

Supplement 1 . Safe Handling of Hazardous Substances

Appendix 1-1 Classification of Hazardous Substances

Type	Representative Substances
Skin Complaint Type	<p>Skin keratinization: Arsenic, Cobalt, Dilute alkali solution</p> <p>Skin coloring: Picric acid, Silver nitrate, Iodine, etc</p> <p>Pigment disorder: Tar, Pitch, Arsenic, etc</p> <p>Acute dermatitis & eczema: acid, Alkali, Chlorodinitrobenzene, Formalin, Tar, Pitch, etc</p> <p>Fester: Chrome, Nickel, Acid, Alkali, etc</p> <p>Lesion of hair & hair glands: Mineral oil, Tar, Chloronaphthalene, etc</p> <p>Lesion of hair: Thallium, Manganese, etc</p> <p>Lesion of nails & skin around nails: Selenium, Thallium, Fluorine, etc</p>
Mucosal Injury Type	<p>Mainly affect respiratory system: Aldehyde, Alkali dust & mist, Ammonia, Chromic acid, Ethylene oxide, Hydrogen chloride, Hydrogen fluoride, Sulfurous acid gas, Sulfur trioxide</p> <p>Affect respiratory, lung tissue: Bromine, Chlorine, Chlorine oxide, Cyanogen bromide, Cyanogen chloride, Methyl hydrogen sulfate, Fluorine, Iodine, etc.</p> <p>Affect terminal airway and alveoli: Arsenic trichloride, Nitrogen peroxide, Phosgene, etc.</p>
Asphyxial Type	<p>Simple asphyxia: Carbon dioxide, Ethane, Helium, Hydrogen, Methane, Nitrogen, Nitrous oxide</p> <p>Chemical asphyxia: Carbon monoxide, Cyanide, Hydrogen cyanide, Nitrile, Aromatic nitro compound (Nitrobenzene, Dinitrobenzene, etc), Aromatic amine compound (Aniline, Methylaniline), Hydrogen sulfide, etc.</p>
Narcotic Type	<p>Most organic solvents and a lot of lipophilic solids have narcotic effect to a greater or lesser extent</p>
Nervous System Disease Type	<p>Carbon disulfide, Halogenated hydrocarbon, Methanol, Thiophene, Tetraethyllead, Manganese, Mercury, etc.</p>
Lung, Hepatic Damage Type	<p>Carbon tetrachloride, Tetrachloroethane, Hexachloronaphthalene, Trinitrotoluene, Dioxane, etc.</p> <p>Especially for liver: Uranium, Cadmium, etc.</p>
Blood Damage Type	<p>Benzene, Lead, Radiation, Phosphine, Arsine, etc.</p>

Hard Tissue Damage Type	Acid mist, Yellow phosphorus, Fluorine, etc.
Lung Damage Type	Alveoli stimulating substances (pulmonary edema, pneumonia), Poorly-soluble dust (pneumoconiosis), free silicic acid (silicosis), asbestos (lung asbestosis), talc (talc lung), aluminum (aluminum lung), coal powder (black lung), black lead (graphite lung), welding dust (welding lung), beryllium (pulmonary berylliosis)
other	allergic property: metallic oxide, fume, etc. circulatory function disorder: nitroglycol, nitroglycerin
Disasterprevention Handbook, Safety Committee of Applied Chemistry, School of Engineering, the University of Tokyo	