

# General Classifications of Hazardous Chemicals

## CSB/SJU Chemistry Department

**Allergens/Sensitizers**--a substance which may produce skin or lung hypersensitivity. Some examples of such compounds are chromium, diazomethane, nickel, dichromates, formaldehyde, isocyanates and certain phenols.

**Carcinogens**--a chemical that has been demonstrated to cause cancer in humans. Some examples of carcinogens are asbestos, inorganic arsenic, benzene, formaldehyde, chromium and nickel compounds.

**Corrosives**--a substance which visibly erodes or irreversibly alters living tissue, and is particularly damaging to the eyes. Respiratory damage, by means of severe bronchial irritation, occurs from the inhalation of the vapors or mists of these types of chemicals. Basically, there are three general categories:

- **Strong acids**, which generally include nitric, hydrochloric, sulfuric and phosphoric.
- **Strong bases**, commonly including ammonia, potassium hydroxide and sodium hydroxide.
- **Dehydrating agents**, such as concentrated sulfuric acid, sodium hydroxide, phosphorus pentoxide and calcium oxide.

**Combustible substance**--a solid that is difficult to ignite and that burns relatively slowly, or liquids with a flashpoint of more than 100 °F (see Flammable substances for the definition of flash point).

**Flammable substances**--a substance with a flash point of less than 100 °F that readily catches fire and burns in air. A flammable liquid, itself, does not burn--it is the vapors given off from the liquid that do. Different liquids produce flammable vapors at different rates, with the rate dependent on the liquid's vapor pressure. The following properties may be mentioned in a discussion of the flammability of a substance:

- **Flash point**--the lowest temperature at which the vapor above the liquid will ignite if an ignition source is present. The flash point for ethyl ether is - 49 °F.
- **Ignition/Autoignition temperature**--the minimum temperature required to initiate or cause self-sustained combustion which is independent of a heat source.
- **Limits of flammability**--each flammable gas and liquid (in the form of a vapor) has two limits which define the range of concentrations in mixtures with air that will propagate flame and explode.
  - Lower flammable limit/Lower explosive limit (LEL)-the percent by volume concentration below which the mixture is too lean to burn.
  - Upper flammable limit/Upper explosive limit (UEL)-the percent by volume concentration below which the mixture is too rich to burn.
  - The flammable range (explosive range) consists of all the concentrations between these two limits.

- Spontaneous combustion or ignition--this phenomenon takes place when, without the application of an external heat source, a substance reaches its ignition temperature.

Some flammable liquids which generally are in use in chemical laboratories are ethanol, methanol, acetone, ether and toluene.

**Irritants**--a chemical substance which causes reversible inflammation of living tissue. Chemicals such as ferrous ammonium sulfate, calcium oxide, sodium chloride, menthol and magnesium hydroxide.

**Mutagenic agents**--a chemical compound able to induce mutations in DNA and living cells.

**Oxidizers**--a chemical that initiates or promotes combustion in other materials, causing fire either by itself or through the release of oxygen or other gases. Common oxidizers include peroxides, chlorates, perchlorates, nitrates and permanganates.

**Target Organ substances**--these chemicals include those which exert a toxic effect on one or more of the various organs or systems of the human body. Target organ classifications include:

- Hepatotoxins--chemicals which produce liver damage.
- Nephrotoxins--chemicals which produce kidney damage.
- Neurotoxins--chemicals which produce toxic effects on the nervous system.
- Reproductive toxins--chemicals which exhibit harmful effects in either the male or female reproductive system, or on the developing fetus (teratogens).
- Cutaneous hazards--chemicals which affect the dermal layer of the body.
- Eye hazards--chemicals which affect the eye or visual capacity.
- Agents which act on the blood or hematopoietic system by decreasing hemoglobin function and therefore deprive the body tissues of oxygen.
- Agents which damage the lungs by irritating or damaging the pulmonary tissues.

**Acute or chronic toxins/poisons**--a substance is toxic because of its ability to damage or interfere with the metabolism of living tissue.

- Acutely toxic substances inflict their damage as a result of a single exposure or an exposure of a short duration. Some examples of acutely toxic substances are hydrogen cyanide, hydrogen sulfide and nitrogen dioxide.
- Chronically toxic substances cause damage after repeated exposures or lower dose exposures of a longer duration. Also associated with some chronic toxins are long latency periods in which the cumulative effects of the substance are not evident for many years. Some examples of chronically toxic substances are all carcinogens and many metals and their derivatives (i.e. nickel, lead and mercury)
- All new and untested chemicals should be treated as toxic until scientific evidence proves otherwise.