How to Use Solvents Safely

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Solvents

- Solvents are very practical materials. They assist us in doing numerous important tasks.

- However, they may also pose a risk to your safety and health .

- when working with or near solvents, you need to be aware of the risks and the safety measures you need to take.

Health risks from solvents

- solvents are common in the workplace and very useful, they can also be hazardous to your health
- Eyes— irritation,
- burning Skin—rashes,
- Dryness
- Ingestion
- Solvents can damage your eyes.
- Mild symptoms of eye exposure include irritation and burning sensation.
- More severe exposure could result in permanent eye damage and even lead to blindness.
- Eyes can be affected by both solvent liquids and solvent vapors

Limits of exposure of solvent

- A major risk of solvent use is its volatility (low boiling point) causing flammable or toxic vapour.

- The exposure limits are the maximum amount you may legally be exposed to in an 8 hour period (long-term limit), or in a 15-minute period (short-term limit).

SHORT-TERM EFFECTS:	LONG-TERM EFFECTS:
Anxiety	Color vision discrimination
Irritability	Seizures
Hearing loss	Chronic Toxic Encephalopathy (CTE)
Trouble concentrating	Depression and chronic fatigue
Impaired decision making	Leukemia
Dizziness which could lead to unconsciousness, seizures, or death	Impaired memory, in severe cases Dementia

common solvent chemical limits

Solvent	Melting point oC	Boiling Point oC	Flash Point oC	Exposure limits short term/long term
Acetone - 94.7	56.1	-20.7	2.6-12.8	500 ppm/ 1500 ppm
Acetic acid	16	118	40	Flammable Corrosive
Butanol	-89.8	117.7	35	Flammable Corrosive Irritant
t-Butanol	25	82	11	Flammable Irritant
Benzene 5.5	80.1	-11.6	1.2-7.8	1 ppm/ Carcinogenic
Chloroform	-63.5	61.2	non-flammable	2 ppm/ Absorbed through skin
Cyclohexane	6.5	80.7	-20	Flamm. Irritant Environ. Hazard
Diethyl ether	-116.3	34.6	-45	Flammable Irritant
DMF	-60.5	152	58	Flammable Irritant Health Hazard
DMSO	19	189	89	Flammable Irritant Health Hazard
Ethyl acetate	-83.6	77.1	-4	Flammable Irritant
Ethanol	-114.1	78.2	16.6	Flammable Irritant
t-Butanol	25	82	11	Flammable Irritant

Solvent Flash PointFlash

Solvent Flash Point Flash point = Temperature at which vapors can be ignited Low flash point means high flammability

□ **<u>Health risks from solvents</u>**

Solvents may enter the body through inhalation or through the skin.

Due to their low vapour pressure,
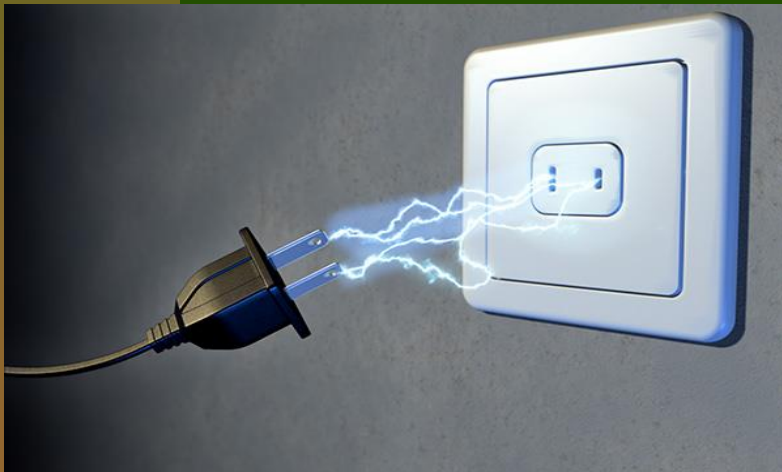
the health risks they pose can be realised easily.

Physical Hazards

- Contamination
- Fire
- Explosion

Reduce Effect of Exposure solvent

- **Ignition Sources Lit cigarettes Welding and cutting Static electricity**

Reduce Effect of Exposure solvent

- Hazard Information: Signs and Labels

Explosive	Flammable	Oxidizing	Corrosive	Toxic	Carcinogenic	irritant
Explode upon ignition or stress	Catch fire easily upon ignition	Oxidize other substances	Corrode other substances and body tissues	Causes death and long-term illness	Causes tumour upon prolonged contact or inhalation	Causes stimulus to body tissues or respiratory system
TNT Ammonium nitrate (NH_4NO_3)	Alcohol, Petrol H_2, CO, CH_4, sodium, potassium	O_2, MnO_4^- $Cr_2O_7^{2-}$	Conc. Acids alkalis Sodium, potassium	$Cl_2(g)$, $Br_2(l)$, CN^-, CO, Zn^{2+}, Pb^{2+}	Asbestos (石棉) Benzene (苯)	Dilute acids / alkalis Cl_2, NH_3, SO_2

Reduce Effect of Exposure solvent

- **Hazard Information: Labels and Signs** NFPA labels Examine labels carefully National Fire Protection Association labels

Reduce Effect of Exposure solvent

- Hazard Information: SDS (Safety Data Sheet)

Reduce Effect of Exposure solvent

Fire Prevention Use solvents in well-ventilated areas

Reduce Effect of Exposure solvent

Personal Protective Equipment

Green Solvents

suitable solvent, is a great challenge to the research community

Properties of Green solvents

- environment friendly
- bio solvents
- derived from agricultural crop processing.

Thank you