furniture, adhesives, paints, varnishes, lacquers, detergents and cleaning agents and waxes.

As formaldehyde is used industrially it may also enter the environment from workplaces where it is manufactured or used.

## How might I be exposed to formaldehyde?

Formaldehyde is produced naturally in small amounts in the human body. It also occurs naturally in fruits and some foods, at levels unlikely to cause harm.

As formaldehyde may also be present naturally in the environment, individuals may come into contact with very low levels of formaldehyde in air.

The general public may be exposed to formaldehyde from contact with consumer products that contain it. Low level exposure from the correct use of these products would not be expected to cause adverse health effects. Other indoor air sources of exposure to formaldehyde include tobacco smoking, cooking, incense burning and building materials.

Exposure to formaldehyde may also occur if it is used where you work: safe levels are enforced to protect employees who may be exposed to formaldehyde at work. Such levels are below those that are thought to cause harmful effects.

## If I am exposed to formaldehyde how might it affect my health?

The presence of formaldehyde in the environment does not always lead to exposure. In order for it to cause any adverse health effects, you must come into contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any chemical, the adverse health effects that you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

Inhalation of formaldehyde can lead to irritation of the nose, mouth and throat. In severe cases, respiratory distress and swelling of the larynx and lungs may occur.

Ingestion of formaldehyde can cause burns and ulcers in the stomach or intestines in the early stages after ingestion. Formaldehyde ingestion may also cause chest or abdominal pain, nausea, vomiting, diarrhoea and gastrointestinal tract haemorrhage. Other clinical features include rapid breathing, yellowish discolouration of the skin, blood in the urine and kidney failure.

Exposure of the eyes to vapour or splashes of formaldehyde causes irritation with immediate stinging and burning with spasm of the eyelids and tearing.

Skin contact with formaldehyde can cause skin irritation and allergic contact dermatitis (allergic response caused by contact with a substance leading to reddening/rash on the skin). Skin contact with high concentrations of formaldehyde solutions can cause blisters and hives.

## Can formaldehyde cause cancer?

Formaldehyde has been classified as a cancer causing chemical in humans by the International Agency for Research on Cancer (IARC).

There is evidence that formaldehyde causes nasal tumours (tumours of the nose) and leukaemia in industrial workers exposed over long periods of time (years). However, exposure over short periods of time is unlikely to have the same level of risk.

## Does formaldehyde affect pregnancy or the unborn child?

There are limited data available on the direct effects of exposure to formaldehyde during pregnancy. Therefore, is not possible to draw any definitive conclusions. Effects on the unborn child are more likely to occur if the exposure to formaldehyde causes the mother to become unwell.

## How might formaldehyde affect children?

Children will be affected by formaldehyde in the same way as adults. However, the effects seen in children may potentially be more severe.

## Are certain groups more vulnerable to the harmful effects of formaldehyde?

People with breathing problems such as asthma may be more sensitive to the effects of formaldehyde.

Individuals who are sensitised to formaldehyde may develop an allergic response (e.g. allergic contact dermatitis) when they are exposed to formaldehyde.

## What should I do if I am exposed to formaldehyde?

Low level exposure from the correct use of products that contain formaldehyde would not be expected to cause any adverse health effects.

Please see below for advice following accidental exposure formaldehyde:

You should remove yourself from the source of exposure.

If you have ingested formaldehyde solution, seek medical advice. Do not make yourself sick.

If you have inhaled formaldehyde you should seek medical advice.

If you have formaldehyde solution on your skin, remove the soiled clothing (not over the head), wash the affected area with lukewarm water and soap for at least 10-15 minutes. Treat the area as a burn and seek medical attention if symptoms develop.

If you have got formaldehyde in your eyes, remove contact lenses, irrigate the affected eye with lukewarm water for at least 10 – 15 minutes and seek medical advice.

## Additional sources of information

NHS Choices- Burns and Scalds: http://www.nhs.uk/conditions/Burns-and-scalds/Pages/Introduction.aspx

UKTIS. Best Use of Medicines in Pregnancy - http://medicinesinpregnancy.org/

NHS Choices- Acid and chemical burns- http://www.nhs.uk/conditions/acid-and-chemical-burns/pages/overview.aspx



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