

Appendix C: Additional Definitions

The following information is intended to familiarize the user with some definitions and potentially hazardous materials. The following can be used to help suggest Special Hazards or to help identify categorical hazards.

Water-reactive chemicals can react violently or vigorously in contact with water, wet surfaces, or even the moisture in the air. These chemicals may react to give off a flammable gas (such as hydrogen) or a toxic gas, (such as phosgene) or spontaneously burn or explode. Water is obviously NOT a good choice for putting out fires caused by water reactive chemicals. A class D fire extinguisher is designed to be used to fight fires caused by certain water reactive chemicals.

Examples include potassium, lithium, sodium, calcium carbide, acid anhydrides, acid chlorides and salt hydrides.

Air-reactive materials – chemicals which react violently in contact with air or oxygen or with compounds containing oxygen. Sometimes air reactive chemicals are called spontaneously combustible or pyrophoric materials. Pyrophoric materials burst into flame spontaneously upon contact with air or oxygen. Spontaneous combustion means that the material does not need an ignition source to begin combustion, or to burn. These materials are sometimes sold in gas cylinders, although they may not be gases themselves. They may be sold packaged under nitrogen or some other inert atmosphere, or they may be created by a chemical reaction in your laboratory. The flame of certain pyrophoric materials is clear and not readily visible. Examples include alkali metals (potassium, cesium), finely divided metal dusts (nickel, zinc, titanium), hydrides (barium hydrides, diborane, diisobutyl aluminum hydride).

Shock/Heat Sensitive Agents – chemicals which may decompose violently if struck or heated. Solids are also prone to explosive decomposition if ground, for example with mortar and pestle or by unscrewing the cap on the container where crystals may be present. Examples of shock sensitive chemicals are Acetylenic compounds, Acyl nitrates, Alkyl nitrates, Alkyl and acyl nitrates, Alkyl perchlorates, Amine metal oxosalts, Azides, Chlorite salts of metals, Diazo compounds, Diazonium salts (when dry), Fulminates, N- Halogen compounds, N-nitro compounds, Oxo salts of nitrogenous bases, Perchlorate salts, Peroxides and hydroperoxides, Picrates, especially picric acid when dry [creanine picric reagent or trinitrile phenol], Polynitroalkyl compounds, Polynitroaromatic compounds. Heat sensitive chemicals are materials with a Self-Accelerating Decomposition Temperature (SADT) such as some organic peroxides, high concentrations of hydrogen peroxide and hydrazine, ethylene oxide, peroxydicarbonate, peroxyacetate, nitro benzyl halides and hydroperoxides. Heat sensitive chemicals should be used in a thermally controlled area.

Compressed Gas Cylinders – substances held in a gaseous state in excess of 15 pounds per square inch gauge. This category includes all cylinders equal to a lecture bottle and larger. It does not apply to aerosol containers.

Corrosives – substances with a pH less than 3.5 or greater than 10.5. Corrosives can cause tissue damage or corrode metal.

Carcinogenic Agents – substances that have sufficient evidence of carcinogenicity from studies in humans, which indicates a causal relationship between exposures to the agent, substance, or mixture, and human cancer. Some examples include aflatoxins, inorganic arsenic compounds, azathioprine, benzene, benzidine, beryllium and beryllium compounds, 1,3-butadiene, cadmium and cadmium compounds, coal tar and coal tar pitches, cyclosporine A, diethylstilbestrol, estrogens, ethylene oxide, nickel compounds, dioxin, and vinyl chloride.

Teratogenic Agents – substances capable of causing harm to human embryos and fetuses. Exposure to teratogens can result in a wide range of structural abnormalities such as cleft lip, cleft palate, dysmelia, anencephaly, ventricular septal defect. In most cases, specific agents produce a specific teratogenic response. Some examples are 13-cis-retinoic acid, isotretinoin (Accutane), temazepam (Restoril; Normisson), nitrazepam (Mogadon), nimetazepam (Ermin), aminopterin, androgenic hormones, busulfan, captopril, enalapril, chlorobiphenyls (PCBs), Dioxin, coumarin, cyclophosphamide, diethylstilbestrol, diphenylhydantoin (Phenytoin, Dilantin, Epanutin), ethanol, ethidium bromide, etretinate, hexachlorophene, lithium, methimazole, organic mercury, penicillamine, tetracyclines, thalidomide, trimethadione, uranium, methoxyethyl ethers and valproic acid. .

Mutagenic Agents – an agent, such as a chemical, ultraviolet light, or a radioactive element, that can induce or increase the frequency of mutation in an organism. Some examples include base analogs, which can substitute for DNA bases and cause copying errors, deaminating agents such as nitrous acid; intercalating agents such as ethidium bromide; alkylating agents such as ethylnitrosourea; transposons, sections of DNA that undergo autonomous fragment relocation/multiplication; some natural plant alkaloids, such as those from vinca species; bromine and some of its compounds; sodium azide; psoralen combined with ultraviolet radiation causes DNA crosslinking and hence chromosome breakage.

Cryogenics – substances that exist in a closed container below $-150\text{ }^{\circ}\text{C}$, $-238\text{ }^{\circ}\text{F}$ or 123 K. Examples include liquid nitrogen and liquid helium. The minimum reporting threshold for this category is 4 liters. These may be noted under special precautions.

Flammables – substances that exist in a solid, liquid or gaseous state and meet the definition of flammable by one of the following:

Flammable liquids: Any liquid having a flash point less than 140 degrees F.

Examples include acetone, ethanol, methanol, xylene, acetaldehyde, acetonitrile, benzene, cyclohexane, diethylamine, dioxane, ethyl ether, hexane, tetrahydrofuran, and toluene.

Flammable solids: are any materials in the solid phase of matter that can readily undergo combustion in the presence of a source of ignition under standard circumstances, i.e. without artificially changing variables such as pressure or density, or adding accelerants. Examples include camphor, cellulose nitrate, naphthalene, decaborane, lithium amide, phosphorous heptasulfide, phosphorous sesquisulfide, potassium sulfide, anhydrous sodium sulfide, sulfur, cesium, magnesium and zirconium, aluminum powder, calcium/magnesium/sodium metals.

Flammable gases: a material which is a gas at $68\text{ }^{\circ}\text{F}$ ($20\text{ }^{\circ}\text{C}$) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a boiling point of $68\text{ }^{\circ}\text{F}$ ($20\text{ }^{\circ}\text{C}$) or less at 14.7 psia (101 kPa)] which:

1. Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air; or
2. Has a flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit.

Examples include acetylene, 1,3-butadiene, n-butane, carbon monoxide, diborane, ethylamine, ethylene oxide, isobutane, and trimethylamine.