

**DANGER**  
HAZARDOUS  
MATERIAL AREA  
AUTHORIZED PERSONNEL ONLY



# Safer Use of Chemicals in School Science Laboratories

(second edition)



Science Teachers' Association of Ontario/  
L'Association des professeurs des sciences de l'Ontario

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The approved chemical list from the Toronto District School Board (TDSB) was used, with permission, to prepare the first edition of this resource (2004). The TDSB list was selected because it was sufficiently comprehensive to include chemicals that teachers across Ontario would likely encounter. STAO remains grateful to the TDSB Science Safety Committee for sharing this information. During the 2020 revision, this list of chemicals was updated by the STAO Safety Committee using inventory lists supplied by several school boards. Comments regarding these chemicals were based on a review of current safety data sheets (SDS) and the experience of committee members. This document shall not be copied or reproduced without STAO's permission.

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## Introduction

Being aware of best practices in the use of chemicals is essential for maintaining safe and engaging science programs in secondary schools. This document was developed to alert teachers to the hazards posed by certain chemicals and provides guidance on their suitability for use. The advice presented is the result of extensive consultation with practising teachers and published safety resources. This resource was particularly developed to assist small school boards and independent schools who may not have the resources to develop their own chemical use documents.

Every effort has been made to ensure the recommendations in this resource have been compiled from sources believed to be reliable and accurate, with best current practices. However, safety best practices continually evolve as our understanding of the hazards and associated risks of using chemicals improves. Consequently, a safety data sheet (SDS) must always be consulted when selecting chemicals appropriate for an activity.

Safer alternatives should always be considered when selecting chemicals. When the risk posed by a chemical outweighs the educational value of an activity, the activity should not be done.

Additional safety best practices include:

- Using small quantities of chemicals
- Using low concentrations
- Only conducting activities that are curriculum related
- Storing chemicals properly by segregating them into the categories outlined in STAO's safety reference text *Safe ON Science*.
- Disposing of chemicals according to board procedures

## Creating a Policy for Hazardous Chemicals

The STAO Safety Committee recommends a collaborative team approach when deciding whether or not a specific chemical or lab activity is appropriate. The team may include appropriate board office safety personnel, curriculum leaders and science teachers with a chemistry background. Considerations that can inform the team's decision making include:

- SDS safety information
- Exposure (likely route of entry, duration, frequency of use)
- The suitability of the facility (e.g., adequacy of ventilation)
- Staff skill level and training
- Safety history of the chemical or activity
- Personal protective equipment (PPE) requirements
- Storage and disposal requirements/protocols



## WHMIS 2015

The Workplace Hazardous Materials Information System (WHMIS) is a comprehensive plan for providing

Canadian workers with information on the safe use of hazardous substances in the workplace. Under WHMIS, workers have the right to understand the safety and health hazards of the materials they use in the workplace, and they have the right to participate in training and refuse unsafe work (as it pertains to OHSA, Regulation 857, Teachers).











First introduced in 1988, WHMIS was modified in 2015 to incorporate the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) for workplace chemicals. This modified version of WHMIS is referred to as WHMIS 2015. Table 1 summarizes the key features of WHMIS 2015. Please consult STAO’s safety reference text *Safe ON Science* for detailed information on WHMIS 2015 symbols, hazard information and labelling requirements.

Table 1: WHMIS 2015 Summary

Feature	WHMIS 2015
<p>Product Name</p> <p>Hazard Symbol surrounded by square red border (Pictogram)</p> <p>Signal Words</p> <ul style="list-style-type: none"> <li>Warning (less severe hazards)</li> <li>Danger (more severe hazards)</li> </ul> <p>Hazard Statements</p> <ul style="list-style-type: none"> <li>Describe the most significant hazards of the product</li> </ul> <p>Precautions</p> <ul style="list-style-type: none"> <li>Advice on minimizing the effect of exposure</li> <li>May include instructions regarding handling, storage, first-aid, PPE requirements and disposal</li> </ul>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><b>Product K1 / Produit K1</b></p> <div style="display: flex; justify-content: center; gap: 20px;">   </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>Danger</b></p> <p>Fatal if swallowed. Causes skin irritation.</p> <p><b>Precautions:</b> Wear protective gloves. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.</p> <p>Store locked up. Dispose of contents/containers in accordance with local regulations.</p> <p>IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. Take off contaminated clothing and wash it before reuse. IF SWALLOWED: Immediately call a POISON CENTRE or doctor. Rinse mouth.</p> </div> <div style="width: 45%;"> <p><b>Danger</b></p> <p>Mortel en cas d'ingestion. Provoque une irritation cutanée.</p> <p><b>Conseils :</b> Porter des gants de protection. Se laver les mains soigneusement après manipulation. Ne pas manger, boire ou fumer en manipulant ce produit.</p> <p>Garder sous clef. Éliminer le contenu/réceptacle conformément aux règlements locaux en vigueur.</p> <p>EN CAS DE CONTACT AVEC LA PEAU : Laver abondamment à l'eau. En cas d'irritation cutanée : Demander un avis médical/consulter un médecin. Enlever les vêtements contaminés et les laver avant réutilisation. EN CAS D'INGESTION : Appeler immédiatement un CENTRE ANTIPOISON ou un médecin. Rincer la bouche.</p> </div> </div> <p style="text-align: center;">Compagnie XYZ, 123 rue Machin St, Mytown, ON, N0N 0N0 (123) 456-7890</p> </div>
<p>Hazard Classes</p>	<ul style="list-style-type: none"> <li>Physical Hazards (19 categories).</li> </ul>

	<ul style="list-style-type: none"> <li>• Health Hazard (12 categories).</li> <li>• The Environmental Hazard class has not been adopted in Canada but may be seen on products that originate from outside Canada.</li> </ul>
Hazard Rating Scale	<ul style="list-style-type: none"> <li>• Scale of 1-4, where 1 is the most hazardous.</li> </ul>
Safety Data Sheets (SDS)	<ul style="list-style-type: none"> <li>• Specific 16-section format.</li> <li>• Must be updated only after the supplier is aware of new information.</li> <li>• Never expire.</li> </ul>
Compliance Date	<ul style="list-style-type: none"> <li>• All workplace product labels must be WHMIS 2015 compliant as of December 2018.</li> </ul>

Table 2. WHMIS 2015 Pictograms. The bold type is the name given to the pictogram. The text in brackets describes the hazard. Reproduced with the permission of the Canadian Centre for Occupational Health and Safety.

	<b>Exploding bomb</b> (for explosion or reactivity hazards)		<b>Flame</b> (for fire hazards)		<b>Flame over circle</b> (for oxidizing hazards)
	<b>Gas cylinder</b> (for gases under pressure)		<b>Corrosion</b> (for corrosive damage to metals, as well as skin, eyes)		<b>Skull and Crossbones</b> (can cause death or toxicity with short exposure to small amounts)
	<b>Health hazard</b> (may cause or suspected of causing serious health effects)		<b>Exclamation mark</b> (may cause less serious health effects or damage the ozone layer*)		<b>Environment*</b> (may cause damage to the aquatic environment)
	<b>Biohazardous Infectious Materials</b> (for organisms or toxins that can cause diseases in people or animals)				

\* The GHS system also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

## Designated Substances

Ontario Regulation 490/09 identifies 11 specific hazardous substances used in Ontario as being “Designated Substances”. The intent of this regulation is to ensure that the use of these substances is strictly controlled. Two conditions must be met in order for this regulation to apply:

- The substance must be present in the workplace
- There must be a likelihood of exposure. While the legislation applies to all workers in Ontario, exposure limits for these chemicals are generally only reached in industrial workplaces. The principal route of entry described by this legislation is inhalation.

Only two of these substances, asbestos and mercury, have been raised as areas of concern in schools. If there is a concern regarding a designated substance at your school, this should be addressed by the Joint Health and Safety Committee, in conjunction with school administration and school board members. Table 3 lists the 11 designated substances; the time-weighted average limits of one of the forms of each substance; and workplaces or applications where these substances are generally found to exceed the legislated limits.

Table 3: Designated Substances

Designated Substance	Time-Weighted Average Limit	Examples of Workplaces or Application
Acrylonitrile	2.0 ppm	Polymer Industry (Rubber)
Arsenic	0.01 mg/m <sup>3</sup>	Mining Industry
Asbestos	0.1 fibers/cc	Fireproof Construction Materials Schools: Old-Style Pipe Insulation
Benzene	0.5 ppm	Industrial Organic Synthesis
Coke Oven Emissions	0.15 mg/m <sup>3</sup>	Steel Industry
Ethylene Oxide	1.0 ppm	Detergents, Solvents
Isocyanates	n/a	Autobody Painting Booths
Lead	0.05 mg/m <sup>3</sup>	Lead Oxide Battery Recycling
Mercury (all forms except alkyl)	0.025 mg/m <sup>3</sup>	Pulp and Paper Industry, Schools: Science barometers, Particle tubes
Silica (quartz)	0.10 mg/m <sup>3</sup>	Industrial Baggers
Vinyl Chloride	1.0 ppm	Industrial Solvent

Source of Data: O. Reg. 490/09: DESIGNATED SUBSTANCES (June 10, 2019.), s.34. Table 1.

## Hazard Classification and Abbreviations

Table 4 provides a list of terms commonly used to classify hazardous substances. For convenience, each type of hazard is given an abbreviation. These abbreviations will be used to classify chemicals later in this resource.

Table 4: Hazard Classification and their Abbreviations

Hazard	Hazard Abbreviations	Description
Biohazardous	B	A substance that contains bacteria or viruses that can cause disease in humans.
Compressed gas	G	A substance under high pressure in a cylinder which may explode or burst when heated, dropped or damaged.
Carcinogen	Carc	A substance that may cause cancer if inhaled, swallowed or absorbed through the skin.
Corrosivity		
(a) Extremely Corrosive	C+	An extremely corrosive substance causes burns when in contact with skin for three minutes or less.
(b) Corrosive	C	A corrosive substance damages skin when in contact for longer than three minutes.
Dangerous for the environment	E	A substance that is toxic to aquatic and/or non-aquatic organisms and may cause long-term adverse effects to the environment.
Dangerously reactive	R	A substance which may react violently causing explosion, fire or release of toxic gases when exposed to light, heat, vibration or extreme temperatures.
Flammability		Flammable substances can be divided into three groups, depending on how easily they vaporize.
(a) extremely flammable	F+	A substance with a flash point lower than 22.8 °C and a boiling point lower than 37.8 °C.
(b) highly flammable	F	A substance with a flash point below 22.8 °C and a boiling point at or above 37.8 °C.
(c) flammable	F-	A substance with a flash point between 22.8 and 37.8 °C.
Harmful	H	A substance with less severe health risks than those in the "Toxic" classification. See below.



Hazard	Hazard Abbreviations	Description
Irritant	Ir	A substance that behaves in a similar way to corrosives but, instead of destroying living tissue, causes significant inflammation (reddening) through immediate, prolonged or repeated contact with the skin or a mucous membrane (e.g., eyes, lungs, etc.).
Mutagen	Muta	A substance that can cause mutations in the genetic material of a cell.
Oxidant	O	A substance that may give rise to a vigorous reaction or explosion when in contact with combustible or flammable substances.
Teratogen	Tera	A substance that can cause defects in the offspring (usually through the placenta after absorption by the mother during pregnancy).
Toxicity		Toxic substances are harmful or may cause death when inhaled, swallowed or absorbed through the skin. These substances may be classified as:
(a) Extremely toxic	T+	A single exposure to the substance may be fatal or cause serious or permanent toxic effects.
(b) Toxic	T	Repeated exposure is needed to cause harm.

## Recommended Suitability with Abbreviations

Table 5 and Table 6 provide a list of chemicals that may be present in secondary schools and has recommendations for their use. These recommendations are based on the lab activities that a teacher may draw on to address the Ontario Science Curriculum. Other factors must also be assessed before using a given chemical, such as the adequacy of the facilities, teacher training, the number of students in the class and maturity of the students. Teachers must always follow their school board's chemical list or safety protocols first before using STAO's recommendations.

In Table 6, chemicals identified as **BANNED** have associated risks that are so great, they outweigh the educational value of using the chemical.

Chemicals identified as **NR** are unsuitable or not generally recommended for use in schools. In some boards, these chemicals may be banned by the employer's local rules.

Chemicals identified as **TU** are for teacher use only or may be used by students after the teacher has adapted them for a student activity. These adaptations may include dilution or reducing the quantity of chemical to be used by the students. This is consistent with the general safety recommendations of using small quantities of chemical, lower concentrations and safer alternative chemicals.

The suitability abbreviation **IntS** indicates that these chemicals may be suitable for use by Grade 9/10 students. The suitability abbreviation **SrS** indicates that these chemicals may be suitable for use by Grade 11/12 students.

After assessing the hazards and risks, teachers should consider their own level of experience and the skill and maturity of their classes when deciding whether or not a chemical is appropriate for their class.

## Restricted Chemicals

The chemicals in Table 5 are seven of the ten chemicals that may be found in schools that are identified as "restricted," according to federal explosives regulations. These regulations restrict the sale, purchase and transport of these substances. The intent of the legislation is to prevent the criminal use of these chemicals and monitor large purchase orders. The procedure for ordering these chemicals may vary, so check with your school board's purchasing department and your supplier for the latest updates.

All of the restricted chemicals in Table 5 are strong oxidants. They typically react vigorously with powdered metals, combustible materials, organic compounds, alkaline solutions and even with some other oxidizers. Store these chemicals with the other oxidizers in the chemical storeroom.

Table 5: Restricted Chemicals

Chemical Name	Hazards	Suitability	Comments
Ammonium Nitrate	Strong oxidant	<b>TU</b>	May self-ignite/detonate when in contact with powdered metals or with some organic compounds such as urea or acetic acid.
Hydrogen peroxide (30%)	Corrosive liquid Strong oxidant	<b>TU</b>	Avoid contact with combustible materials, organic materials, metals, acids, and alkaline solutions. To slow the rate of decomposition, refrigerate and store in a light-resistant container. Splashes will burn and bleach skin. Goggles are essential. Gloves and aprons are recommended. Use small quantities and exercise care.
Nitric Acid (concentrated)	Corrosive liquid Strong oxidant	<b>TU</b> <b>SrS</b> if diluted	Incompatible with alkalis, reducing agents, combustibles and organic acids, e.g., acetic acid. As with all concentrated acids, dilute nitric acid by adding acid to water.
Potassium Chlorate	Strong oxidant	<b>TU</b>	Extremely reactive with reducing agents, combustible materials and organic compounds. Caution: When potassium chlorate is heated in a test tube, it often quickly re-solidifies in the upper part of the test tube, forming a plug. This may result in the test tube bursting.
Potassium nitrate	Strong oxidant	<b>TU</b>	Incompatible with combustible substances. Contact with potassium nitrate results in violent combustion or explosion. Potassium nitrate is hygroscopic, meaning that it absorbs water from its surroundings. Water in the air space may change the normally granular solid into a hard mass on the bottom of the container. As with all of your chemical inventory, order small quantities frequently.
Sodium chlorate	Strong oxidant	<b>TU</b>	Avoid contact with combustible substances. May react quickly causing ignition, violent combustion or explosion.
Sodium nitrate	Strong oxidant	<b>TU</b>	Avoid contact with combustible substances. May react quickly causing ignition, violent combustion or explosion.

## Chemical Hazard and Suitability List

Table 6 provides the hazards, recommended suitability and comments for chemicals that may be found in an Ontario secondary school. This information is based on a review of published SDS data as of January 2020 and the experience of committee members. This data is intended to provide an overview of safety considerations. Teachers are reminded that the SDS and school board-specific protocols must always be consulted prior to using any

chemicals. Specific advice for the preparation of some of the solutions mentioned below are provided in the STAO publication *Laboratory Recipes*.

**Definitions of terms used in table 6:**

- Deliquescent – a deliquescent substance absorbs moisture from the atmosphere and begins to dissolve.
- Hygroscopic - a hygroscopic substance absorbs moisture from its surroundings.

Table 6: Chemical Hazard and Suitability List

Chemical Name	Hazards	Suitability	Comments
<b>Acacia</b> (Gum Arabic)		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Potential allergen.</li> </ul>
<b>Acetic Acid</b> (Ethanoic Acid) Glacial (17.4 mol/L)	<b>C+, F-, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Very corrosive to skin and eyes.</li> <li>• Irritating vapour.</li> <li>• Moderate fire risk. Glacial acetic acid reacts violently with nitric acid, chromium(VI) oxide, peroxides, permanganates and other oxidants.</li> <li>• May sensitize skin, resulting in an allergic response.</li> <li>• Consider purchasing glacial acetic acid in PVC coated safety bottles.</li> <li>• Always use a fume hood when dispensing glacial acetic acid. Protective gloves and eye protection must be worn.</li> </ul>
Solution (< 1.6 mol/L)		<b>IntS</b>	
<b>Acetic Anhydride</b> (Ethanoic Anhydride)	<b>F, C+, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Very reactive and causes severe burns.</li> </ul>
<b>Aceto-Carmine Staining Solution</b> (2% aqueous) (Schneider Stain)	<b>C, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Corrosive to body tissues.</li> <li>• Moderately toxic.</li> </ul>
<b>Acetaminophen</b> (Tylenol)	<b>H</b>	<b>IntS</b>	
<b>Acetone</b> (Propanone)	<b>F+, H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Flammable. Keep away from open flames, sparks and hot surfaces</li> <li>• Avoid contact with strong oxidants or halogenated compounds.</li> <li>• Reacts violently with nitric acid.</li> <li>• All heating must be done on a water bath.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Aceto-Orcein Biological Stain</b> (2% aqueous)	<b>C, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Slightly corrosive to eyes and skin.</li> <li>• Moderately toxic by ingestion.</li> </ul>
<b>Acetyl Chloride</b> (Ethanoyl chloride)	<b>R</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Reacts violently with water, producing phosgene gas. Forms an explosive mixture with air.</li> </ul>
<b>Acetylcholine Chloride Solution</b> (0.01% aqueous)		<b>IntS</b>	

Chemical Name	Hazards	Suitability	Comments
<b>Acetylene</b> , gas cylinder (Ethyne)	<b>G, F+</b>	<b>NR</b>	<ul style="list-style-type: none"> <li>The use of acetylene cylinders is NOT recommended for use in science departments.</li> <li>Generating acetylene with calcium carbide is acceptable for senior students.</li> </ul>
<b>Acetylsalicylic Acid</b> (Aspirin)	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin and eye irritation.</li> </ul>
<b>Acridine Orange</b> , powder	<b>T, Muta</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Suspected mutagen.</li> <li>Recommend purchase of less hazardous 1% solution.</li> </ul>
1% aqueous solution	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Skin irritant. Wear protective gloves.</li> </ul>
<b>Adenosine Triphosphate, Disodium Salt</b>		<b>IntS</b>	
<b>Adipic Acid</b> (Hexanedioic Acid)	<b>F, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Combustible.</li> <li>Can cause eye irritation.</li> <li>Store in a dedicated acids cabinet away from water.</li> <li>Short shelf life.</li> </ul>
<b>Adipoyl Chloride/hexane solution</b> (Hexanedioyl Chloride)	<b>T+, C, F+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Offensive odour.</li> <li>Aspiration hazard.</li> <li>Reproductive toxicity.</li> <li>May cause organ damage.</li> <li>Can cause severe skin burns and eye damage.</li> <li>Highly flammable liquid and vapour. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Short shelf life.</li> <li>Store in a dedicated flammables cabinet.</li> <li>Use only in a fume hood.</li> <li>Used for the synthesis of nylon.</li> </ul>
<b>Adrenaline</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion.</li> <li>Short shelf life.</li> <li>Can cause skin and eye irritation.</li> </ul>
<b>Adrenaline Chloride</b> , (0.1% aqueous solution)	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion.</li> <li>Short shelf life</li> <li>Can cause skin and eye irritation.</li> </ul>
<b>Agar</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>See the STAO publication <i>Laboratory Recipes</i> for advice on the preparation of agar solutions.</li> </ul>
<b>Agarose</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Moisture sensitive. Store in a cool, dry place.</li> </ul>
<b>Alanine</b>		<b>IntS</b>	
<b>Albumin Egg</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Short shelf life.</li> </ul>
<b>Alizarin Red</b> , Solid	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin and serious eye damage.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Alizarin Yellow</b> , Solid		<b>IntS</b>	
<b>Alka-Seltzer Tablets</b>		<b>IntS</b>	
<b>Alum</b> (Aluminum Potassium Sulfate)		<b>IntS</b>	
<b>Aluminon</b> (Aurin Tricarboxylic Acid)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye damage.</li> </ul>
<b>Aluminum</b> , mesh/strip/foil/shot		<b>IntS</b>	
<b>Aluminum Ammonium Sulfate</b>			See <b>Ammonium Alum</b> .
<b>Aluminum Chloride</b> Hydrated	<b>Ir, H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye damage.</li> <li>• Slightly toxic by ingestion.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Aluminum Hydroxide</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Aluminum Oxide</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Body tissue irritant.</li> <li>• Avoid inhalation of dust.</li> </ul>
<b>Aluminum Phosphate</b>	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Solutions are slightly corrosive.</li> <li>• Can cause skin and serious eye damage.</li> </ul>
<b>Aluminum Potassium Sulfate</b>			See <b>Alum</b> .
<b>Aluminum Sulfate</b>	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious eye damage or irritation.</li> </ul>
<b>Aminoacetic Acid</b>			See <b>Glycine</b> .
<b>Ammonia (aq)</b> (Ammonium Hydroxide) Concentrated (14.8 mol/L) Solution  ( $< 2.0$ mol/L)	<b>C, E</b>          <b>Ir</b>	<b>TU</b>          <b>IntS</b>	<ul style="list-style-type: none"> <li>• Both liquid and vapour are extremely irritating – especially to the eyes and respiratory tract.</li> <li>• Dispense in a fume hood.</li> <li>• Beware of release of gas when opening bottle.</li> <li>• Consider purchasing in PVC-coated safety bottle.</li> <li>• Can cause severe skin and eye damage.</li> <li>• Store in a dedicated base cabinet.</li> <li>• Both liquid and vapour are extremely irritating – especially to the eyes and respiratory tract.</li> <li>• Use in a fume hood.</li> <li>• Can cause severe skin and eye damage.</li> <li>• See STAO publication <i>Laboratory Recipes</i> for advice on preparing ammonia solutions.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Ammonium Acetate</b> (Ammonium Ethanoate)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> <li>• Short shelf life because the solid is deliquescent.</li> </ul>
<b>Ammonium Alum</b> (Aluminum Ammonium Sulfate)	<b>Ir, T</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Ammonium Bicarbonate</b> (Ammonium Hydrogen Carbonate)		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Creates irritating fumes when heated.</li> </ul>
<b>Ammonium Bromide</b>	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation.</li> <li>• Short shelf life.</li> <li>• Moderately toxic by ingestion and inhalation.</li> </ul>
<b>Ammonium Carbonate</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin, eye and respiratory tract irritation.</li> </ul>
<b>Ammonium Chloride</b> (Sal Ammoniac)	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> <li>• Fumes given off when heated are irritating to the eyes.</li> <li>• Avoid inhaling dust.</li> <li>• Organ toxicity.</li> </ul>
<b>Ammonium Citrate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> <li>• Fumes given off when heated are irritating to the eyes.</li> <li>• Avoid inhaling dust.</li> <li>• Organ toxicity.</li> </ul>
<b>Ammonium Ethanedioate</b>			See <b>Ammonium Oxalate</b> .
<b>Ammonium Ferrous Sulfate</b>			See <b>Iron(II) Ammonium Sulfate</b> .
<b>Ammonium Hydrogen Carbonate</b>			See <b>Ammonium Bicarbonate</b> .
<b>Ammonium Hydrogen Phosphate</b>			See <b>Ammonium Phosphate, Dibasic</b> .
<b>Ammonium Hydroxide</b>			See <b>Ammonia (aq)</b> .
<b>Ammonium Molybdate</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause irritation to skin, eye and respiratory tract.</li> <li>• Moderately toxic by ingestion.</li> </ul>
<b>Ammonium Nitrate</b>	<b>O, H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• May explode if heated.</li> <li>• Explodes readily if contaminated with combustible material.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Can cause skin irritation and serious eye damage.</li> </ul>
<b>Ammonium Oxalate</b>	<b>C, T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion and inhalation.</li> <li>• Slightly corrosive to body tissue.</li> <li>• Can cause skin irritation and serious eye damage.</li> </ul>
<b>Ammonium Phosphate, Dibasic (Ammonium Hydrogen Phosphate)</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can irritation to skin, eyes and respiratory tract.</li> </ul>
<b>Ammonium Sulfate</b>	<b>T</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> </ul>
<b>Ammonium Sulfide Solution</b>	<b>C, E</b>	<b>NR</b>	<ul style="list-style-type: none"> <li>• Reacts with acid to produce toxic hydrogen sulfide gas.</li> <li>• Strong irritant to skin and mucous membranes.</li> <li>• Harmful vapour.</li> <li>• Can cause severe skin and eye damage.</li> </ul>
<b>Ammonium Thiocyanate</b>	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion.</li> <li>• Do not react with concentrated sulfuric acid or heat with dilute acids because fumes containing toxic HCN may be produced.</li> <li>• Use only in solution as a test for <math>\text{Fe}^{3+}(\text{aq})</math>.</li> </ul>
<b>Amyl Acetate (Pentyl Ethanoate)</b>	<b>T, F</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Flammable liquid and vapour. Keep away from heat, open flames, sparks and hot surfaces.</li> <li>• Can cause skin and serious eye irritation.</li> <li>• May cause liver damage and nervous system depression.</li> <li>• Banana-like odour.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>n-Amyl Alcohol</b>	<b>F-, T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Moderate fire risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Slightly toxic by ingestion and inhalation.</li> <li>• Can cause skin and serious eye irritation.</li> <li>• May irritate respiratory tract.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Amylase</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Respiratory sensitization.</li> <li>• Minimize dust.</li> </ul>
<b>Ascorbic Acid (Vitamin C)</b>		<b>IntS</b>	
<b>Aspartic Acid</b>		<b>IntS</b>	
<b>Azo dyes, Solid</b>		<b>TU</b>	<ul style="list-style-type: none"> <li>• Used to prepare solutions of indicators, stains etc.</li> <li>• Weighing of powders should be done in a fume hood.</li> </ul>



Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Water soluble methyl orange and sulfonated azo dyes are generally safe.</li> <li>Many others are suspected carcinogens. Some may be harmful. For full details consult supplier's SDS.</li> </ul>
<b>Baking Soda</b>			See <b>Sodium Bicarbonate</b> .
<b>Barium Chloride</b> , Solid	<b>T+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Highly toxic if ingested. Avoid breathing dust.</li> </ul>
Solutions	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic if ingested.</li> <li>Use 0.1 mol/L solution for identifying sulfates.</li> </ul>
<b>Barium Hydroxide</b> , Solid	<b>T, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic if ingested.</li> <li>Can cause severe skin and eye damage.</li> <li>Poor shelf life. Absorbs carbon dioxide from air.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
0.1 mol/L Solution	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic if ingested.</li> <li>Can cause serious skin and eye damage.</li> </ul>
<b>Barium Nitrate</b> , Solid	<b>O, T, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>May explode if heated.</li> <li>Strong oxidant. Keep away from combustibles.</li> <li>Can cause skin irritation and serious eye damage.</li> <li>Toxic if ingested.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
Solutions (< 1 mol/L)	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic if ingested.</li> <li>Can cause skin irritation and serious eye damage.</li> </ul>
<b>Barium Sulfate</b>		<b>SrS</b>	<ul style="list-style-type: none"> <li>The dust may present a hazard.</li> <li></li> </ul>
<b>Benedict's Solution/Reagent</b>	<b>Ir, E</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause eye irritation.</li> <li>This is an alternative to Fehling's solution when testing for reducing sugars.</li> <li>Once prepared it has a short shelf life. Two-part Fehling's solution can last for years.</li> <li>See the STAO publication <i>Laboratory Recipes</i> for advice on the preparation of this reagent.</li> </ul>
<b>Benzaldehyde</b>	<b>T, Ir, F-</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by inhalation or ingestion.</li> <li>Irritating vapour with almond-like odour.</li> <li>Use small quantities in a well-ventilated laboratory or fume hood.</li> <li>Light sensitive.</li> <li>Combustible. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Benzoic Acid</b>	<b>Ir, T, F</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Body tissue irritant.</li> <li>• Slightly toxic by ingestion.</li> <li>• Combustible. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Can cause respiratory irritation and serious eye irritation.</li> <li>• Use in a well-ventilated area.</li> </ul>
<b>Benzyl Alcohol</b>	<b>H, Ir, F</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• An alcohol of low volatility and flammability.</li> <li>• Reacts violently with strong oxidants.</li> <li>• May form explosive peroxides over time.</li> <li>• May cause allergic skin response.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Bile Salts</b>		<b>SrS</b>	
<b>Biological Stains</b>		<b>TU</b>	<ul style="list-style-type: none"> <li>• Many are harmful. For full details consult supplier's SDS.</li> <li>• Solutions should be prepared by teacher. Use a fume hood when working with powders to prepare solutions.</li> <li>• Some solutions are flammable because their solvent is an alcohol.</li> <li>• Treat old solutions as hazardous.</li> </ul>
<b>Bismuth Chloride</b>	<b>H, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Corrosive dust.</li> <li>• Short shelf life because it is deliquescent.</li> <li>• Can cause severe burns to skin and eye damage.</li> </ul>
<b>Biuret's Solution</b>	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation because it contains NaOH.</li> <li>• See the STAO publication <i>Laboratory Recipes</i> for advice on the preparation of this reagent.</li> </ul>
<b>Bleach</b>			See <b>Sodium Hypochlorite</b> .
<b>Bleaching Powder</b>			See <b>Calcium Hypochlorite</b> .
<b>Borealine II</b>	<b>H, Ir, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Used as a holding solution for preserved specimens.</li> <li>• Skin sensitizer.</li> <li>• Eye irritant.</li> <li>• Aquatic toxicity.</li> </ul>
<b>Boric Acid</b>	<b>T, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> <li>• Reproductive toxicity. May damage fertility or the unborn child.</li> <li>• Used to make boric acid/borax buffer.</li> </ul>
<b>Borax</b>	<b>H</b>		See <b>Sodium Borate</b> .

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Commonly used in slime-making activities. Health Canada cautions that teachers be vigilant to ensure students do not ingest borax during these activities.</li> </ul>
<b>Brass</b> shot or strips (Copper – Zinc Alloy)		<b>IntS</b>	
<b>Brilliant Green</b>	<b>T, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion.</li> <li>Eye irritant.</li> </ul>
<b>Bromine</b> , liquid	<b>T+, O, R, C</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Very hazardous, highly toxic and extremely corrosive.</li> </ul>
<b>Bromine</b> , water (3% aqueous solution)	<b>T, C, E</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion and inhalation.</li> <li>Can cause severe skin burns and eye damage.</li> <li>Acute hazard to the aquatic environment.</li> <li>Use on a small scale.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Store in a cool, well-ventilated area.</li> <li>See STAO publication <i>Laboratory Recipes</i> for advice on preparing bromine water.</li> </ul>
<b>Bromocresol Green</b> , Solid 0.04% Solution		<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>Store in a tightly sealed container.</li> </ul>
<b>Bromocresol Purple</b> , Solid  0.04% Solution	<b>Ir</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin, respiratory tract and serious eye irritation.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Store in a tightly sealed container.</li> </ul>
<b>Bromophenol Blue</b> , Solid 0.04% Solution		<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>Store in a tightly sealed container.</li> </ul>
<b>Bromothymol Blue</b> , Solid 0.04% Solution		<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>Store in a tightly sealed container.</li> </ul>
<b>Buffer Solutions</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>The STAO publication <i>Laboratory Recipes</i> provides advice on the preparation of buffer solutions.</li> </ul>
<b>Butane</b>	<b>G, F+</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>The use of butane cylinders is NOT recommended. However, gas cigarette lighters are a useful source of the gas collected by the downward displacement of water (e.g., determining molar mass), provided they are used only under close supervision. Butane collected in this manner should be collected and released in a fume hood.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Overheated butane lighters can explode.</li> </ul>
<b>Butanoic Acid</b> (Butyric Acid)	<b>C, F</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Very unpleasant smell.</li> <li>Flammable liquid. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Can cause severe skin burns and eye damage.</li> <li>Used to produce esters.</li> <li>Use only in a fume hood.</li> </ul>
<b>n-Butanol</b>	<b>F, T, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by inhalation and ingestion.</li> <li>Moderate fire risk.</li> <li>Can cause serious eye damage and possible organ toxicity.</li> <li>Heat only in a water bath.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Butanone</b> (Ethyl Methyl Ketone)	<b>F+, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Serious fire risk.</li> <li>Keep away from open flames, sparks and hot surfaces.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Butyric Acid</b>			See <b>Butanoic Acid</b> .
<b>Cadmium compounds</b>	<b>T, E, Carc</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Most are either known or suspected carcinogens.</li> </ul>
<b>Caffeine</b>	<b>T+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic if swallowed.</li> </ul>
<b>Calcium</b> , turnings	<b>F, R</b>		<ul style="list-style-type: none"> <li>Flammable in finely divided form.</li> <li>Reacts with water to produce flammable hydrogen gas.</li> <li>Avoid contact with oxidants.</li> </ul>
<b>Calcium Acetate</b>		<b>IntS</b>	
<b>Calcium Carbide</b> , lump	<b>F, R, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Corrosive to skin and eyes.</li> <li>Reacts with water to produce flammable ethyne (acetylene) gas.</li> <li>Collect ethyne in a well-ventilated area like a fume hood.</li> <li>Generate small quantities of ethyne (acetylene).</li> <li>Store in a cool, dry place.</li> </ul>
<b>Calcium Carbonate</b> (Limestone/Marble Chips/Natural Chalk)		<b>IntS</b>	
<b>Calcium Chloride</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Eye irritant.</li> <li>Short shelf life because it is hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Calcium Fluoride</b> (Fluorspar)	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic.</li> <li>Skin irritant.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Use in a fume hood or well-ventilated area.</li> </ul>
<b>Calcium Hydroxide</b> (Slaked Lime)	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Skin irritant.</li> <li>Can cause serious eye damage. Eye protection is essential.</li> <li>Avoid dust inhalation.</li> <li>See the STAO publication <i>Laboratory Recipes</i> for advice on the preparation of limewater.</li> <li>Use in a fume hood or well-ventilated area.</li> </ul>
<b>Calcium Hypochlorite</b> (Bleaching Powder)	<b>O, C, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious burns to skin and eye damage.</li> <li>Fire risk when in contact with organic substances.</li> <li>Reacts with acids to release toxic chlorine gas.</li> </ul>
<b>Calcium Nitrate</b>	<b>O, H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant.</li> <li>Potential fire risk when in contact with organic material.</li> <li>May explode if shocked or heated.</li> </ul>
<b>Calcium Oxide</b> , powder (Quicklime)	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Reaction with water evolves heat.</li> <li>A lump may disintegrate violently when water is added.</li> <li>Avoid contact with organic material.</li> <li>Eye protection is essential.</li> <li>Sensitive to moisture. Store in a cool, dry place.</li> </ul>
<b>Calcium Phosphate</b> (mono, di, tri, -basic)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> </ul>
<b>Calcium Sulfate Dihydrate</b> (Gypsum/Drierite)		<b>IntS</b>	
<b>Carbon</b>			See <b>Charcoal</b> and <b>Graphite</b> .
<b>Carbon Dioxide</b> , Solid (Dry Ice)	<b>H</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Tongs and protective gloves are essential when handling dry ice.</li> </ul>
<b>Carborundum Powder</b> (Silicon Carbide)		<b>IntS</b>	
<b>Carmine Stain</b>		<b>IntS</b>	
<b>Carnauba Wax</b>		<b>IntS</b>	
<b>Catalase</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Poor shelf life.</li> <li>Keep refrigerated.</li> </ul>
<b>Cellulose</b> , powder		<b>IntS</b>	
<b>Charcoal</b> , all types	<b>F</b>	<b>IntS</b>	

Chemical Name	Hazards	Suitability	Comments
<b>Chlorine</b> , Water (saturated aqueous solution)	<b>O, T, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Strong pungent odour.</li> <li>• Use small quantities.</li> <li>• Use only in a fume hood or well-ventilated area.</li> <li>• See STAO publication <i>Laboratory Recipes</i> for advice on preparing chlorine water.</li> </ul>
<b>Chlorophenol Red</b> , indicator solution (0.4%)		<b>IntS</b>	
<b>Chromatography Ink</b>		<b>IntS</b>	
<b>Chromium Metal</b> , fused pieces or chunks	<b>E, NR</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Toxic to aquatic life.</li> </ul>
<b>Chromium(III) Compounds</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Use microscale amounts.</li> <li>• Skin and eye irritant.</li> </ul>
<b>Chromium(VI) Compounds</b>	<b>Carc, T</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Many are known carcinogens.</li> </ul>
<b>Chromium Potassium Sulfate</b> (Chrome Alum)	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Use microscale amounts.</li> <li>• Skin and eye irritant.</li> </ul>
<b>Citric Acid</b>	<b>Ir</b>	<b>IntS</b>	
<b>Clinitest</b> , (tablets & strips)		<b>IntS</b>	
<b>Cobalt Metal</b> , pellets/shot		<b>TU</b>	<ul style="list-style-type: none"> <li>• Keep as display sample only.</li> </ul>
<b>Cobalt(II) Acetate</b> , Solid	<b>H, E, Carc</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Possible carcinogen by ingestion.</li> <li>• Use microscale amounts.</li> <li>• Banned by some school boards.</li> </ul>
<b>Cobalt(II) Chloride</b> , Solid	<b>T, E, Carc</b> <b>H,</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Solid is a skin and respiratory sensitizer. Avoid skin contact. Use of tweezers is recommended.</li> <li>• Suspected carcinogen by inhalation.</li> <li>• Banned by some school boards.</li> </ul>
Solution (< 0.1 mol/L)	<b>H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Banned by some school boards.</li> </ul>
Test Strips		<b>IntS</b>	
<b>Cobalt(II) Nitrate</b> , crystals	<b>O, T, E,</b> <b>Carc</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Oxidant. Fire risk when in contact with organic material.</li> <li>• Possible carcinogen.</li> <li>• Banned by some school boards.</li> </ul>
Solution (<0.1 mol/L)	<b>Carc</b>	<b>SrS</b>	
<b>Cobalt(II) Sulfate</b> , Crystals	<b>Ir, T, E,</b> <b>Carc</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Eye, skin and respiratory irritant.</li> <li>• Possible carcinogen by inhalation or ingestion.</li> <li>• Banned by some school boards.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
Solution (<0.1 mol/L)	<b>H, Carc</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Banned by some school boards.</li> </ul>
<b>Copper</b> , sheet/foil/strip/shot		<b>IntS</b>	
<b>Copper compounds</b> , Solid	<b>H, E</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>There is a danger that the hazards of these substances can be underestimated because they are so commonly used.</li> </ul>
Solutions (<0.1 mol/L)		<b>IntS</b>	
<b>Cream of Tartar</b>			See <b>Potassium Bitartrate</b> .
<b>Crystal Violet</b> , Solid	<b>Ir, T, F</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Moderately toxic by ingestion.</li> <li>Body tissue irritant.</li> <li>Keep away from open flames, sparks and hot surfaces</li> </ul>
<b>Cyclohexane</b>	<b>F+, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Serious fire risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Aspiration hazard.</li> <li>May cause skin irritation.</li> <li>Narcotic effects. May cause drowsiness. Use small quantities in well-ventilated area, preferably a fume hood.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Cyclohexanol</b>	<b>F, T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Combustible.</li> <li>Can cause skin and eye irritation.</li> <li>Toxic by skin absorption, ingestion and inhalation.</li> <li>May form explosive peroxides. Commercial product contains peroxidation inhibitors.</li> <li>Avoid prolonged storage.</li> <li>Hygroscopic. Keep container tightly sealed.</li> <li>Store in a dedicated flammables cabinet.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Cyclohexene</b>	<b>F+, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Serious fire risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Offensive odour.</li> <li>May form unstable peroxides if stored over a long period.</li> <li>Use small quantities in well-ventilated area, preferably a fume hood.</li> <li>Slightly toxic by ingestion and inhalation.</li> <li>Store in a dedicated flammables cabinet.</li> <li>Used to demonstrate unsaturated bonds in organic compounds. Olive oil is a safer alternative.</li> </ul>
<b>Detain</b> (Quieting Solution)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Short shelf life.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Dextrose</b> (Glucose)		<b>IntS</b>	
<b>Diastase of Malt</b>			See <b>Amylase</b> .
<b>Diatomaceous Earth</b>		<b>IntS</b>	
<b>1,4-Dichlorobenzene</b> (p-Dichlorobenzene)	<b>Ir, Carc, E</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Severe irritant.</li> <li>Possible carcinogen.</li> <li>Stearic acid is a safer alternative for melting point determination.</li> </ul>
<b>EDTA</b> (Ethylenediaminetetraacetic Acid Disodium Salt), Solid 0.1 mol/L Solution	<b>T, Ir</b>	<b>IntS</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion.</li> <li>Can cause serious eye irritation.</li> </ul>
<b>Eosin Y</b> , Solid Aqueous Solution (0.2%) Alcoholic Solution (1%)	<b>Ir</b>  <b>F</b>	<b>TU</b> <b>IntS</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Serious eye irritant.</li> <li>Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
<b>Epinephrine</b>			See <b>Adrenalin</b> .
<b>Epsom Salts</b>			See <b>Magnesium Sulfate</b> .
<b>Ethanedioic Acid</b>			See <b>Oxalic Acid</b> .
<b>Ethenediol</b>			See <b>Ethylene Glycol</b> .
<b>Ethanoic Acid</b>			See <b>Acetic Acid</b> .
<b>Ethanoic Anhydride</b>			See <b>Acetic Anhydride</b> .
<b>Ethanol denatured</b> (Ethyl Alcohol)	<b>F+, T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Serious fire risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Skin and eye irritant.</li> <li>Contains highly toxic methanol as an added impurity.</li> <li>Large volumes should be handled in a fume hood.</li> <li>Heat only in a water bath.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Ethyl Acetate</b> (Ethyl Ethanoate)	<b>F+, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause serious eye irritation.</li> <li>Highly flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Used as an alternative to acetone (propanone) in experiments involving the measurement of the strength of hydrogen bonds.</li> <li>Store in a dedicated flammables cabinet.</li> <li>Used for chlorophyll extraction.</li> </ul>



Chemical Name	Hazards	Suitability	Comments
<b>Ethylbenzene</b>	<b>Ir, F T+</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Irritating to eyes, skin and mucous membranes.</li> <li>• Narcotic in high concentrations.</li> <li>• Aspiration toxicity.</li> </ul>
<b>Ethylene Glycol</b> (Ethanediol)	<b>T</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Very toxic by ingestion.</li> <li>• Toxic by skin absorption and inhalation.</li> <li>• Use in a well-ventilated area.</li> </ul>
<b>Ethyl Methyl Ketone</b>			See <b>Butanone</b> .
<b>Ethyne</b>			See <b>Acetylene</b> .
<b>Fast Green</b> Solid	<b>H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Use to stain tissue cell samples.</li> <li>• Slightly toxic by ingestion.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
Solution	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Contains fast green, water and acetic acid.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Fehling's Solution A, B</b>	<b>C, H, E, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Solution A contains copper(II) sulfate.</li> <li>• Solution B is caustic because it contains sodium hydroxide.</li> <li>• Both solutions A and B can cause serious skin and eye damage.</li> <li>• Use as an alternative to Benedict's solution as a semi-quantitative test for reducing sugars.</li> <li>• The 2-part solution has a long shelf life.</li> </ul>
<b>Fixatives</b> , biological		<b>TU</b>	<ul style="list-style-type: none"> <li>• Many are harmful. For full details consult supplier's SDS.</li> <li>• Solutions should be prepared by teacher. Use a fume hood when working with powders to prepare solutions</li> <li>• Some solutions are flammable if they are prepared with alcohols.</li> <li>• Care needs to be taken with old samples especially if their exact composition is unknown.</li> </ul>
<b>Fluorescein</b>		<b>SrS</b>	<ul style="list-style-type: none"> <li>• Fluorescent dye/indicator.</li> </ul>
<b>Formic Acid</b> (Methanoic Acid)	<b>C, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> <li>• Reacts violently with bases.</li> <li>• Over time formic acid decomposes into carbon monoxide and water which may cause its container to explode, particularly if it is tightly sealed.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Store in a dedicated acid cabinet away from any source of moisture.</li> </ul>
<b>Fructose</b>		<b>IntS</b>	
<b>Fuchsin Acid, Solid</b> 1% Aqueous Solution	<b>Ir</b>	<b>TU</b> <b>SrS</b>	<ul style="list-style-type: none"> <li>Biological stain/indicator.</li> <li>Can cause serious skin and eye damage.</li> </ul>
<b>Fumaric Acid</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> </ul>
<b>Galactose</b>		<b>IntS</b>	
<b>Gasoline</b>	<b>F, T</b>	<b>BANNED</b>	
<b>Gentian Violet</b>			See <b>Crystal Violet</b> .
<b>Gibberellic Acid, Solid</b>  Alcoholic Solution	<b>F</b>  <b>F</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Used as a plant growth hormone.</li> <li>Solutions have very short shelf life. Avoid storing for longer than a few days.</li> <li>Flammable because it contains an alcohol.</li> </ul>
<b>Glass Wool</b>	<b>Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Wear protective gloves.</li> </ul>
<b>Glucose (Dextrose)</b>		<b>IntS</b>	
<b>Glycerol (Glycerin, 1,2,3-Propanetriol)</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Some people are allergic to glycerol and may experience irritation to their skin and eyes.</li> <li>Contact with strong oxidants may cause fire or explosion.</li> </ul>
<b>Glycine (Aminoacetic acid)</b>	<b>Ir</b>	<b>SrS</b>	
<b>Graphite</b>	<b>F-</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Fire risk as a fine powder.</li> </ul>
<b>Gypsum</b>			See <b>Calcium Sulfate Dihydrate</b> .
<b>Helium, Q sized gas cylinder</b>	<b>G</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Teachers should discourage students from inhaling helium to change sound of voice.</li> <li>The use of all lecture-sized cylinders is discouraged because they are difficult to get refilled.</li> </ul>
<b>Hexamethylenediamine (Hexane-1,6-Diamine), Solid</b>	<b>C, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Use to make nylon.</li> <li>Carry out "Nylon Rope" demonstration in a fume hood.</li> <li>Moderately toxic by ingestion.</li> </ul>
<b>Hexanes</b>	<b>F+, T, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Serious fire risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Toxic by inhalation. Use on a small scale (1 mL or less) in a well-ventilated laboratory or fume hood.</li> <li>• Aspiration hazard.</li> <li>• Suspected of damaging fertility.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Hexanedioyl Chloride</b>			See <b>Adipoyl Chloride</b> .
<b>Hydrochloric Acid</b> (Muriatic Acid) Concentrated (12 mol/L) Solutions (< 6.0 mol/L)	<b>C+, T+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> <li>• Purchase HCl in PVC coated safety bottles.</li> <li>• Use a fume hood when dispensing or preparing dilute solutions.</li> <li>• Do not inhale vapours or mist.</li> <li>• Take extra care when opening bottles of concentrated acid on a hot day. Hydrochloric acid fumes readily, particularly when warm. These fumes are most responsible for some of the corrosion damage in chemical storage cabinets.</li> <li>• Store in a dedicated acid cabinet away from any source of moisture.</li> </ul>
Solutions (< 2.0 mol/L)	<b>Ir</b>	<b>SrS, IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage</li> </ul>
<b>Hydrogen</b> , Q sized gas cylinder	<b>G, F+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Severe fire hazard.</li> <li>• The use of lecture-sized cylinders is discouraged because they are difficult to get refilled.</li> </ul>
<b>Hydrogen Peroxide</b> 30% Solution	<b>C, O Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Severely corrosive to skin, eyes and respiratory tract.</li> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• An explosion risk if heated.</li> <li>• Shelf life can be extended by storing in a refrigerator.</li> <li>• Requires special handling and storage attention.</li> <li>• Store in a dark, vented container.</li> </ul>
6% Solution		<b>SrS</b>	<ul style="list-style-type: none"> <li>• 6% solution is an oxidizer and a skin and eye irritant.</li> </ul>
3% Solution		<b>IntS</b>	
<b>Iodoform</b> (Triiodomethane)	<b>H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Use on a small scale (1 mL or less).</li> <li>• Use only in a fume hood.</li> <li>• Store in a well-ventilated area.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>INDICATORS</b> , acid/base Solids  Solutions		<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Many indicator solutions are made by dissolving a dye in ethanol, which is flammable.</li> <li>The STAO publication <i>Laboratory Recipes</i> provides advice on the preparation of the acid/base indicator solutions commonly found in schools.</li> </ul>
<b>Indigo Carmine</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Indicator and stain.</li> <li>Slightly toxic by ingestion.</li> </ul>
<b>Indole-3-Acetic Acid</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Used a 1.0 – 10.0 mg/L solution as a plant growth hormone.</li> <li>Light sensitive. Store in a dark bottle in a cool, dark place.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Indophenol Indicator</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Short shelf life.</li> <li>Used as a 0.025% solution for Vitamin C determination.</li> </ul>
<b>Iodine</b> , Solid          Aqueous Solution (< 0.1 mol/L)	<b>R, T, Ir, E</b>          <b>Ir</b>	<b>TU</b>          <b>IntS</b>	<ul style="list-style-type: none"> <li>Reacts vigorously with reducing agents.</li> <li>Can cause serious irritation of skin and eyes.</li> <li>Readily sublimates. Store away from heat and light. Corrodes metal shelving. Stains wooden shelving.</li> <li>Sometimes used to demonstrate sublimation. Use only a few iodine crystals and a long test tube with a loose plug of cotton wool in the mouth. Discontinue heating as soon as some iodine crystals have sublimed near the mouth of the tube.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Can cause serious irritation of skin and eyes.</li> <li>See STAO publication <i>Laboratory Recipes</i> for advice on preparing iodine solutions. Store away from heat and light.</li> </ul>
Tincture of Iodine	<b>Ir, F</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> <li>Flammable because it contains ethanol. Keep away from sources of heat, open flames, sparks and hot surfaces. Store away from heat and light.</li> </ul>
<b>Iron Metal</b> , sheet/strips/wire/filings		<b>IntS</b>	

Chemical Name	Hazards	Suitability	Comments
<b>IRON COMPOUNDS</b> , Solids Solutions (< 1.0 mol/L)	<b>H, Ir</b> <b>Ir</b>	<b>IntS</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>Harmful if ingested.</li> </ul>
<b>Iron(II) Ammonium Sulfate</b> (Ferrous Ammonium Sulfate/Mohr's Salt)	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> <li>Short shelf life.</li> <li>Deliquescent.</li> </ul>
<b>Iron(II) Chloride</b> (Ferrous Chloride)	<b>H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> <li>Short shelf life. Substance is deliquescent and easily oxidized.</li> </ul>
<b>Iron(III) Nitrate</b> (Ferric Nitrate)	<b>O, H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Avoid contact with combustible material.</li> <li>Use only in a well-ventilated area.</li> </ul>
<b>Iron(II) Sulfate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> <li>Solutions have a very short shelf-life.</li> </ul>
<b>Isoamyl Alcohol</b>			See <b>Isopentyl Alcohol</b> .
<b>Isobutyl Alcohol</b> (2-methyl-1-propanol)	<b>H, F, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause irritation of skin and eyes.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Isopentyl Alcohol</b> (Isoamyl Alcohol, 3-methyl-1-butanol)	<b>H, F-</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by ingestion.</li> <li>Moderate fire risk.</li> <li>May form explosive peroxides in storage.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Store in a dedicated flammables cabinet.</li> </ul>
<b>Isopropanol</b>			See <b>2-propanol</b> .
<b>Kaolin</b> (China Clay)		<b>IntS</b>	
<b>Kerosene</b> , odourless	<b>F, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Moderate fire risk.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Store in a dedicated flammables cabinet.</li> <li>Aspiration hazard.</li> </ul>
<b>Kinetin</b>	<b>Muta</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Possible mutagen.</li> <li>Use 0.1 – 5 mg/L solution as a plant growth promoter.</li> </ul>
<b>Lactic Acid</b>	<b>C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Lactose</b>		<b>IntS</b>	
<b>Lanolin</b>		<b>IntS</b>	
<b>Lauric Acid</b> (Dodecanoic Acid)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious irritation of skin and eyes.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Lead Metal, sheet/foil/strips/</b> or shot	<b>Carc,</b> <b>Tera, T, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Possible carcinogen.</li> <li>• Reproductive toxicity.</li> <li>• May cause organ damage.</li> <li>• Wear gloves when handling.</li> <li>• Use fume hood when handling powders or dust.</li> </ul>
<b>LEAD COMPOUNDS, in general</b>	<b>Carc,</b> <b>Tera, T, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause serious irritation of skin and eyes.</li> <li>• Possible carcinogen.</li> <li>• Reproductive toxicity.</li> <li>• May cause organ damage.</li> <li>• Wear gloves when handling.</li> <li>• Use fume hood when handling powders or dust.</li> <li>• Avoid inhaling aerosol of any lead compounds, e.g., when dissolving a carbonate in dilute acid, cover with a watch glass or carry out in a fume hood.</li> <li>• Use only on a small scale.</li> </ul>
<b>Lead(II) Acetate, Solid</b>	<b>Carc,</b> <b>Tera, T, E</b>	<b>TU</b>	See <b>Lead Compounds.</b>
<b>Lead(II) Nitrate, Solid</b>	<b>Carc,</b> <b>Tera, T, E,</b> <b>O</b>	<b>TU</b>	See <b>Lead Compounds.</b> <ul style="list-style-type: none"> <li>• Oxidant. Keep away from combustible materials.</li> </ul>
Solution (< 0.2 mol/L)	<b>Carc,</b> <b>Tera, T, E</b>	<b>SrS</b>	See <b>Lead Compounds.</b>
<b>Lipase</b>		<b>IntS</b>	
<b>Limewater</b> (Calcium Hydroxide Solution)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause mild skin irritation.</li> <li>• Eye protection is essential.</li> <li>• Absorbs carbon dioxide from the air. Store in a well-sealed container.</li> <li>• The STAO publication <i>Laboratory Recipes</i> provides advice on the preparation of limewater.</li> </ul>
<b>Lithium Metal</b>	<b>R, F, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Water-reactive.</li> <li>• Flammable solid.</li> <li>• Requires Class D extinguisher or bucket of sand to extinguish flames.</li> <li>• Corrosive to skin, eyes and respiratory tract.</li> <li>• Must be stored under a dry oil, like mineral oil.</li> <li>• Good shelf life if stored properly.</li> <li>• Use only a small piece when demonstrating its reaction with water.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Lithium Carbonate</b>	<b>C, H, Tera</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Possible teratogen.</li> <li>• Strong base when dissolved in water.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Slightly toxic by ingestion.</li> </ul>
<b>Lithium Chloride</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion.</li> <li>• Can cause serious skin and eye damage.</li> <li>• The solid has a short shelf life because it is deliquescent.</li> <li>• Used for flame tests.</li> </ul>
<b>Lithium Hydroxide</b>	<b>C, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Strong base. Can cause severe damage to eyes, skin and respiratory tract.</li> <li>• Short shelf life because it is hygroscopic. Keep container tightly sealed.</li> <li>• Store in a cool, dry place in a well-sealed container.</li> </ul>
<b>Lithium Nitrate</b>	<b>O, H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Risk of explosion when shocked or heated.</li> <li>• Short shelf life because it is deliquescent.</li> <li>• Can cause serious skin and eye damage.</li> </ul>
<b>Lithium Sulfate</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> </ul>
<b>Litmus, solid/solution/test papers</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Paper strips are moisture sensitive. Store in a cool, dry place.</li> </ul>
<b>Luminol</b>	<b>Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation.</li> <li>• Used to demonstrate chemiluminescence.</li> </ul>
<b>Lugol's Solution</b>			See <b>Iodine (aqueous solution)</b> .
<b>Lycopodium powder</b>	<b>F+, H</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Highly flammable powder.</li> <li>• Possible allergen.</li> </ul>
<b>Magnesium Metal, ribbon turnings</b>	<b>F</b> <b>F</b>	<b>IntS</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>• Burns with a very bright flame. Instruct students not to look directly at the flame.</li> <li>• Class D fire extinguisher or sand is needed to put out a magnesium fire.</li> <li>• The reaction with acids is very vigorous. Close supervision is necessary.</li> </ul>
<b>MAGNESIUM COMPOUNDS, in general</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Low risk.</li> <li>• Many have a short shelf life because they are hygroscopic or deliquescent.</li> </ul>
<b>Magnesium Chloride</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Magnesium Nitrate</b>	<b>O, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• Skin and respiratory tract irritant.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Magnesium Sulfate</b> (Epsom Salts)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Irritates eyes and respiratory tract.</li> <li>Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Malachite Green, Solid</b>	<b>H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion.</li> <li>Can cause serious skin and eye damage.</li> <li>Care needed when using fine powder because it can be difficult to contain.</li> </ul>
Aqueous Solution (1%) Alcoholic Solution (saturated)		<b>IntS</b> <b>SrS</b>	<ul style="list-style-type: none"> <li>Alcohol solution is flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
<b>Maleic Acid</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Toxic by ingestion.</li> </ul>
<b>Malonic Acid</b>	<b>Ir, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>A strong acid when dissolved in water. Corrosive to eyes, skin and respiratory tract.</li> </ul>
<b>Maltose</b> (Malt Sugar)		<b>IntS</b>	
<b>Manganese Metal, chips</b>	<b>Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Use as a display sample only.</li> <li>Dust may be an irritant.</li> <li>Dust is flammable.</li> </ul>
<b>MANGANESE COMPOUNDS, in general</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by ingestion.</li> </ul>
<b>Manganese Dioxide</b> (Manganese(IV) Oxide)	<b>H, Ir</b>		<ul style="list-style-type: none"> <li>The thermal decomposition of potassium chlorate using manganese dioxide as the catalyst to prepare oxygen gas has caused several accidents. Oxygen is best generated from hydrogen peroxide solution using manganese dioxide or yeast as a catalyst.</li> </ul>
<b>Manganese(II) Sulfate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can be a skin irritant.</li> </ul>
<b>Marble Chips</b> (boiling chips)			See <b>Calcium Carbonate</b> .
<b>Menthol</b>	<b>H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can be a severe eye irritant.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Mercury, Liquid</b>	<b>T+</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>This is a designated substance.</li> <li>The major risk is the long-term exposure to small quantities of mercury vapour.</li> <li>Disposal via licensed contractor is essential.</li> </ul>
<b>Methanoic Acid</b>			See <b>Formic Acid</b> .
<b>Methanol</b> (methyl alcohol)	<b>F+, T+, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Liquid and vapour are highly flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>



Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Toxic by all routes of entry, including skin absorption. Can cause blindness if ingested.</li> <li>• Methanol is not a suitable alternative to ethanol.</li> <li>• Heat only in a water bath.</li> <li>• Methanol's use in the "Rainbow Flame Test" demonstration has resulted in many serious accidents. There are safer ways to conduct this demonstration.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Methionine</b>	<b>F-</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• An amino acid.</li> <li>• Dust may be combustible.</li> </ul>
<b>Methyl cellulose</b> (Quieting Solution)		<b>IntS</b>	
<b>Methylene Blue</b> , Solid  Aqueous Solution (1%)	<b>H, Ir</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Solution should be prepared by teacher.</li> <li>• Store in a cool, dry place.</li> </ul>
<b>Methyl Orange</b> , Solid  Aqueous Solution (0.1%)	<b>T+</b>  <b>T</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>• Highly toxic if swallowed.</li> <li>• Solution should be prepared by teacher.</li> <li>• Store in a cool, dry place.</li> <li>• Toxic if swallowed.</li> </ul>
<b>3 - methyl -1- butanol</b>			See <b>Isopentyl Alcohol</b> .
<b>2 - methyl - 1- propanol</b>			See <b>Isobutyl Alcohol</b> .
<b>Methyl Red</b> , Solid  Aqueous Solution	<b>H</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>• Harmful if swallowed.</li> <li>• Colour fades when stored for a long period of time.</li> </ul>
<b>Methyl Salicylate</b> (Oil of Wintergreen)	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Harmful if swallowed.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Methyl Violet</b> , Solid  Aqueous Solution (1%) Alcoholic Solution	<b>H, Ir</b>  <b>F</b>	<b>TU</b>  <b>IntS</b> <b>SrS</b>	<ul style="list-style-type: none"> <li>• Harmful if swallowed.</li> <li>• Can cause serious skin and eye irritation.</li> <li>• Alcohol solutions are flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
<b>Mineral Oil</b>		<b>IntS</b>	

Chemical Name	Hazards	Suitability	Comments
<b>Mohr's Salt</b>			See <b>Iron(II) Ammonium Sulfate</b> .
<b>Muriatic Acid</b>			See <b>Hydrochloric Acid</b> . <ul style="list-style-type: none"> <li>The muriatic acid available at hardware stores is impure hydrochloric acid (10 mol/L approx.) Purchasing this product at a hardware store is discouraged. Order it from a recognized vendor of science chemicals.</li> </ul>
<b>Naphthalene</b> (Moth Balls)	<b>F-, H, E</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Safer alternative substances are available for melting point determination e.g., stearic acid, lauric acid.</li> </ul>
<b>Neutral Red</b>		<b>TU</b>	<ul style="list-style-type: none"> <li>Biological stain/indicator.</li> </ul>
<b>Nichrome</b> , wire		<b>IntS</b>	
<b>Nickel Metal</b> , sheet/wire/strips/ or shot	<b>Carc, T</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Known carcinogen by inhalation of dust.</li> <li>May cause allergic reaction.</li> </ul>
<b>NICKEL COMPOUNDS</b> , in general	<b>T, Carc, E</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>The powder may spontaneously ignite.</li> <li>Dusts of these compounds are suspected carcinogens and may cause skin sensitization.</li> </ul>
<b>Nicotine</b> , solution	<b>H</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic to aquatic life.</li> <li>Harmful if swallowed.</li> <li>The solid should not be used in schools due to its toxicity. Only purchase the dilute solution.</li> </ul>
<b>Ninhydrin</b> , Solid	<b>T, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Light sensitive. Store in a cool, dry place.</li> <li>Used to test for amino acids and proteins. It can also be used as an indicator for the presence of cyanide in untreated flax seeds.</li> </ul>
Solution or spray	<b>F-, T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>The solution either contains butanol which is flammable, or it is dissolved in water.</li> </ul>
<b>NITRATES</b> , in general	<b>O, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Many are strong oxidants. Avoid contact with combustible material.</li> <li>Nitrates should not be mixed with reducing agents and heated.</li> <li>Some solid nitrates can detonate on heating or on physical impact.</li> <li>May have additional hazards depending on the cation.</li> </ul>
<b>Nitric Acid</b> Concentrated (16 mol/L)	<b>O, C+, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Very corrosive and strong oxidant. Avoid contact with acetic acid and substances that are readily reduced.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Store in a dedicated acids cabinet away from moisture and other acids.</li> <li>• Will destroy most metals and plastics. Do not store in a plastic bottle.</li> <li>• Purchase nitric acid in PVC-coated safety bottles.</li> <li>• Always use a fume hood when dispensing this substance. Gloves and goggles are essential.</li> <li>• Nitric acid reacts with some metals to produce nitrogen dioxide – a toxic reddish gas. This demonstration must be done on a small scale in a fume hood.</li> </ul>
Solutions (1.0 mol/L) or lower	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Have students use a 0.5 mol/L (or less) solution where possible, e.g., for the comparison of dilute acids.</li> </ul>
<b>NITRITES</b> , in general	<b>O, T, E</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Nitrites react with acids to produce toxic nitrogen dioxide. This reaction must only be performed on a small scale in a fume hood.</li> <li>• There is potential for the confusion of nitrites with nitrates. Hence, store them separately.</li> </ul>
<b>Nitrogen</b> , Q sized gas cylinder		<b>TU</b>	<ul style="list-style-type: none"> <li>• The use of lecture-sized cylinders is discouraged because they are difficult to get filled.</li> </ul>
<b>Nitrogen Dioxide</b> , tubes	<b>T+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Used for equilibrium demonstration.</li> <li>• NO<sub>2</sub> is a highly toxic gas. Be careful not to break the tubes.</li> </ul>
<b>1-octanol and 2-octanol</b>	<b>Ir, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin burns and eye damage</li> </ul>
<b>Oleic Acid</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation.</li> <li>• Darkens on exposure to air.</li> <li>• Keep container tightly sealed.</li> </ul>
<b>Orange(III)</b>			See <b>Methyl Orange</b> .
<b>Orange(IV)</b> , Solid Aqueous Solution (0.1%)		<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>• Biological stain or indicator.</li> <li>• Solution should either be purchased or prepared by teacher.</li> </ul>
<b>Oxalic Acid</b> (Ethanedioic Acid), Solid	<b>T, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin burns and eye damage.</li> <li>• Forms explosive mixtures with silver and mercury compounds.</li> </ul>
Solution (< 0.4 mol/L)	<b>Ir</b>	<b>IntS</b>	
<b>Oxygen</b> , Q sized gas cylinder	<b>G, O</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• The use of lecture-sized cylinders is discouraged because they are difficult to get refilled.</li> </ul>
<b>Palmitic Acid</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can irritate skins, eyes and respiratory tract.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Pancreatin</b> , Solid Solution		<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>Both solid and solution should be kept in a refrigerator.</li> </ul>
<b>Paradichlorobenzene</b>	<b>T+</b>	<b>BANNED</b>	See <b>Dichlorobenzene</b> .
<b>Paraffin Oil</b>			See <b>Mineral Oil</b> .
<b>Paraffin Wax</b>	<b>F-</b>	<b>IntS</b>	
<b>Pentan-1-ol and Pentan-2-ol</b>			See <b>Amyl Alcohols</b> .
<b>Pentyl Ethanoate</b>			See <b>Amyl Acetate</b> .
<b>Pepsin</b> , enzyme	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin and eye irritation.</li> <li>Skin sensitizer.</li> <li>Use a 0.5% solution for protein digestion.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Peptone</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Bacteriological media.</li> </ul>
<b>Petroleum Ether</b>	<b>F+, H, E,</b> <b>Muta,</b> <b>Carc</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Liquid and vapour are highly flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Aspiration hazard.</li> <li>Suspected carcinogen.</li> <li>May cause genetic defects.</li> <li>Sometimes used for chlorophyll extraction. Isopropyl alcohol and ethanol have been successfully used as alternatives.</li> </ul>
<b>Phenanthroline</b> , Solid  Solution (0.1%, aqueous)	<b>T+</b>	<b>TU</b>  <b>SrS</b>	<ul style="list-style-type: none"> <li>Highly toxic by ingestion.</li> <li>Poor shelf life.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Phenol Red</b> , Solid  Solution	<b>Ir</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin and eye irritation.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Phenolphthalein</b> , Solid  Solution	<b>H, F,</b> <b>Carc,</b> <b>Muta</b>  <b>F+, Ir</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Possible carcinogen.</li> <li>May cause genetic defects.</li> <li>Reproductive toxicity suspected.</li> <li>Highly flammable because solvent is ethanol.</li> <li>Can cause irritation of skin, eyes and respiratory tract.</li> </ul>
<b>Phenylhydrazine</b>	<b>Carc, T,</b> <b>Muta, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Skin sensitizer.</li> <li>Suspected carcinogen and mutagen.</li> </ul>
<b>Phenyl Salicylate</b> , (Salol)	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by ingestion.</li> <li>Can cause skin and eye irritation.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Light sensitive. Store in a cool, dark place.</li> </ul>
<b>Phloroglucinol (Benzene-1,3,5-triol), Solid</b>	<b>C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Used to test for pentose or galactose.</li> <li>Solution must be freshly prepared because it is only stable for 5-7 days.</li> <li>Light sensitive. Store in a cool, dark place.</li> </ul>
<b>Phosphoric Acid, Concentrated (14.8 mol/L)</b>	<b>C+, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Severe inhalation hazard.</li> <li>Store in a dedicated acid cabinet, away from water.</li> <li>Consider purchasing in a PVC-coated bottle.</li> </ul>
5% Solution	<b>C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> </ul>
<b>Phosphorus, Red</b>	<b>H, F, E</b>	<b>TU, NR</b>	<ul style="list-style-type: none"> <li>Small quantities may be used in a well-ventilated laboratory.</li> <li>All spatulas etc. that have been used to handle red phosphorus must be washed with water, the washings filtered, and the filter paper burned in a fume hood.</li> </ul>
<b>Phosphorus, White</b>	<b>R, F, T+, C, E</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Spontaneously combusts when exposed to air.</li> </ul>
<b>Phthalic Acid</b>	<b>H, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Irritating to mucous membranes.</li> <li>Narcotic in high concentrations.</li> </ul>
<b>Phthalic Anhydride</b>	<b>H, C</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>A skin and respiratory sensitizer.</li> <li>Avoid contact and raising dust.</li> </ul>
<b>Platinum, wire</b>		<b>IntS</b>	
<b>Polyvinyl Alcohol (PVA), Solid</b>		<b>TU</b>	<ul style="list-style-type: none"> <li>Combustible solid.</li> </ul>
Solution (10%)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Used as a quieting/slowing agent in microscopy.</li> </ul>
Solution (4%)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Mix with saturated sodium borate solution to prepare a polymer ("slime").</li> </ul>
<b>Potassium</b>	<b>R, F+, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Extremely dangerous when in contact with water. Releases large volumes of hydrogen gas with enough heat to ignite. Use very small, rice grain-sized amounts.</li> <li>Requires Class D extinguisher or bucket of sand to extinguish flames.</li> <li>Corrosive to skin, eyes and respiratory tract.</li> <li>Proper storage is essential. Keep fully submerged in mineral oil.</li> <li>Order minimal quantity and check stock regularly.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Short shelf life. As potassium ages it may form a crust of peroxides, potassium peroxide, <math>K_2O_2</math>, and potassium superoxide, <math>KO_2</math>. Potassium superoxide is yellow and may react explosively with the oil in which it is stored or when cut.</li> </ul>
<b>Potassium Acetate</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Harmful if swallowed.</li> <li>Deliquescent. Keep container tightly sealed.</li> <li>Store in a cool, dry place.</li> </ul>
<b>Potassium Aluminum Sulfate</b>			See <b>Alum</b> .
<b>Potassium Ammonium Sulfate</b>		<b>IntS</b>	
<b>Potassium Bicarbonate</b> (Potassium Hydrogen Carbonate)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Hygroscopic. Keep container tightly sealed.</li> <li>Store in a cool, dry place.</li> </ul>
<b>Potassium Bisulfate</b>	<b>C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Potassium Bitartrate</b> (Potassium Hydrogen Tartrate/Cream of Tartar)		<b>IntS</b>	
<b>Potassium Binoxalate</b> (Potassium Hydrogen Oxalate)	<b>T, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Use on a small scale only.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Potassium Bromate</b>	<b>T, O, Carc</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Toxic by ingestion only.</li> <li>Suspected carcinogen.</li> <li>Strong oxidant. Avoid contact with combustible material. Store away from combustibles.</li> <li>Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
<b>Potassium Bromide</b>	<b>H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Potassium Carbonate</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye damage.</li> <li>Some risk of organ toxicity.</li> </ul>
<b>Potassium Chlorate</b>	<b>O, H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Avoid contact with combustible material.</li> <li>Extremely dangerous because the substance, if only slightly contaminated, may explode when exposed to moderate shock or when heated.</li> <li>Should never be used to prepare oxygen. A safer method is the catalytic decomposition of hydrogen peroxide.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Potassium Chloride</b>	<b>H</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Potassium Chromate and Dichromate, Solid</b>	<b>T+, E, Carc</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Suspected carcinogen by inhalation and/or ingestion.</li> </ul>
<b>Potassium Dihydrogen Phosphate</b>			See <b>Potassium Phosphate</b> .
<b>Potassium Hydrogen Oxalate</b>			See <b>Potassium Binoxalate</b> .
<b>Potassium Ferricyanide</b> Solid  0.1 mol/L solution	<b>H</b>  <b>H, Ir</b>	<b>TU</b>  <b>SrS</b>	<ul style="list-style-type: none"> <li>Dangerous because extremely toxic hydrogen cyanide gas may be produced if substance is heated or comes in contact with concentration acids.</li> <li>Light sensitive. Store in a cool, dry place.</li> <li>Reactions with concentrated acids may produce extremely toxic hydrogen cyanide gas.</li> <li>Used for the detection of iron(II) ions and in ferroxyl indicator for corrosion testing.</li> <li>Can cause serious eye irritation.</li> </ul>
<b>Potassium Ferrocyanide,</b> Solid  0.1 mol/L solution	<b>H</b>  <b>H</b>	<b>TU</b>  <b>SrS</b>	<ul style="list-style-type: none"> <li>Dangerous because extremely toxic hydrogen cyanide gas may be produced if substance is heated or comes in contact with concentration acids.</li> <li>Effloresces when in contact with air. Keep container tightly sealed.</li> <li>Used for the detection of iron(III) ions.</li> <li>Reactions with concentrated acids may produce extremely toxic hydrogen cyanide gas.</li> </ul>
<b>Potassium Fluoride</b>		<b>BANNED</b>	See <b>Fluorides</b> .
<b>Potassium Hydrogen Carbonate</b>			See <b>Potassium Bicarbonate</b> .
<b>Potassium Hydrogen Phthalate</b>	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Primary standard for preparing volumetric alkali solutions. Also used as a buffering agent.</li> </ul>
<b>Potassium Hydrogen Sulfate</b>			See <b>Potassium Bisulfate</b> .
<b>Potassium Hydrogen Tartrate</b>			See <b>Potassium Bitartrate</b> .

Chemical Name	Hazards	Suitability	Comments
<b>Potassium Hydroxide</b> (Caustic Potash), Solid  0.2 mol/L solution	<b>C+</b>  <b>C</b>	<b>SrS</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>Extremely corrosive to skin and eyes. Eye protection must be worn even if dilute solutions are used.</li> <li>Dissolving is very exothermic. Consider placing the solution-making container in an ice bath.</li> <li>Good ventilation or a fume hood is essential when preparing solutions because a corrosive aerosol is often produced.</li> <li>Deliquescent. Keep container tightly sealed.</li> <li>Solutions &gt; 1.0 mol/L cause severe burns.</li> <li>Can cause severe damage to skin and eyes.</li> <li>Concentrations of 0.4 mol/L or less are adequate for most experiments, particularly in grades 9 and 10.</li> </ul>
<b>Potassium Iodate</b>	<b>O, H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Oxidant. Avoid contact with combustible material.</li> <li>Reacts violently with aluminum, magnesium, carbon, sulfur, phosphorus and organic materials.</li> <li>Can cause serious skin and eye irritation.</li> </ul>
<b>Potassium Iodide</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye irritation.</li> <li>Sensitive to air, light and moisture. Store in cool, dark, dry place.</li> </ul>
<b>Potassium Metabisulphite</b>	<b>C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause severe eye damage.</li> <li>Avoid dust formation.</li> <li>Keep away from acids. Produces sulfur dioxide gas in reaction with acids.</li> <li>Use only in a fume hood.</li> </ul>
<b>Potassium Nitrate</b> (Saltpeter/Nitre)	<b>O</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Fire and explosion risk when heated or in contact with organic materials.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Potassium Nitrite</b>	<b>O, T, E</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Fire and explosion risk when heated or in contact with organic materials.</li> <li>Toxic by ingestion.</li> <li>Hygroscopic. Keep container tightly sealed.</li> <li>Keep away from acids. Reacts with acids to produce toxic nitrogen dioxide gas.</li> </ul>
<b>Potassium Oxalate</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious skin and eye irritation.</li> <li>Use only on a small scale.</li> <li>Efflorescent in warm, dry air.</li> </ul>
<b>Potassium Permanganate</b>	<b>R, O, H, E, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Fire and explosion risk when heated or in contact with organic materials.</li> </ul>



Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Can cause ignition of organic compounds and reducing agents.</li> <li>• May explode if closed container is suddenly heated.</li> <li>• Can cause serious skin and eye damage.</li> <li>• Use on a small scale.</li> </ul>
<b>Potassium Phosphate, monobasic</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Potassium Phosphate, dibasic</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Potassium Phosphate, tribasic</b>	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Potassium Sodium Tartrate (Rochelle Salt)</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Efflorescent. Store in a cool, dry place.</li> </ul>
<b>Potassium Sulfate</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> </ul>
<b>Potassium Thiocyanate, Solid</b>	<b>H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Releases extremely toxic cyanide fumes if it comes in contact with concentrated acids or is heated.</li> <li>• Moisture sensitive. Keep container tightly sealed.</li> <li>• Can cause serious eye damage and skin irritation.</li> </ul>
0.1 mol/L solution	<b>H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Releases extremely toxic cyanide fumes if it comes in contact with concentrated acids.</li> <li>• Can cause serious eye damage and skin irritation.</li> <li>• Used to test for iron(III) ions.</li> </ul>
<b>Potassium Thiosulphate</b>	<b>H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation.</li> <li>• Slightly deliquescent. Keep container tightly sealed.</li> </ul>
<b>Potato Starch</b>			See <b>Starch</b> .
<b>1,2-propanediol (Propylene Glycol)</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Avoid contact with skin and clothing.</li> </ul>
<b>Propanoic Acid, Concentrated</b>	<b>C, F</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Flammable liquid and vapour. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Can cause severe skin and eye damage.</li> <li>• Use a fume hood when preparing dilute solutions from the concentrated acid.</li> </ul>
<b>1-propanol and 2-propanol (n-Propyl Alcohol and Isopropanol)</b>	<b>F, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Flammable liquid and vapour. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• Can cause serious damage to eyes and irritate respiratory tract.</li> <li>• Use only in a fume hood or well-ventilated area.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Propanone</b>			See <b>Acetone</b> .
<b>Propylene Glycol</b>			See <b>1,2 Propanediol</b> .
<b>PTC Taste Paper</b>		<b>SrS</b>	<ul style="list-style-type: none"> <li>• Used for genetic taste testing.</li> <li>• The concentration of the active ingredient is so low that it does not pose a health risk. Sodium benzoate taste paper can also be used.</li> </ul>
<b>Pyrogallol</b>	<b>H, Muta</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Readily absorbed through skin.</li> <li>• Harmful to eyes and lungs.</li> <li>• Suspected of causing genetic defects.</li> </ul>
<b>Quicklime</b>			See <b>Calcium Oxide</b> .
<b>Quieting Solution</b>		<b>IntS</b>	See <b>Methyl Cellulose</b> . <ul style="list-style-type: none"> <li>• Used to slow down or relax microorganisms.</li> </ul>
<b>Quinine Sulfate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye irritation.</li> <li>• Used for taste bud tests. Cold tea is a good alternative.</li> <li>• Light sensitive. Store in a dark place.</li> </ul>
<b>Resorcinol</b>	<b>H, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Readily absorbed through skin.</li> <li>• Skin and eye irritant.</li> <li>• This substance is often dissolved in ethanol, ethanoic acid or propanone for use in experiments. Hence, its solutions may be flammable.</li> </ul>
<b>Ringer's Solution</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Saline solution used for frog or mammal physiology experiments.</li> </ul>
<b>Rochelle Salt</b>			See <b>Potassium Sodium Tartrate</b> .
<b>Rubbing Alcohol</b>			See <b>2-propanol (Isopropyl Alcohol)</b> .
<b>Safranin O, Solid</b> Aqueous Solution (1%) Alcoholic Solution (0.25%) (Gram Counter Stain)	<b>F-</b>	<b>TU</b> <b>IntS</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>• Used to prepare solutions of biological stains.</li> </ul>
<b>Salicylic Acid</b>	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin irritation and serious eye damage.</li> <li>• Moderately toxic by ingestion.</li> <li>• Moisture and light sensitive.</li> </ul>
<b>Sand</b>	<b>H, Carc.</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Suspected carcinogen.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>• May cause organ damage with prolonged exposure.</li> <li>• Avoid inhaling dust when pouring. Use coarse sand instead of fine sand to minimize dust.</li> </ul>
<b>Schiff Reagent</b>	<b>Ir, Carc.</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Possible carcinogen.</li> <li>• Can cause skin irritation and serious eye damage.</li> <li>• Used to test for aldehydes. Contains fuchsin basic, sodium metabisulfite, hydrochloric acid and water.</li> </ul>
<b>Sebacoyl chloride (Decanedioyl Dichloride)</b>	<b>C+, T, F+</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Corrosive.</li> <li>• Fumes are strongly irritating to the eyes.</li> <li>• Toxic by ingestion.</li> <li>• Used for nylon preparation.</li> <li>• Dangerous fire risk.</li> <li>• Must be used in a fume hood.</li> <li>• Moisture sensitive. Store in airtight container.</li> </ul>
<b>Silica</b>			See <b>Sand</b> .
<b>Silica Gel</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Moisture sensitive. Store in airtight container.</li> </ul>
<b>Silicon, Powder Lumps</b>	<b>F Ir, F</b>	<b>NR IntS</b>	<ul style="list-style-type: none"> <li>• Flammable powder.</li> <li>• Can cause skin and eye irritation.</li> </ul>
<b>Silicon Carbide (Carborundum)</b>		<b>IntS</b>	
<b>Silicon Dioxide</b>			See <b>Sand</b> .
<b>Silver, Foil/shot</b>		<b>SrS</b>	
<b>Silver Acetate</b>	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye irritation.</li> <li>• Light sensitive. Store in a cool, dark place.</li> <li>• Short shelf life. Purchase small quantities.</li> </ul>
<b>Silver Chloride</b>	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can irritate respiratory tract.</li> <li>• Light sensitive. Store in a cool, dark place.</li> <li>• Short shelf life. Purchase small quantities.</li> </ul>
<b>Silver Nitrate, Solid</b>	<b>O, H, C, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Stains skin and clothing.</li> <li>• Oxidant. Avoid contact with combustible material.</li> <li>• Short shelf life. Purchase small quantities.</li> <li>• Light sensitive. Store in a cool, dark place.</li> </ul>
Solution0 (0.2 mol/L or less)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• May stain skin and clothing.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
			<ul style="list-style-type: none"> <li>Students should only use small quantities of dilute solutions.</li> <li>Can cause skin and serious eye irritation.</li> <li>Light sensitive. Store in a cool, dark place.</li> </ul>
<b>Silver Oxide</b>	<b>H, O, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Oxidant. Avoid contact with combustible material.</li> <li>Can cause skin and serious eye damage.</li> <li>Can be used for percent composition experiments.</li> <li>Light sensitive. Store in a cool, dark place.</li> </ul>
<b>Silver Sulfate</b>	<b>C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious eye damage.</li> <li>Light sensitive. Store in a cool, dark place.</li> </ul>
<b>Soda Lime</b>	<b>C+</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Equivalent to a mixture of calcium hydroxide and sodium hydroxide.</li> <li>Store with other corrosives.</li> </ul>
<b>Sodium</b>	<b>R, F, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Reacts vigorously with water to produce flammable hydrogen gas and a corrosive solution of sodium hydroxide.</li> <li>Flammable solid.</li> <li>Requires Class D extinguisher or bucket of sand to extinguish flames.</li> <li>Corrosive to skin and eyes.</li> <li>Must be stored under a dry oil like mineral oil.</li> <li>Good shelf life if stored properly.</li> <li>Order minimal quantity and check on a regular basis.</li> </ul>
<b>Sodium Acetate</b>	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause severe skin and eye damage.</li> <li>Irritant to respiratory tract.</li> </ul>
<b>Sodium Aluminum Sulfate</b>			See <b>Aluminum Sodium Sulfate</b> .
<b>Sodium Benzoate</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious eye damage or irritation.</li> <li>Sodium benzoate taste paper is an alternative to using PTC paper.</li> </ul>
<b>Sodium Bicarbonate</b> (Baking Soda, Sodium Hydrogen Carbonate)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Slowly decomposes in moist air.</li> </ul>
<b>Sodium Bisulfate</b> (Sodium Hydrogen Sulfate)	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause serious eye damage or irritation.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Borate</b> (Borax)	<b>H, Tera</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Possible teratogen.</li> <li>Slightly toxic by ingestion.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Sodium Bromate</b>	<b>O, T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Keep from contact with organic material.</li> <li>Toxic by ingestion.</li> <li>Can cause serious eye damage and skin irritation.</li> <li>Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Sodium Bromide</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by ingestion.</li> <li>Can cause serious eye damage or irritation.</li> </ul>
<b>Sodium Carbonate</b> (Washing Soda/Soda Ash)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause serious eye damage and skin irritation.</li> <li>Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Chlorate</b>	<b>O, H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Avoid contact with combustible material.</li> <li>Should never be used to prepare oxygen. A safer method is the catalytic decomposition of hydrogen peroxide.</li> </ul>
<b>Sodium Chloride</b> (Table Salt)		<b>IntS</b>	<ul style="list-style-type: none"> <li>Somewhat hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Chromate and Dichromate</b>	<b>T+, E, Carc</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Suspected carcinogen by inhalation and/or ingestion.</li> </ul>
<b>Sodium Citrate</b>		<b>IntS</b>	
<b>Sodium Dihydrogen Phosphate</b>			See <b>Sodium Phosphate</b> , Monobasic.
<b>Sodium Ferricyanide</b> , Solid	<b>H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Dangerous because extremely toxic hydrogen cyanide gas may be produced if substance is heated or comes in contact with concentration acids.</li> <li>Can cause serious eye irritation.</li> <li>Light sensitive. Store in a cool, dry place.</li> </ul>
Solution	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Reactions with concentrated acids may produce extremely toxic hydrogen cyanide gas.</li> <li>Used for the detection of iron(II) ions and in ferroxyl indicator for corrosion testing.</li> <li>Can cause serious eye irritation.</li> </ul>
<b>Sodium Ferrocyanide</b> , Solid	<b>H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Dangerous if heated, or if in contact with concentrated acids, because extremely toxic hydrogen cyanide gas may be produced.</li> <li>Can cause serious eye irritation.</li> </ul>
Solution		<b>SrS</b>	<ul style="list-style-type: none"> <li>Used for the detection of iron(III) ions.</li> </ul>
<b>Sodium Fluoride</b>	<b>T+</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>Highly toxic.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Sodium Hydrogen Carbonate</b>			See <b>Sodium Bicarbonate</b> .
<b>Sodium Hydrogen Phosphate</b>			See <b>Sodium Phosphate</b> , Dibasic.
<b>Sodium Hydrogen Sulfate</b>			See <b>Sodium Bisulfate</b> .
<b>Sodium Hypochlorite</b> Solution (Bleach)	<b>O, C, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Reacts with acids to produce toxic chlorine gas</li> <li>• Oxidant. Avoid contact with organic material.</li> <li>• Banned by some school boards.</li> </ul>
<b>Sodium Hydroxide</b> (Caustic Soda/Lye) Solid  Solutions (< 0.4 mol/L)	<b>C+</b>  <b>C</b>	<b>TU</b>  <b>IntS</b>	<ul style="list-style-type: none"> <li>• Extremely corrosive to skin and eyes. Eye protection must be worn even if dilute solutions are used. Solutions &gt; 1.0 mol/L cause severe burns.</li> <li>• A great deal of heat is evolved when NaOH is dissolved in water.</li> <li>• Good ventilation or a fume hood is essential when preparing solutions because a corrosive aerosol is often produced.</li> <li>• Absorbs carbon dioxide from atmosphere. Keep container tightly sealed.</li> <li>• React with glass. Do not store solutions in glass containers.</li> <li>• Concentrations of 0.4 mol/L or less are adequate for most experiments, particularly in grades 9 and 10.</li> </ul>
<b>Sodium Iodate</b>	<b>O, H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Oxidant. Fire risk when in contact with organic material.</li> <li>• Sensitizer of skin and respiratory tract. May cause allergic reaction.</li> <li>• Slightly toxic by ingestion.</li> <li>• Deliquescent. Keep container tightly sealed.</li> <li>• Changes colour when exposed to light.</li> </ul>
<b>Sodium Iodide</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye irritation.</li> <li>• Deliquescent. Keep container tightly sealed.</li> <li>• Light sensitive. Store in a dark place.</li> </ul>
<b>Sodium Metabisulfite</b> (Sodium Pyrosulfite)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious eye damage.</li> <li>• Moisture sensitive. Store in a dry location.</li> </ul>
<b>Sodium Metasilicate</b>	<b>H, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> </ul>
<b>Sodium Nitrate</b> , Solid	<b>O, H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• Friction or shock may result in an explosion.</li> <li>• Can cause serious eye irritation.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
Solutions (0.1 mol/L)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin irritation.</li> </ul>
<b>Sodium Nitrite</b>	<b>O, T, E, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Strong oxidant.</li> <li>• Fire and explosion risk when heated or in contact with organic materials.</li> <li>• Reacts with acids to produce toxic nitrogen dioxide.</li> <li>• Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Oxalate, Solid</b>	<b>T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion.</li> <li>• Hygroscopic. Keep container tightly sealed.</li> </ul>
Solutions (0.1 mol/L)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin irritation.</li> </ul>
<b>Sodium Peroxide</b>	<b>R, O, C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Serious explosion/fire risk.</li> <li>• Avoid contact with water, alcohol, acids, powdered metals, and all organic materials.</li> <li>• Strong oxidant.</li> <li>• Can cause severe skin and eye damage.</li> <li>• Keep dry.</li> <li>• Reacts with water to give sodium hydroxide and oxygen gas.</li> </ul>
<b>Sodium Phosphate, Monobasic (Sodium Dihydrogen Phosphate)</b>	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Slightly hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Phosphate, Dibasic (Sodium Hydrogen Phosphate)</b>	<b>C</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin and eye damage.</li> <li>• Hygroscopic. Keep container tightly sealed.</li> </ul>
<b>Sodium Phosphate, Tribasic (TSP/Trisodium Phosphate)</b>	<b>C</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> </ul>
<b>Sodium Polyacrylate, Powder</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious eye damage.</li> <li>• Absorbs about 800 times its weight in water.</li> </ul>
<b>Sodium Salicylate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> <li>• Body tissue irritant.</li> </ul>
<b>Sodium Silicate, Solution (Water Glass)</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious skin burns and eye damage.</li> <li>• Protect from light.</li> </ul>
<b>Sodium Stearate</b>	<b>F-</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Do not handle near open flames.</li> </ul>
<b>Sodium Sulfate</b>		<b>IntS</b>	
<b>Sodium Sulfide, Solid</b>	<b>C, T, E</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> <li>• Deliquescent. Keep container tightly sealed.</li> <li>• Reacts with acid to give toxic hydrogen sulfide.</li> </ul>
Solution (0.1 mol/L)	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause severe skin and eye damage.</li> <li>• Reacts with acid to give toxic hydrogen sulfide.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Sodium Sulfit</b>	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious eye damage.</li> <li>• Air and moisture sensitive. Keep tightly sealed.</li> </ul>
<b>Sodium Tartrate</b>		<b>IntS</b>	
<b>Sodium Tetraborate</b>			See <b>Sodium Borate</b> .
<b>Sodium Thiocyanate</b>	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion.</li> <li>• Deliquescent. Keep container tightly sealed.</li> <li>• Light sensitive. Store in a dark place.</li> </ul>
<b>Sodium Thiosulphate (Hypo)</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
<b>Starch, soluble</b> (Potato Starch)		<b>IntS</b>	<ul style="list-style-type: none"> <li>• The STAO publication <i>Laboratory Recipes</i> provides advice for the preparation of a starch solution.</li> </ul>
<b>Stearic acid</b> (Octadecanoic Acid)		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Use only in a fume hood or well-ventilated area.</li> <li>• Laboratory grade stearic acid is actually 50% stearic acid and 45% palmitic acid and has a melting point of 55-56 °C.</li> <li>• Reagent grade stearic acid is greater than 95% stearic acid and has a melting point of 67-69 °C. The reagent grade is a better choice for melting point labs.</li> </ul>
<b>Strontium Chloride, Solid</b>	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause serious eye damage.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>
Solution (1.0 mol/L or less)		<b>IntS</b>	
<b>Strontium Nitrate, Solid</b>	<b>O, T, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Strong oxidant. Avoid contact with combustible material.</li> <li>• Slightly toxic by ingestion.</li> <li>• Can cause skin and serious eye irritation.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
Solution (1.0 mol/L or less)	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin irritation and serious eye damage.</li> </ul>
<b>Succinic Acid</b>	<b>T, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slightly toxic by ingestion.</li> <li>• Can cause skin irritation and serious eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>



Chemical Name	Hazards	Suitability	Comments
<b>Sucrose</b> (Cane Sugar)		<b>IntS</b>	
<b>Sudan III</b> , Solid	<b>T+, F-</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
Solution	<b>T+, F</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Used as a biological stain.</li> <li>Flammable because the solvent is an alcohol. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Can cause skin and serious eye irritation.</li> <li>Use only in a fume hood or well-ventilated area.</li> <li>Can cause organ damage.</li> </ul>
<b>Sudan IV</b> , Solid	<b>T, H, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause skin irritation and serious eye damage.</li> <li>Flammable. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> </ul>
Solution	<b>T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Flammable because the solvent is an alcohol. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Can cause skin and serious eye irritation.</li> <li>Can cause organ damage.</li> </ul>
<b>Sulfur</b>	<b>F, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Fine dust can be moderate fire or explosion risk. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>Sulfur burns to produce toxic sulfur dioxide gas. Must only be burned in a fume hood.</li> <li>Do not react sulfur with oxidants such as chlorates because the reaction products are toxic. Similarly, sulfur reactions with reactive metals like magnesium and aluminum are too vigorous to be done safely.</li> <li>Reactions with copper and iron may be done provided small amounts are used.</li> <li>A safety shield is recommended for all sulfur reactions.</li> </ul>
<b>Sulfuric Acid</b> Concentrated (18 mol/L)	<b>C+, R</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Very corrosive liquid. Can cause severe skin and eye damage.</li> <li>Like all acid dilutions, solutions of sulfuric acid must be made by slowly adding acid to water with mixing because the reaction of sulfuric acid with water is highly exothermic. Consider placing the mixing vessel in an ice bath.</li> <li>The reaction of concentrated sulfuric acid with sugar produces large volumes of irritating gases and aerosols. This reaction must be done in a fume hood. The black</li> </ul>

Chemical Name	Hazards	Suitability	Comments
Solutions (< 1.0 mol/L)	<b>C</b>	<b>IntS</b>	<p>residue that remains must be washed thoroughly before it is touched.</p> <ul style="list-style-type: none"> <li>• Store in a dedicated acids cabinet and away from any source of water.</li> <li>• Use only in a fume hood or well-ventilated area.</li> <li>• Powerful dehydrating agent.</li> <li>• Even dilute solutions are harmful to skin and eyes.</li> </ul>
<b>Tannic Acid</b>	<b>H</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Possible allergen.</li> <li>• Darkens when exposed to air. Store in a cool, dry place.</li> </ul>
<b>Tartaric Acid</b>	<b>Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin irritation and serious eye damage.</li> <li>• Use only in a fume hood or well-ventilated area.</li> </ul>
<b>Thioacetamide, Solid</b>	<b>T, Carc, Ir</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>• Moderately toxic by ingestion and inhalation.</li> <li>• Possible carcinogen.</li> <li>• Use on small scale only.</li> <li>• Can cause skin irritation and serious eye damage.</li> </ul>
Solution (1.0 mol/L)	<b>T, Carc</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Possible carcinogen.</li> <li>• Moderately toxic by ingestion.</li> <li>• Use on small scale only.</li> </ul>
<b>Thymol Blue, Indicator, Solid</b> Solution		<b>TU</b> <b>IntS</b>	
<b>Thymolphthalein, Indicator, Solid</b> Alcoholic Solution (0.4%)	<b>F, Ir</b>	<b>TU</b> <b>IntS</b>	<ul style="list-style-type: none"> <li>• Solution is flammable because its solvent is an alcohol. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Can cause skin irritation and serious eye damage.</li> </ul>
<b>Tin, shot, mesh, granulated, foil, strips</b>		<b>IntS</b>	
<b>Tin(II) Chloride (Stannous Chloride)</b>	<b>H, C</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Can cause severe burns to skin and eyes.</li> <li>• Can form explosive mixture with oxidants such as nitrates and peroxides.</li> <li>• Poor shelf life because it absorbs oxygen from air and reacts to form an insoluble oxychloride. Keep container tightly sealed.</li> <li>• Deliquescent. Keep container tightly sealed.</li> </ul>

Chemical Name	Hazards	Suitability	Comments
<b>Tin(IV) Chloride</b> (Stannic Chloride)	<b>H, C, R</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• Reacts with moist air to produce fumes of hydrogen chloride. The fumes are very irritating to eyes, skin and respiratory tract.</li> <li>• Can cause severe burns to skin and eyes.</li> <li>• Poor shelf life. Moisture sensitive. Keep container tightly sealed.</li> <li>• Can form explosive mixtures with turpentine.</li> </ul>
<b>Trichloroacetic acid (TCA)</b>	<b>R, C+, E</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Highly reactive.</li> </ul>
<b>Trypsin</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Can cause skin and serious eye irritation.</li> <li>• Can cause sensitization of skin and respiratory tract. May cause an allergic response. Avoid breathing dust.</li> <li>• Poor shelf life. Keep refrigerated.</li> </ul>
<b>Turpentine</b> (Fir Oil)	<b>H, F, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Flammable liquid and vapour. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Can cause skin and serious eye irritation.</li> <li>• May sensitize skin and cause an allergic response.</li> <li>• Harmful by inhalation, skin absorption and ingestion.</li> <li>• Use only in a well-ventilated area away from sources of ignition.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Universal Indicator, Solution</b>	<b>F, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>• Flammable because its solvent is an alcohol. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Can cause skin and serious eye irritation.</li> </ul>
<b>Urea</b>		<b>IntS</b>	
<b>Vitamin C</b>			See <b>Ascorbic Acid</b> .
<b>Washing Soda</b>			See <b>Sodium Carbonate</b> .
<b>Water Glass</b>			See <b>Sodium Silicate</b> .
<b>Wintergreen Oil</b>			See <b>Methyl Salicylate</b> .
<b>Wright's Stain Solution</b>	<b>F, T</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>• The solution is flammable because its solvent is methanol. Keep away from sources of heat, open flames, sparks and hot surfaces.</li> <li>• Toxic by ingestion.</li> <li>• May cause organ damage.</li> <li>• Can cause skin and serious eye irritation.</li> <li>• Store in a dedicated flammables cabinet.</li> </ul>
<b>Xylene</b> (Dimethyl Benzene)	<b>F, T</b>	<b>BANNED</b>	<ul style="list-style-type: none"> <li>• Vapour is harmful to eyes and respiratory system where it can produce narcotic effects.</li> </ul>
<b>Yeast</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>• Slight risk of allergic reaction.</li> </ul>

<b>Chemical Name</b>	<b>Hazards</b>	<b>Suitability</b>	<b>Comments</b>
<b>Zinc</b> , mesh, granulated, mossy, shot	<b>F</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Dust can be a dangerous fire risk.</li> <li>Store in a cool, dry place.</li> </ul>
<b>Zinc Acetate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Can cause skin and serious eye irritation.</li> </ul>
<b>Zinc Chloride</b> , Solid	<b>C, T</b>	<b>TU</b>	<ul style="list-style-type: none"> <li>Can cause severe skin burns and eye damage.</li> <li>Solid is deliquescent. Keep container tightly sealed.</li> </ul>
Solutions (1.0 mol/L or less)	<b>Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Can cause skin and serious eye irritation.</li> </ul>
<b>Zinc Nitrate</b>	<b>R, H, O, Ir</b>	<b>SrS</b>	<ul style="list-style-type: none"> <li>Strong oxidant. Avoid contact with combustible materials. Violent reactions with metals and reducing agents.</li> <li>Toxic nitrogen dioxide evolved on heating.</li> <li>Can cause skin and serious eye irritation.</li> </ul>
<b>Zinc Oxide</b>		<b>IntS</b>	<ul style="list-style-type: none"> <li>Changes colour on heating.</li> <li>Toxic fumes produced if heated.</li> <li>Harmful to aquatic environments.</li> </ul>
<b>Zinc Sulfate</b>	<b>H, Ir</b>	<b>IntS</b>	<ul style="list-style-type: none"> <li>Slightly toxic by ingestion.</li> <li>Can cause serious eye damage. Irritant to skin and mucous membranes.</li> </ul>
<b>Zinc Sulfide</b>	<b>H</b>	<b>NR</b>	<ul style="list-style-type: none"> <li>Produces toxic hydrogen sulfide gas when in contact with acid. Keep away from water and acids.</li> </ul>

## Suggested Solution Concentrations for Specific Activities

### Safer Solutions

Prior to a laboratory activity involving the use of chemical solutions, science teachers should identify the minimum safe concentration of a solution that results in the desired effects of a reaction being observed. Useful guidance can be found in the STAO publication *Laboratory Recipes*.

In most cases, solutions with a concentration of 0.4 mol/L or less is adequate. At this concentration, common acids and bases are IRRITANTS rather than CORROSIVE. In some lab activities, more concentrated solutions are required to achieve the desired result in a reasonable period of time (e.g., the collection of hydrogen using the reaction between zinc and hydrochloric acid).

It is recommended that an inventory of 0.1 mol/L solutions of frequently used inorganic salts be kept in 1 L polypropylene bottles to reduce lab preparation time. A workplace label should be attached to these bottles, identifying the chemical, concentration and a statement indicating that an SDS is available. It is also recommended that stock acid and base solutions should also be prepared for general use (e.g., 0.01 mol/L, 0.1 mol/L, 1.0 mol/L).

Diluted solutions of ammonia should be prepared just before use because the continual loss of gas from the solution reduces its concentration. Specific recommendations for safe chemical use can be found in the STAO publication *Safe ON Science* (revised 2017).

Table 7 provides specific comments and suggested solution concentrations for selected activities. The hazards associated with each concentration is given. If no hazard is given, assume the risk is low. Advice for solution preparation can be found in STAO's publication *Laboratory Recipes*.

Table 7: Comments and Suggested Solution Concentrations for Selected Activities

Activity	Concentration	Comments
Acid-base titrations	<ul style="list-style-type: none"><li>0.1 mol/L acid and base solutions and acid solutions (IRRITANT)</li></ul>	Basic solutions more dilute than 0.01 mol/L are not suitable for precise volumetric work because dissolved carbon dioxide interferes with the results.  Solutions more concentrated than 0.5 mol/L can be used but evaporation of the solvent at the tip of the burette may cause flow problems.
Collection of hydrogen gas	<ul style="list-style-type: none"><li>2 mol/L hydrochloric acid (IRRITANT)</li><li>1 mol/L sulfuric acid (IRRITANT)</li></ul>	A gas cylinder is a quick, convenient and safer source to supply class sets of hydrogen.  The reaction of zinc metal with acid can be used to generate hydrogen. 5 mL of acid will produce 120 mL of hydrogen gas (EXTREMELY FLAMMABLE).
Heat of neutralization	<ul style="list-style-type: none"><li>1 mol/L sulfuric, 2 mol/L hydrochloric and 2 mol/L acetic acids (IRRITANTS)</li></ul>	Mixing acids with alkalis may give a change in temperature of 12 °C. This is more suitable for thermochemistry measurements. The use of 0.4 mol/L solutions should produce a temperature increase of 2 °C which may not give reliable

Activity	Concentration	Comments
	<ul style="list-style-type: none"> <li>1 mol/L sodium and potassium hydroxide solutions (CORROSIVE)</li> <li>1 mol/L sodium carbonate solution (LOW RISK)</li> </ul>	readings on poor quality thermometers. Consider using temperature probes instead.
Indicators with acids and bases	<ul style="list-style-type: none"> <li>0.1 mol/L acid or base solutions (IRRITANT)</li> </ul>	More concentrated base solutions may alter the colour of an indicator when left for several minutes. Base solutions have a short shelf life due to the reaction with atmospheric carbon dioxide.
Metals reacting with acids	<ul style="list-style-type: none"> <li>1 mol/L sulfuric acid, 2 mol/L hydrochloric acid (IRRITANTS)</li> </ul>	<p>1 mol/L sulfuric or 2 mol/L hydrochloric acid are recommended if the hydrogen is to be collected. More dilute acids work as well but at a slower rate.</p> <p>Sulfuric acid and hydrochloric acids produce hydrogen gas with active metals. Do not use nitric acid because the reaction may also produce nitrogen dioxide gas (TOXIC).</p> <p>1 mol/L sulfuric or 2 mol/L hydrochloric acid are required if the hydrogen is to be collected. The reaction with more dilute solutions is too slow.</p>
Oxygen preparation	<ul style="list-style-type: none"> <li>6% (20 vol) hydrogen peroxide (IRRITANT)</li> </ul>	<p>Using gas cylinders to produce class sets of gases is a convenient and safer alternative.</p> <p>For large-scale preparation by the teacher, it may be more cost effective and less time consuming to start with 6% (20 vol) hydrogen peroxide and then top up the reaction mixture with 30% (100 vol) solution (CORROSIVE).</p>
Periodicity of the reaction of the alkali metals with water	<ul style="list-style-type: none"> <li>n/a</li> </ul>	Add indicator to 100 mL of water in a 400 mL beaker. Surround the beaker with a safety shield. Skewer the metal with a dissection probe. Use wire screen to cover the beaker. Lift screen slightly, dislodge the metal off the probe into water. Alternatively, use a video, particularly if the use of the alkali metals is banned in your school board.
Precipitation reactions and tests for cations	<ul style="list-style-type: none"> <li>0.4 mol/L solutions of acids and bases (IRRITANT)</li> <li>0.4 mol/L solutions of metal compounds</li> <li>1 mol/L ammonia</li> </ul>	The volume of solution to be tested should be no more than one fifth of the height of the test tube. This avoids test tube overflow when the second reagent is added and allows agitation of the mixture without splashing over. Ammonia solutions should not be stored for long periods as ammonia gas (TOXIC) is released and the solution

Activity	Concentration	Comments
	<ul style="list-style-type: none"> <li>0.3 mol/L ammonium acetate</li> </ul>	becomes progressively more dilute. Ammonia solutions should only be used in a well-ventilated area. Ammonium acetate is useful to detect calcium ions in solution.
Preparation of soap	<ul style="list-style-type: none"> <li>5 mol/L sodium hydroxide (CORROSIVE)</li> </ul>	The teacher must decide whether the students are capable of performing the procedure safely. A great deal of stirring is required to make a smooth soap. Consider using a mechanical stirrer if it is available.
Rate of reaction (e.g., hydrogen peroxide decomposition)	<ul style="list-style-type: none"> <li>A range of concentrations from 0.6% to 6% (IRRITANT)</li> </ul>	Hydrogen peroxide decomposes over time. Always use fresh supplies for this activity. Store hydrogen peroxide in a refrigerator until needed.
Rate of reaction (e.g., thiosulfate/acid reaction)	<ul style="list-style-type: none"> <li>2 mol/L hydrochloric acid (IRRITANT)</li> <li>A range of sodium thiosulfate concentrations up to 0.2 mol/L</li> </ul>	Investigations at higher concentrations of acid can produce unreliable results. Concentrations above 0.2 mol/L sodium thiosulfate mixed with acid may produce enough sulfur dioxide (TOXIC and CORROSIVE) to cause a problem for asthmatics.
Reducing sugar test	<ul style="list-style-type: none"> <li>Benedict's solution (short shelf life)</li> <li>Fehling's A and B (long shelf life)</li> </ul>	<p>Benedict's solution and Fehling's solution both test for reducing sugars. Benedict's solution contains a less corrosive base (sodium carbonate) than the two-part Fehling's A and B (sodium hydroxide) but has a much shorter shelf life. Both are suitable for Senior science students.</p> <p>Several drops of these solutions are required to produce a positive test. Always use clean test tubes. Residues and particle size are just two of many factors that may cause colour changes.</p>
Salt preparation using dilute acids with metal hydroxides, metal oxides or metal carbonates	<ul style="list-style-type: none"> <li>2 mol/L hydrochloric acid (IRRITANT) or 1 mol/L sulfuric acid (IRRITANT) with 2 mol/L bases (CORROSIVE) including ammonia solution</li> </ul>	<p>10 mL of 2 mol/L hydrochloric acid with 10 mL of 2 mol/L sodium hydroxide solution will produce 1.2 g of sodium chloride.</p> <p>10 mL of 1 mol/L sulfuric acid (IRRITANT) with copper(II) oxide (HARMFUL) or copper(II) carbonate (HARMFUL) produces 1.6 g of copper(II) sulfate crystals (HARMFUL).</p> <p>Note that a 2 mol/L sodium carbonate solution is preferable to 2 mol/L sodium hydroxide solution because it is less corrosive.</p>
Testing for unsaturation in	<ul style="list-style-type: none"> <li>0.001 mol/L acidified potassium permanganate solution</li> </ul>	Add 1 mL of solution to 1 mL of a liquid alkene in a test tube. A colour change indicates the presence of carbon-carbon double or triple bonds.

Activity	Concentration	Comments
organic compounds		