



Filter Systems

FACTS

Solvents

For better workbench environment

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General

Everybody who is working in industrial environments gets in contact with chemicals which contain a solvent. Chemical processes of one sort or another are occurring either as an essential requirement for, or as a consequence of, many seemingly physical working activities.

How dangerous the chemical is, containing the solvent, depends on the properties of the substance and the precautions taken when handling the chemical. Not many employees do understand the risks of exposure to hazardous substances due to the very specialist knowledge of occupational health risks and to the fear of losing their jobs when complaining about the situations in their company.

We have made this leaflet for those who want to get extra information about solvents.

Organic solvents are absorbed mainly through the mucuous membranes (resporatory system appr. 80-200 m²) but some can also be absorbed through the skin (2 m²) and digestion (food and drinks) (area appr. 10 m²).

Gases have an ability to mix with the air in a room (*from Latin di = pull apart & fusion = spread*). Diffusion means that the particles spread in a room and form other molecules till all have the same equal position towards each other.

Additional we see that in western society more persons become sensitive to allergic materials (airborne particles, pets, solvents) which implicates the need for adequate extraction equipment and precautions.

Why are solvents dangerous?

Solvents dissolve fat. The easier they dissolve fat, the easier it is absorbed by the body and the greater is its capacity for affecting the nervous system. The ability to dissolve fat is partly the reason why they are used and that is one of the main reasons why they are so dangerous if they get into your body.

Especially the cells of the brain contain quite a lot of fat. And as the brain nearly works in the same way as a sponge, absorbing solvents, this makes solvents dangerous

But can't the body break down solvents?

Yes it can. The liver can break down many of the solvents. But unfortunately the chemicals formed when these substances are broken down can be even more dangerous than the original solvents.

It can take a long time, so long that the body cannot get rid of everything during the night or the weekend. And it is very serious because it means that solvents can continue to wreak their effects on the body. The amount of solvents in the organs (of the body) can then accumulate step by step during the week as the break for the weekend is not long enough to have all the absorbed chemicals removed from the body.

**But are all solvents equally dangerous?**

No, and some are absorbed by the body by greater difficulty than others. If you have to use a solvent, try to use one that causes as little harm as possible.

There are many kinds of solvents (see backside) which can harm the body. Some of these solvents are used in manufacturing processes to form other products, some are used with heat and other humidities and can transform themselves in other more dangerous materials.

What in the body is harmed by the solvents?

That depends on the solvent in question. The brain, bone marrow, liver and kidneys are in the danger zone. The most common thing is damage to the nervous system.

What happens straight away is that your nervous system gets affected. Just as with alcohol (which is a solvent) if you consume a lot. Your reactions are slower, you get clumsy. Your judgement gets worse which, in turn, leads to other risks in many jobs beside the risk of health.

This does not mean that you are harmed for a short period. It has been proven that occupational symptoms appear over a longer period and that solvents can cause lasting damage such as damage to the nervous system, respiratory ways, eyes, brain, liver and kidneys.

Solvents and their properties**Isocyanates**

TDI (toluene-2,4-diisocyanate), MDI (diphenyl-methane diisocyanate), HDI (hexa-methylene diisocyanate).

Isocyanates can easily be absorbed through the skin and through the mucous membranes. In contact with water they form amines which will stay in the blood for a long time. Isocyanates are found in polyurethane materials (coatings), glues and varnishes.

Alcohols

Methanol, ethanol, isopropanol

Inhalation, or contact with the skin can cause dizziness, headache, disturbed vision and fainting. Absorption over a longer period can reduce the eyesight of the victim.

Aldehydes

Formaldehyde, acetaldehyde

These solvents are transformed products when heat is applied to i.e. rosin. The fumes have an irritating effect on the eyes and the respiratory organs. Inhalation can induce headache, dizziness and fainting in severe cases.

Esters (acetate)

Ethyl acetate, dioctyl phthalate.

Materials often used as a solvent and dissolvent in paints, plastic industries and synthetic fibres. As all solvents it causes irritation of the respiratory passages but in long-term absorption it will cause damage to kidneys and liver.



There are many other solvents present on the market such as ketones, mercaptans, organic acids, ethers which all have their reaction to the human body. Mainly the respiratory ways are involved or with contact to the skin (splashes) they will cause eczema.

Occupational asthma

A very wide range of chemical and agents of biological origin have been described as causes of occupational asthma.

'Occupational Asthma is a disease characterised by variable air flow limitation and/or airway hyper-responsiveness due to causes and conditions attributable to a particular occupational environment and not to stimuli encountered outside the workplace (Bernstein et al 1993)'

As the nose is part of the respiratory ways it should be borne in mind that asthma often is indicated by symptoms common to 'hay-fever' an itchy blocked or running nose, often red and accompanied by sneezes. The eyes show symptoms such as 'glazed, itchy or running'.

Workers may be unaware of the possible relationship between their symptoms and their work. Prevention and fume extraction at the spot will present adequate solution to prevent dangerous fumes and gases to reach their exposure limits. It has shown that employees once sensitised, will have severe reactions on airborne concentrations which are lower as the allowed exposure limits.