Reducing Hazardous Exposure to Organic Solvents

The "health hazards associated with solvent exposure include toxicity to the nervous system, reproductive damage, liver and kidney damage, respiratory impairment, cancer, and dermalitis."

What is a Solvent?
A Solvent is any substance (solid, liquid, or gas) that can dissolve another solid, liquid, or gas (called a solute) to form a solution. A solution is more than a mixture of two different substances because the solvent and solute will have chemical interactions that link them together based on their respective chemical properties. Whereas the individual components of a mixture can be separated by means of mechanical filtration, solvents cannot. When referred to in industrial applications, a solvent is usually a liquid Organic Solvent. Organic solvents are carbon-based and used to dissolve solids, liquids and gases. There are many strong organic solvents that will dissolve (or "attack") many solid materials, including unwanted residues making them useful in a variety of applications such as:

• in paints, inks, varnishes, lacquers and other coatings
• as cleaners and degreasers
• in paint strippers
• in glues, adhesives and spray products
• as refrigerants and coolants
• in dry cleaning
• in nail polish removers
• in detergents
• numerous other places at work and at home

Common solvents include:

• Acetone
• Toluene
• Benzene
• Ethyl Acetate
• Ethanol
• Methanol
• Xylene
• MEK (Methyl Ethyl Ketone)
• Acetic Acid
• Hexane
• Petroleum Ether
• Methylene Chloride

It should be noted that care should be taken when using and storing these solvents because of their strong dissolving properties. Some plastic storage bins can and will be attacked and disintegrated by many of organic solvents.
General Solvent Safety

The most important thing to remember about organic solvent safety is that they present a significant flammability hazard. Consequently, great care should be taken during storage and handling of organic solvents, especially large quantities of organic solvents. Storage drums should be well grounded to prevent any spark from igniting the liquid, electrical devices used in areas of high usage should be intrinsically safe, and there should be absolutely no smoking around these chemicals. When “hot work” needs to be done in an area of high solvent use, permits must be obtained and the area must be cleared of all solvents and ventilated before work can begin. Furthermore, there should be engineering controls in place to ventilate storage areas and places of high usage in case of spills that would produce extremely flammable mixtures in the air.

Furthermore, besides the flammability considerations, there are other accepted workplace practices that should be implemented when dealing with organic solvents. Basic safe work procedures to avoid overexposure to solvents include:

- Don’t wash your hands with solvent.
- Use proper personal protection equipment (ppe) when working with solvents. This will keep solvents off your skin and clothes- if clothes do get wet with solvent; change clothes right away.
- Use the minimal amount of solvent necessary for your application.
- Cover or seal solvent-filled containers when they are not in use. Also contain solvent-soaked items, like used rags.
- Keep areas properly ventilated: make sure fans and exhaust systems are turned on when solvents are used.
- Storage- Always label organic solvent containers.
- Never enter a confined space with the proper PPE and respiratory equipment that are (or could potentially be) contaminated with solvents.
- Label and store solvent waste appropriately.

Respiratory Solvent Safety

Inhalation of solvent vapors and mists is one of the most common ways of being overexposed to solvents. Vapors form as solvents evaporate. Additionally, mist can be inhaled during solvent spraying applications. When these mist and vapors are inhaled, they are absorbed into the bloodstream through the lungs.

The Material Safety Data Sheets (MSDS) of solvents should always be referenced prior to handling and using the chemical. Let’s use Acetone as example:

Acetone is a commonly used solvent. Under “Potential Health Effects” by Inhalation, the MSDS notes that “Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.”
Check your understanding:

1. Explain what a solvent is.

2. Why is storage a concern for organic solvents?

3. What types of materials should organic solvents be kept away from?

4. Give 5 safe practices you should follow while working with organic solvents.

5. Explain the difference between flammable liquids and combustible liquids.

6. Perfume/cologne contain VOCs why is this a good property of perfume/cologne?