

Appendix A. Substances with Greater Hazardous Nature than Educational Utility

Chemicals used in the laboratory may be hazardous because of the following:

- Safety risks (i.e., highly flammable or explosive material)
- Acute and chronic health hazards
- Environmental harm
- Impairment of indoor air quality

Assessment of the following chemicals and chemical families indicates that their hazardous nature far exceeds their potential usefulness in school programs.

- I. UNKNOWN or UNLABELED chemicals
- II. Chemicals UNUSED for more than 3 years
- III. RADIOACTIVE chemicals
- IV. EXPLOSIVES including:
 - Acetylides
 - Azides
 - Fulminates
 - Hydrazines
 - Organic nitros (including picric acid & trinitrotoluene (TNT))
 - Styphnates
 - Tetrahydrofuran
- V. HIGHLY FLAMMABLE chemicals including:
 - Acetylene
 - Ethers
- VI. HIGHLY TOXIC chemicals including:
 - Cyanides
 - Mercury compounds
 - Sulfides
 - Thallium compounds
- VII. KNOWN HUMAN CARCINOGENS including:
 - Hexavalent chromium
 - Vinyl chloride

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Assessment of the chemicals in the following list indicates that their hazardous nature is greater than their potential usefulness in school programs. Evaluation included physical hazards (i.e., flammability, explosive propensity, reactivity, corrosivity) and health hazards (i.e., toxicity, carcinogenicity).

This following list of chemicals was generated from the *Manual of Safety and Health Hazards in the School Science Laboratory* published by U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health [1984].

Carcinogenic substances were identified from the *Report on Carcinogens* (10th Edition) generated by the National Toxicology Program [2002].

Chemical	CAS Number	Hazard
Acrylonitrile	107-13-1	Flammable (NFPA = 3), reasonably anticipated human carcinogen
Ammonium chromate	7788-98-9	Oxidizer, known human carcinogen
Ammonium oxalate	1113-38-8	May be fatal if inhaled or ingested
Ammonium vanadate	7803-55-6	May be fatal if inhaled or ingested
Aniline	62-53-3	Combustible, may be fatal if inhaled, ingested, or absorbed through the skin
Aniline hydrochloride	142-04-1	May be fatal if inhaled, ingested, or absorbed through the skin
Anthracene	102-12-7	Irritant, may cause an allergic skin reaction
Antimony	7440-36-0	May be fatal if inhaled, irritant
Antimony trichloride	10025-91-9	Corrosive
Arsenic and arsenic compounds	N/A	Known human carcinogen
Asbestos	1332-21-4	Known human carcinogen
Ascarite II	N/A	Corrosive, may be fatal if ingested
Benzene	71-43-2	Flammable (NFPA = 3), known human carcinogen, mutagen
Benzoyl peroxide	94-36-0	Flammable (NFPA = 3), explosive, oxidizer
Bromine	7726-95-6	Oxidizer, corrosive, may be fatal if inhaled or ingested
Cadmium and cadmium compounds	N/A	Known human carcinogens
Calcium cyanide	592-01-8	May be fatal if inhaled or ingested

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Chemical	CAS Number	Hazard
Carbon disulfide	75-15-0	Flammable (NFPA = 4), acute CNS toxicity and peripheral neurotoxicity
Carbon tetrachloride	56-23-5	May be fatal if inhaled or ingested, reasonably anticipated human carcinogen
Chloral hydrate	302-17-0	Controlled barbiturate
Chlorine	7782-50-5	Oxidizer, corrosive, may be fatal if inhaled
Chloroform	67-66-3	Reasonably anticipated human carcinogen
Chlorpromazine	50-53-3	Controlled substance
Chromic acid	7738-94-5	Oxidizer, known human carcinogen
Chromium hexavalent compounds	N/A	Known human carcinogen
Chromium trioxide	1333-82-0	Oxidizer, corrosive, known human carcinogen
Colchicine	64-86-8	May be fatal if ingested, mutagen
p-Dichlorobenzene	106-46-7	Combustible, reasonably anticipated human carcinogen
Dimethylaniline	121-69-7	May be fatal if inhaled, ingested, or absorbed through the skin
p-Dioxane	123-91-1	Flammable (NFPA = 3), forms peroxides (Group 2), reasonably anticipated human carcinogen
Ethylene dichloride (1,2-Dichloroethane)	107-06-2	Flammable (NFPA = 3), reasonably anticipated human carcinogen, mutagen
Ethylene oxide	75-21-8	Flammable (NFPA = 4), explosive (NFPA = 3), may be fatal if inhaled or absorbed through the skin, known human carcinogen
Formaldehyde (formalin)	50-00-0	Flammable (NFPA=3), reasonably anticipated human carcinogen
Gasoline	8006-61-9	Flammable (NFPA = 3)
Gunpowder	N/A	Explosive
Hexachlorophene	70-30-4	May be fatal if inhaled, ingested, or absorbed through the skin, possible teratogen
Hydrobromic acid	10035-10-6	Corrosive, may be fatal if inhaled or ingested

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Hydrofluoric acid	7664-39-3	Corrosive, may be fatal if inhaled or ingested (liquid and vapor can cause severe burns not always immediately painful or visible but possibly fatal)
Hydrogen	1333-74-0	Flammable (NFPA = 4)
Hydriodic acid	10034-85-2	Corrosive, may be fatal if inhaled or ingested
Lead arsenate	7784-40-9	Known human carcinogen, teratogen
Lead carbonate	1319-46-6	May be fatal if inhaled or ingested, neurotoxic
Lead (VI) chromate	7758-97-6	May be fatal if inhaled or ingested, known human carcinogen
Lithium, metal	7439-93-2	Combustible, water reactive
Lithium nitrate	7790-69-4	Oxidizer
Magnesium, metal (powder)	7439-95-4	May ignite spontaneously on contact with water or damp materials
Mercury	7439-97-6	Corrosive, may be fatal if inhaled or ingested
Mercuric chloride	7487-94-7	May be fatal if inhaled, teratogen
Methyl iodide (iodomethane)	74-88-4	May be fatal if inhaled, ingested or absorbed through the skin, potential carcinogen (NIOSH)
Methyl methacrylate	80-62-6	Flammable (NFPA = 3), explosive (vapor)
Methyl orange	547-58-0	Possible mutagen
Methyl red	493-52-7	Possible mutagen
Nickel carbonate	333-67-3	Reasonably anticipated human carcinogen
Nickel, metal	7440-02-0	Reasonably anticipated human carcinogen, mutagen
Nickel oxide	1314-06-3	Reasonably anticipated human carcinogen, mutagen
Nickelous acetate	373-02-4	Reasonably anticipated human carcinogen
Nicotine	45-11-5	May be fatal if inhaled, ingested, or absorbed through the skin
Osmium tetroxide	20816-12-0	May be fatal if inhaled or ingested
Paris green	12002-03-8	May be fatal if inhaled, ingested, or absorbed through the skin, known human carcinogen
Pentane	109-66-0	Irritant, flammable (NFPA = 4)

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Phenol	108-95-2	Combustible (liquid and vapor), corrosive, may be fatal if inhaled, ingested, or absorbed through the skin
Phosphorus pentoxide	1314-56-3	Water reactive, corrosive
Phosphorous, red, white	7723-14-0	May ignite spontaneously in air
Phthalic anhydride	85-44-9	Combustible/finely dispersed particles form explosive mixtures in air, corrosive
Potassium chromate	7789-00-6	Oxidizer, known human carcinogen
Potassium, metal	7440-09-7	Flammable (NFPA = 3), water reactive, forms peroxides
Potassium oxalate	583-52-8	Corrosive, may be fatal if ingested
Potassium sulfide	1312-73-8	Spontaneously combustible, explosive in dust or powder form, corrosive
Pyridine	110-86-1	Flammable (NFPA = 3), possible mutagen
Selenium	7782-49-2	Severe irritant
Silver cyanide	506-64-9	May be fatal if inhaled, ingested, or absorbed through the skin
Silver nitrate	7761-88-8	Oxidizer, corrosive, may be fatal if ingested
Silver oxide	20667-12-3	Oxidizer
Sodium arsenate	7778-43-0	May be fatal if inhaled or ingested, known human carcinogen
Sodium arsenite	7784-46-5	Known human carcinogen, teratogen
Sodium azide	26628-22-8	Explosive, may be fatal if ingested or absorbed through the skin
Sodium chromate	7775-11-3	Oxidizer, corrosive, known human carcinogen
Sodium cyanide	143-33-9	May be fatal if inhaled, ingested or absorbed through the skin
Sodium dichromate	10588-01-9	Oxidizer, corrosive, may be fatal if ingested, known human -carcinogen
Sodium fluoride	7681-49-4	May be fatal if inhaled or ingested
Sodium nitrite	7632-00-0	Oxidizer
Sodium sulfide	1313-82-2	Corrosive, may be fatal if inhaled or ingested
Sodium thiocyanide	540-72-7	Contact with acid liberates very toxic gas

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Stannic chloride - (anhydrous)	7646-78-8	Corrosive, hydrochloric acid liberated upon contact with moisture and heat
Stearic acid	57-11-4	May form combustible dust concentration in the air
Strontium	7440-24-6	Water reactive
Strontium nitrate	10042-76-9	Oxidizer
Sudan IV	85-83-6	Irritant, toxic properties have not been thoroughly evaluated
Sulfuric acid, fuming	8014-95-7	Corrosive, may be fatal if ingested
Tannic acid	1401-55-4	Irritant
Tetrabromoethane	79-27-6	May be fatal if inhaled, ingested, or absorbed through the skin
Thioacetamide	62-55-5	Reasonably anticipated human carcinogen
Thiourea	62-56-6	Reasonably anticipated human carcinogen
Titanium trichloride	7705-07-9	Water reactive, corrosive
Titanium tetrachloride	7550-45-0	Water reactive, corrosive, may be fatal if inhaled
o-Toluidine	95-53-4	Reasonably anticipated human carcinogen, mutagen
Trichloroethylene	79-01-6	Reasonably anticipated human carcinogen
Uranium	7440-61-1	Radioactive material
Uranyl acetate	541-09-3	Radioactive material
Urethane	51-79-6	Combustible, reasonably anticipated human carcinogen
Wood's metal	8049-22-7	May be fatal if inhaled or ingested, known human carcinogen (cadmium), neurotoxic