

## Chemical Storage Guidelines

### General Requirements

- Note some items on this list will fit into 2 or more classes, leading to further segregation. For instance a caustic solution that is also an oxidizer would be separated from the other caustics.
- Unless otherwise specified, materials should be stored on shelves with a small lip to help prevent bottles from falling and breaking/spilling.
- Flammable and combustible liquids should be in flammable storage cabinets as much as possible, but in the event of space issues, preference should be given to flammables.

<b>Chemical Type</b>	<b>WHMIS Class</b>	<b>Examples</b>	<b>Storage Recommendations</b>
<b>Flammable liquids – Flash Point &lt;37.4°C</b>	B2	<ul style="list-style-type: none"> <li>• Toluene</li> <li>• Ethanol</li> <li>• Carbon Disulphide (CS<sub>2</sub>)</li> </ul>	<ul style="list-style-type: none"> <li>• Keep in a sealed or metal pipe ventilated, Fire Code approved, flammable storage cabinet</li> <li>• Keep away from oxidizing materials and acids/bases.</li> </ul>
<b>Combustible liquids – Flash Point &gt;37.4°C</b>	B3	<ul style="list-style-type: none"> <li>• Mineral spirits</li> <li>• Ethylene glycol monobutyl ether (EB)</li> </ul>	<ul style="list-style-type: none"> <li>• Recommended to be stored in the same way as flammables.</li> </ul>
<b>Caustic Solids</b>	E	<ul style="list-style-type: none"> <li>• Potassium hydroxide</li> <li>• Sodium hydroxide</li> </ul>	<ul style="list-style-type: none"> <li>• Dry cabinet</li> <li>• Away from acids</li> </ul>
<b>Basic/caustic Solutions</b>	E	<ul style="list-style-type: none"> <li>• Sodium hydroxide/water</li> </ul>	<ul style="list-style-type: none"> <li>• Cabinet with separate drip pan from acids etc.</li> </ul>

<b>Chemical Type</b>	<b>WHMIS Class</b>	<b>Examples</b>	<b>Storage Requirements</b>
<b>Inorganic Acids</b>	E	<ul style="list-style-type: none"> <li>Nitric acid</li> <li>Phosphoric acid</li> <li>Sulfuric acid</li> <li>Hydrofluoric acid (HF (aq))</li> </ul>	<ul style="list-style-type: none"> <li>Store in cabinet of non-combustible material – dedicated acid storage recommended</li> <li>Use plastic secondary containment to contain spills</li> <li>Separate acids into groups - mineral acids, oxidizing acids, special acids (e.g. perc, HF)</li> <li>Separate Perchloric acid from all other acids using non-reactive bins such as glass or equivalent</li> <li>Keep separate from caustic solids and solutions</li> <li>HF - see HF protocol</li> </ul>
<b>Organic Acids</b>	E, various	<ul style="list-style-type: none"> <li>Glacial acetic acid</li> </ul>	<ul style="list-style-type: none"> <li>On shelf in secondary containment, separate from other groups.</li> </ul>
<b>Odourous volatile substances</b>	various	<ul style="list-style-type: none"> <li>Perchloro-ethylene</li> <li>Mercaptans</li> </ul>	<ul style="list-style-type: none"> <li>Can be stored with flammable liquids to reduce odours</li> </ul>
<b>Water Reactives</b>	F	<ul style="list-style-type: none"> <li>Sodium</li> <li>Potassium</li> </ul>	<ul style="list-style-type: none"> <li>In cabinet, typically under inert blanket.</li> <li>Cabinet should withstand water spray in case of fire</li> </ul>

			requiring water suppression
<b>Air Reactives</b>	F	<ul style="list-style-type: none"> <li>• T-butyl lithium</li> <li>• Lithium aluminum hydride</li> </ul>	<ul style="list-style-type: none"> <li>• Store in inert atmosphere away from all other groups.</li> <li>• Follow supplier's specific storage instructions</li> </ul>
<b>Oxidizers</b>	C	<ul style="list-style-type: none"> <li>• Sodium hypochlorite</li> <li>• Benzoyl peroxide</li> <li>• Potassium permanganate</li> </ul>	<ul style="list-style-type: none"> <li>• Store in cabinet of non-combustible material</li> <li>• Separate from flammable and combustible materials</li> </ul>
<b>Reducing agents</b>	C	<ul style="list-style-type: none"> <li>• Oxalic acid</li> <li>• Sodium borohydride</li> <li>• Tin II chloride</li> <li>• Phosphorous acid</li> </ul>	<ul style="list-style-type: none"> <li>• Store away from oxidizers and flammables/combustibles in non-combustible cabinet</li> </ul>
<b>Toxic Gasses</b>	D1A	<ul style="list-style-type: none"> <li>• Hydrogen sulphide</li> <li>• Phosgene</li> <li>• Sulphur dioxide</li> <li>• Arsine</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated ventilated cabinet if concentration is sufficient.</li> <li>• Example – 25ppm CO in N<sub>2</sub> does not need ventilated cabinet.</li> </ul>
<b>Inert Solids</b>	various	<ul style="list-style-type: none"> <li>• Sodium Chloride</li> <li>• KNO<sub>3</sub></li> </ul>	<ul style="list-style-type: none"> <li>• Shelving/cabinets with edge guards</li> </ul>

### ***Peroxide Formers***

The below is quoted from The CRC Handbook of Chemistry and Physics, 101st Edition, 2021-2022 (accessed Apr. 2022). Note that the easiest way to test for peroxides is with commercially available peroxide test strips/sticks.

Because some compounds form peroxides more easily or faster than others, prudent practices require testing the supply on hand in the laboratory on a periodic basis. The following list provides guidelines on test scheduling. The peroxide hazard of the compounds listed in Group 1 is on the basis of time in storage. The compounds in Group 2 present a peroxide hazard primarily due to concentration, mainly by evaporation of the liquid. The compounds listed in Group 3 are hazardous because of the potential of peroxide-initiated polymerization. When stored as liquids, the peroxide formation may increase, and therefore these compounds should be treated as Group 1 peroxidizable compounds.

#### **Group 1 Test Every 3 Months**

Divinyl acetylene  
Isopropyl ether  
Potassium  
Sodium amide  
Vinylidene chloride

#### **Group 2 Test Every 6 Months**

Acetal  
Cumene  
Cyclohexene  
Diacetylene  
Dicyclopentadiene  
Diethyl ether  
Dimethyl ether  
1,4-Dioxane  
Ethylene glycol dimethyl ether (glyme)  
Methyl acetylene  
Methyl isobutyl ketone  
Methyl cyclopentane  
Tetrahydrofuran  
Tetrahydronaphthalene (tetralin)  
Vinyl ethers

#### **Group 3 Test Every 12 Months**

Acrylic acid

Acrylonitrile  
Butadiene  
Chloroprene  
Chlorotrifluoroethene  
Methyl methacrylate  
Styrene  
Tetrafluoroethylene  
Vinyl acetate  
Vinyl acetylene  
Vinyl chloride  
Vinyl pyridine