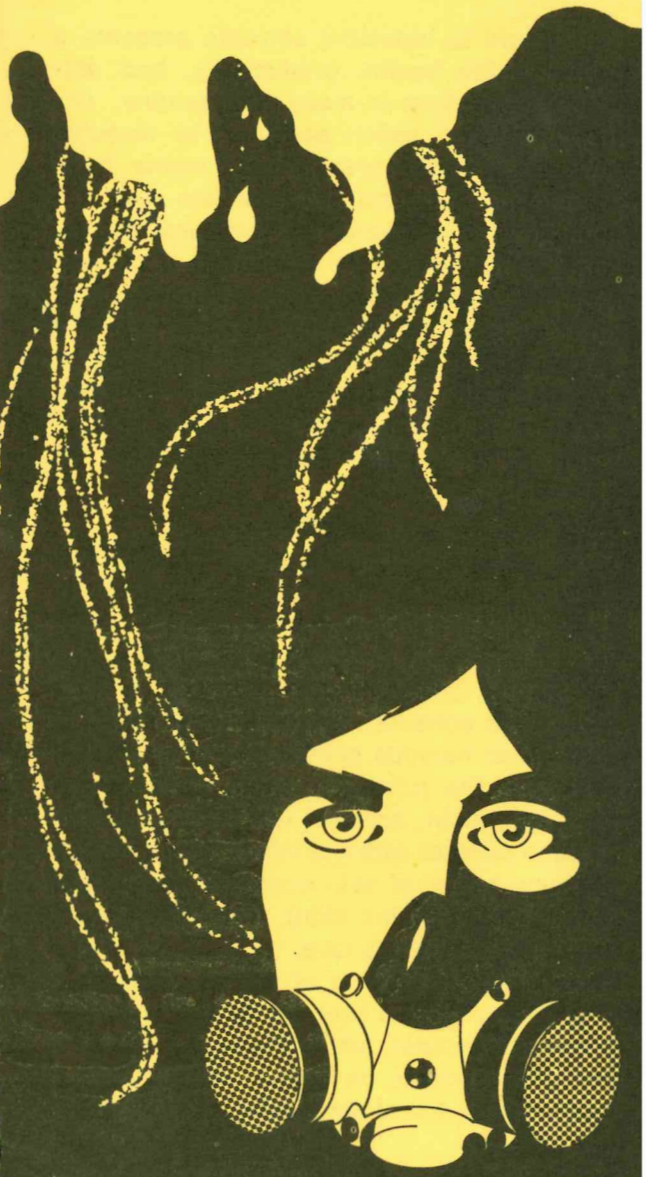
WORKING WITH SOLVENTS



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service / Center for Disease Control
National Institute for Occupational Safety and Health

WORKING WITH INDUSTRIAL SOLVENTS

Exposure to industrial solvents presents a threat to the health, productivity, and efficiency of workers in many occupations. Organic solvents, which are used to dissolve materials like oils, greases, and resins, have widespread industrial applications and are incorporated in a variety of products including paints, varnishes, lacquers, adhesives, plastics, textiles, waxes, and polishes. They are also used in cleaning, degreasing, and drying operations. Since over-exposure to solvents may cause adverse health effects, proper precautions must be taken and adequate controls implemented to protect the worker.

Health Problems With Use

The solvent or mixture of solvents being used, the amount of exposure, and the duration of the exposure all affect hazard potential. One should avoid inhaling vapors and having skin contact with any organic solvent. All organic solvents may have some effect on the central nervous system and inhalation of vapors is the principal mode of entry. Although certain solvents can be absorbed through contact with the intact skin, the most common result of skin contact is dermatitis (inflammation of the skin). Accidental swallowing of solvents is rare.

Excessive inhalation of solvent vapor may cause impairments such as lack of coordination or drowsiness, which have no discernible permanent effects on health, but which may increase the risk of accidents. In other cases,

over-exposure may result in serious damage to the blood, lungs. liver, kidneys, nervous system, or gastrointestinal tract, particularly if the more toxic or irritating solvents like benzene, carbon tetrachloride, carbon disulfide, or formaldehyde are used.

Benzene is well known for its effect on the blood-forming tissue of the bone marrow and there is strong evidence to suggest a link between benzene exposure and leukemia. Inhalation of carbon tetrachloride may affect the normal functioning of the brain and cause dizziness, headaches, fatigue, drowsiness, and — in instances of severe exposure — unconsciousness. Extensive or continued over-exposure to the solvent have, in some cases, resulted in liver and kidney damage. Chronic exposure to carbon disulfide may cause damage to the motor nerves, which control the voluntary movements of the body. Formaldehyde vapors are extremely irritating to the mucous membranes of the nose and throat and high exposures lead to inflammation and edema (swelling) of the passageways to the lungs. Skin contact with organic solvents may cause a dermatitis, the severity of which can range from simple irritation to actual skin damage. Even the mildest solvents can dissolve the natural protective barriers of fats and oils, leaving the skin subject to disabling and possibly disfiguring dermatitis and opening the way to serious infection.

Control of Exposures

Means to control exposures to solvents include the substitution of less toxic solvents, local exhaust ventilation, proper work practices or procedures, protective clothing and respirators, and good personal hygiene.

Substitution of a solvent that is less toxic or that evaporates less quickly may be effective in reducing hazard potential. For example, the substitution of methyl chloroform for carbon tetrachloride has decreased the hazards in many cleaning and degreasing operations. In some cleaning operations, detergents and water can be used instead of solvents. Consideration should be given to using less toxic and volatile solvents in other processes. The substitution of a less toxic solvent does not imply that a health hazard has been eliminated, however; it means only that a worker is less likely to suffer ill effects.

Local exhaust ventilation is an effective way of preventing solvent vapors from entering the worker's breathing zone by removing vapors at their point of origin. Although some solvents are less toxic than others, good safety practices dictate that care be exercised in the use of any organic industrial solvent. Solvent containers must be covered when not in use and leaks or spills must be cleaned up immediately. Mechanical devices to move parts to and from the solvent container should be used whenever possible in cleaning operations. Proper work practices and procedures are important in limiting solvent exposures.

Since some solvents can be absorbed through the skin, and all tend to remove natural lubricants, perhaps causing dermatitis, protective clothing such as gloves and aprons should be worn to prevent skin contact. Barrier creams also may offer some degree of protection. If there is a possibility that solvents may be splashed into the eyes, eye protection such as safety glasses, gog-

gles, and/or face shields should be worn. Approved respirators can be used for short or intermittent durations or emergency exposures. They should not be used as a regular means of protection against solvent vapors as exhaust ventilation is usually required.

Good personal hygiene practices are essential whenever solvents are used, as the skin should always be protected. The skin should never be washed with any organic solvent. Splashes should be washed off the skin as soon as possible. Clothes should be changed if they become soaked with solvents, since prolonged skin contact can cause more serious problems.

Management's Responsibilities

Employers should recognize that organic solvents can be a threat to the health and safety of employees. They should set up appropriate work procedures and provide necessary controls. Operating guidelines should be established for the selection, use, and handling of solvents. Employee training and education programs should be instituted. Any complaints or erratic behavior on the employees' part which may be the result of solvent exposure, should be quickly investigated. Good housekeeping should be practiced throughout all solvent storage and handling areas.

Employees' Responsibilities

Employees should be aware of the health and safety problems associated with the use of organic industrial solvents and should follow these general rules as well as other company safety rules issued to protect them on the job.

1. Avoid breathing solvent vapors.
2. Avoid skin contact.
3. Use all exhaust systems.
4. Use all available protective devices and equipment.
5. Avoid using solvents around hot metal surfaces or flames. Most solvents are flammable or combustible, and some may break down to form poisonous gases when exposed to hot surfaces or flames.
6. Do not smoke in areas where solvents are used or stored.
7. Clean up and report any spills immediately.
8. Avoid working with solvents in confined, unventilated areas.
9. Report all ill effects and skin disorders.
10. Practice good personal hygiene habits.

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