Chemicals that are not recommended for use in schools

These may be grouped into certain hazardous elements and their compounds, solid chromates(VI) and dichromates(VI), cyanides, some chlorates (VII), metal amides, metal phosphides and certain gases in cylinders. A list taken from Safety in Science Education (1996) is given below.

Abbreviations of hazards

E Explosive F+ Extremely Flammable T+ Very toxic C Corrosive N Dangerous for the environment O Oxidising Sen Sensitiser Xi Irritant Xn Harmful
F Highly Flammable T Toxic
F- Flammable

Carc 1 Category 1 carcinogen
Carc 1 (inhal) Category 1 carcinogen by inhalation route only
Carc 2 Category 2 carcinogen
Carc 3 Category 3 carcinogen

Ammonium chlorate(VII) (perchlorate)	O	Not generally recommended	Not recommended for use in schools.
Anthracene	Xn	Not generally recommended	Keep exhibition sample only.
Antimony	Xn, N	Not generally recommended	If antimony electrodes are made casting, do so in fume cupboard and apply minimum heat to melt metal.
Arsenic	T	Not generally recommended	Keep as exhibition sample only.
Arsenic compounds	T, Carc 1	Not generally recommended	Not recommended for use in schools, They will form highly toxic arsine in contact with acids and reducing agents, e.g. zinc. Some alloys or sulfide ore samples of other metals collected from the field for analysis may contain arsenic.
Barium chromate(VI)	T, N	Not generally recommended	Not recommended for school use as a solid. If a precipitate is formed in a reaction it should not be isolated and dried as it is carcinogenic by inhalation.
Beryllium	T+, N, Carc 2(inhal), Sen	Not generally recommended	Keep as exhibition sample only and in a safe place.
Beryllium compounds	T+, N, Carc 2(inhal), Sen	Not generally recommended	Not recommended for use in schools.
Butane gas in cylinder	F+	Not generally recommended	The keeping of large cylinders of butane is not recommended in schools other than as a temporary heat source or in a plumbed in supply from an external ventilated store.
Calcium phosphide	F. T+, N	Not generally recommended	This material must be stored in a dry place and at the first sign of deterioration the screw cap should be replaced with a rubber stopper.
Carbon disulfide	F+, T	Not generally recommended	Not recommended for use in schools. The vapour can spread some distance and no heat sources of any type are safe in the same laboratory. Use dimethylbenzene for preparation of the allotropes of sulfur. 3-phenyl propenoate (ethyl cinnamate) can be used in 'hollow prism' experiments. The prism needs thorough cleaning after use with propanone.
Carbon monoxide - cylinder	F, T	Not generally recommended	When reducing metal oxides take the same precautions as when using hydrogen. Nickel and iron can form toxic, explosive carbonyls. Either avoid reducing the oxides of these metals or take precautions to ensure their decomposition.
Chlorates(VII)	O, C	Not generally recommended	Not generally recommended for use in schools. Need for

(perchlorates)			cleanliness. Do not return unused chlorate(VII) to jar and replace lid immediately to exclude dust. Do not allow solutions to dry on wood, paper or clothing as these may ignite at a later time.
Chloric(VII) acid (Perchloric acid)	O, C	Not generally recommended	For hydrolysis of DNA, 6M hydrochloric acid is an effective alternative. For study of acid strengths of oxy-acids alternatives are sulfuric acid H_2SO_4) and sulphurous acid (H_2SO_3) also the phosphoric(V) acid compared with phosphoric(III) acid (phosphorous acid).
Chlorine - cylinder	T	Not generally recommended	Not suitable for use in schools. Chlorine should not be reacted with fine metal powders such as aluminium, hydrocarbon gases or with ammonia or its compounds. Mixtures of hydrogen and chlorine gases in UV or sunlight are explosive over a range of compositions.
Chloromethane (Methyl chloride)	F+, N, Carc 3	Not generally recommended	This and other low molecular mass haloalkanes are not recommended for use in schools.
Chromates(VI) and dichromate(VI) Insoluble solids	T, Carc 2(inhal)	Not generally recommended	Chromate precipates should not be isolated and dried in experiments.
'Chromic acid' (cleaning mixture)	O, T, C, N, Carc 1 (inhal)	Not generally recommended	This mixture of concentrated sulfuric acid and potassium dichromate which has been traditionally used for cleaning glassware reacts violently with many organic compounds and residues. Under no circumstances should the material be stored. Commercial detergents are much safer.
Colchicine	T+	Not generally recommended	Not suitable for use in schools.
Cyanides	T+, N	Not generally recommended	Not recommended for use in schools.
DDT	T, N, Carc 3	Not generally recommended	
Di(benzenecarbonyl) peroxide (Benzoyl peroxide)	E, Xi	Not generally recommended	The substance is a sensitiser. Di(dodecanoyl)peroxide provides a much safer alternative catalyst for polymerisation.
1,2-dichloroethane (Ethylenedichloride)	F, T, Carc 2	Not generally recommended	Not recommended for use in schools.
4,4'-dinitrobiphenyl		Not generally recommended	Known carcinogen. Effectively banned in schools by government education departments (AM70 in England and Wales, SEED Circular 8/95 in Scotland and DENI Guidance in N Ireland.
2,4-dinitrobromobenzene	T	Not generally recommended	Sensitiser. Not suitable for use in schools.
2,4-dinitrochlorobenzene	T	Not generally recommended	Sensitiser. Not suitable for use in schools.
2,4-dinitrifluorobenzene	T	Not generally recommended	Sensitiser. Not suitable for use in schools.
Dinitrogen oxide (Nitrous oxide) - cylinder	T	Not generally recommended	The gas is explosive if mixed with ammonia, carbon monoxide, hydrogen or hydrogen sulfide.
Ethane, cylinder	F+	Not generally recommended	Not suitable for use in schools.
Ethanenitrile (Acetonitrile)	F, Xn	Not generally recommended	Benzenecarbonitrile (benzonitrile) offers a much safer alternative for reactions of this class of compounds.
Ethene, cylinder	F+	Not generally recommended	Not suitable for use in schools.
Ethyne cylinder (Acetylene)	F+	Not generally recommended	Not suitable for use in school laboratories.
Fluorine	T+, C	Not generally recommended	Not suitable for use in schools.

Hydrazine, anhydrous	T, F-, N, Carc 2, Sen	Not generally recommended	Only by teacher, use with strictest precautions.
Hydrazine salts	T, N, Carc 2, Sen	Not generally recommended	Only use by teachers with strictest precautions. Hydrazine may be released on reaction with alkali.
Hydrofluoric acid		Not generally recommended	Only handled by experienced teacher or by S6 with extremely close supervision.
Hydrogen cyanide	F+, T+, N	Not generally recommended	Not suitable for use in schools.
Hydrogen sulfide - cylinder	F+, T+, N	 Not generally recommended	The gas can react violently with metal oxides, peroxides and soda lime. Not suitable for use in schools
Lead(II) chromate (VI)	T, N, Carc 3	Not generally recommended	The solid is not recommended for use in schools. The production of a precipitate of lead chromate does not present a hazard provided it is not filtered off and dried.
Magnesium chlorate(VII) (Anhydrone)	O, Xi	Not generally recommended	Not suitable for use in schools.
Mercury alkyls	T+, N	Not generally recommended	Not suitable for use in schools.
Nickel(II) oxide	T, Carc 1(inhal), Sen	Not generally recommended	This material is carcinogenic by inhalation and is often found in use in Art departments. Its use is not recommended in schools. It could be adventitiously formed by heating carbonates, nitrates or hydroxides.
Nitrocellulose	E	Not generally recommended	Not suitable for use in schools.
Nitrogen monoxide (Nitric oxide) - cylinders	T+ T+	 Not generally recommended	As with nitrogen dioxide it is very toxic by inhalation and severe irritant to respiratory system, eyes and skin. Again delayed symptoms can follow an exposure and if the gas is inhaled it should be treated as a matter for concern. Not recommended for use in schools.
Nitrogen triiodide	E	Not generally recommended	Preparation not recommended in schools.
Nitromethylbenzenes (Nitrotoluenes)	T	Not generally recommended	Not recommended for use in schools.
Oleum (fuming sulfuric acid)	C	Not generally recommended	Not recommended for use in schools.
'Oxygen mixture' (Potassium chlorate (V) plus manganese(IV) oxide)		Not generally recommended	Not recommended for use in schools. Oxygen is best prepared by the action of manganese(IV) oxide on hydrogen peroxide solution.
Phosphides, metal	F, T+, N	Not generally recommended	Not recommended for use in schools.
Potassium amide (Potassamide)	C	Not generally recommended	Not recommended for use in schools.
Potassium chlorate(VII) (Potassium perchlorate)	O, Xn	Not generally recommended	Not recommended for use in schools. Need for cleanliness. Do not return unused chlorate(VII) to jar and replace lid immediately to exclude dust.
Potassium cyanide	T+, N	Not generally recommended	Not recommended for use in schools.
Propane cylinder	F+	Not generally recommended	Not recommended for use in schools except as source of piped burner supply.
Propenamide (Acrylamide)	T, Carc 2, Sen	Not generally recommended	Polymerisation of the monomer is not recommended in schools. For DNA electrophoresis agarose works for most cases. If polyacrylamide is needed, purchase the gel in prepolymerised sheets or slabs.
Selenium and compounds	T, N	Not generally recommended	An exhibition sample may be kept.
Sodamide	C	Not generally recommended	Not recommended for use in schools.

Sodium azide	T+, N	Not generally recommended	Avoid use if at all possible. Small amounts of dilute solutions are sometimes in used in analytical procedures. Take care with disposal as it forms explosive azides with heavy metals – drains may contain copper or even lead parts! Contact with acid liberates a very toxic gas.
Sodium chromate(VI) Insoluble solids	T, Carc 2(inhal)	Not generally recommended	Chromate precipates should not be isolated and dried in experiments.
Sodium dichromate(VI) Insoluble solids	T, Carc 2(inhal)	Not generally recommended	Chromate precipates should not be isolated and dried in experiments.
Tellurium metal	T	Not generally recommended	Keep as exhibition sample only.
Tellurium compounds	T	Not generally recommended	Not suitable for use in schools.
Thallium metal	T+	Not generally recommended	Not suitable for use in schools.
Thallium salts	T+, N	Not generally recommended	Not suitable for use in schools.
Zinc chromate(VI)	T, N, Carc 1	Not generally recommended	Not suitable for use in schools. The solid is not recommended for use in schools. The production of a precipitate of zinc chromate on a small scale does not present a hazard provided it is not filtered off and dried.