

Organic substances in buildings

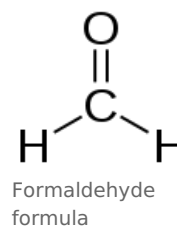
Organic gases

Volatile organic compounds (VOCs) are released from building materials, furniture, sealants, carpets (e.g. formaldehyde, styrene, xylene, ethylbenzene, tetrachlorethylene, trichloroethane, acetone), from various paints, cleaning agents, cosmetics (chloroform, benzene, styrene), from insecticides, pesticides, electronic devices (chloroform, ethylbenzene) and from burning (mainly cigarette smoke). For their *detection*, **large-capacity pumps** are used, which pass the air through a filter on which the substances are captured, or the air is bubbled through a solution in which it reacts with some reagent. In both cases, the amount of the detected substance is determined in the laboratory. If we want to determine the exposure of an individual, we can use a personal sampling kit or a passive dosimeter.

Formaldehyde

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Formaldehyde is a pungent smelling gas. From a chemical point of view, it is the simplest aldehyde. It is released, for example, from formaldehyde resins, used in the production of chipboard or for gluing carpets. A small amount of it is released into the environment from these materials, but due to the prevalence of this substance, its concentrations in interiors are not negligible. It has a non-specific effect on the human organism: it causes burning of the eyes and mucous membranes, a feeling of dryness in the throat leading to coughing, itchy skin, aggravates the problems of allergy sufferers, headaches, fatigue, insomnia, irritability and even depression. In children, there are changes in salivary immunity (lysozyme, SIAG). After the exposure ends, the status is adjusted.



Formaldehyde has clastogenic effects. According to the IARC assessment, formaldehyde is a proven human carcinogen. ^[1] It is also an effective contact and inhalation allergen. Formaldehyde is easily vented.

Polycyclic aromatic hydrocarbons

This article has been translated from WikiSkripta; ready for the **editor's review**.

Benzopyrene formula

'*Polycyclic aromatic hydrocarbons* (**PAU**, **PAH**) are suspected or proven carcinogens. They are difficult to detect, mixtures of these substances are usually determined, and the part of PAHs that is bound to the respirable fraction of the aerosol is also determined - from it they reach deep into the respiratory tract. The source of PAHs in buildings are certain activities (among others smoking), but they also enter the body through food (from burnt fats) and from the outdoor environment (burning of fossil fuels, exhaust gases, burning of household waste in domestic fireplaces).

An example of a PAH can be benzopyrene, which in its chemically pure form does not cause malignant growth; however, if it is bound to the respirable fraction of the aerosol, it causes bronchogenic carcinoma.

Smoking fumes

Cigarette smoke is a dynamic complex of more than 4,000 gaseous and solid substances. Contains 43 proven carcinogens (dibenzanthracene, benzo-a-pyrene, dimethylnitrosamine, diethylnitrosamine, vinyl chloride, hydrazine, arsenic, etc.), 60 co-carcinogenes, promoters or suspected carcinogens, mutagens, allergens, toxic substances. It is also rich in carbon monoxide (smokers have 5-10% of the carboxyhemoglobin). There are 700 additives in cigarette smoke.



Active smoking

Active smoking causes or increases the risk of a number of fatal and non-fatal diseases:

- **fatal diseases** related to smoking - carcinoma of the lungs, upper respiratory tract, bladder carcinoma, carcinoma of the pancreas, ischemic heart disease, chronic obstructive pulmonary disease, carcinoma of the esophagus, carcinoma of the kidney, cervix (Peto, R. in: Crofton, J., Doll, R.: Tobacco and Health, 1996);
- **non-fatal diseases** related to smoking - peripheral vascular disease, cataract, Crohn's disease, ulcers of the stomach, duodenal ulcers, hip fractures (over 65 years). (Peto, R. in: Crofton, J., Doll, R.: Tobacco and Health, 1996);

Passive smoking

Passive smoking (second hand smoking) causes 120-160 deaths in the Czech Republic per year. **ETS** (environmental tobacco smoke) contains hundreds of toxic substances. Exposure to ETS can be demonstrated in the blood, saliva or urine of non-smokers, the acute impact is manifested by irritation of the mucous membranes of the eyes and respiratory tract, an unpleasant olfactory sensation.

ETS causes

- lung cancer;
- fatal and non-fatal heart attacks (↓ ability to transport oxygen by blood, ↓ ability of the myocardium to use oxygen ATP synthesis, greater extent of ischemia);
- inflammation of the upper and lower respiratory tract;
- inflammations of the middle ear;
- a small but significant decrease in lung function in children;
- increase in the incidence of new asthma diseases and its recurrences;
- it is associated with sudden infant death syndrome.



ETS

Effects on the fetus in a smoking mother: ↓ birth weight (about 250 g) and the related impact on further development, congenital limb defects (Experts Statement on Passive Smoking, Barcelona 1996). Smoking during pregnancy further increases the risk of spontaneous abortion and ectopic pregnancy.

Links

References

1. World Health Organisation. *Formaldehyde, 2-Butoxyethanol and 1-tert-Butoxypropan-2-ol : Summary of Data Reported and Evaluation* [online]. [cit. 2011-03-28]. <<http://www.inchem.org/documents/iarc/vol88/volume88.pdf>>.