

### 3.6. Oxidizing Agents – Procedures for Safe Handling and Storage

Oxidizing agents are chemicals that bring about an oxidation reaction. The oxidizing agent may 1) provide oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen) or 2) receive electrons being transferred from the substance undergoing oxidation (chlorine is a good oxidizing agent for electron-transfer purposes, even though it does not contain oxygen). The intensity of the oxidation reaction depends on the oxidizing-reducing potential of the material involved. Fire or explosion is possible when strong oxidizing agents come into contact with easily oxidizable compounds, such as metals, metal hydrides or organics. Because oxidizing agents possess varying degrees of instability, they can be explosively unpredictable.

#### 3.6.1. Examples of Oxidizing Agents

<b>Gases</b>	Fluorine, Chlorine, Ozone, Nitrous Oxide, Oxygen
<b>Liquids</b>	Hydrogen Peroxide, Nitric Acid, Perchloric Acid, Bromine, Sulfuric Acid
<b>Solids</b>	Nitrites, Nitrates, Perchlorates, Peroxides, Chromates, Dichromates, Picrates, Permanganates, Hypochlorites, Bromates, Iodates, Chlorites, Chlorates, Persulfates

#### 3.6.2. Handling

- Appropriate personal protective equipment (e.g., safety goggles, gloves, fire resistant or all cotton lab coat) must be worn when working with oxidizers.
- If a reaction is potentially explosive or if the reaction is unknown, use a fume hood (with the sash down as a protective barrier), safety shield, or other methods for isolating the material or the process.
- Oxidizers can react violently when in contact with incompatible materials. For this reason, know the reactivity of the material involved in an experimental process. Assure that no extraneous material is in the area where it can become involved in a reaction.
- The quantity of oxidizer used should be the minimum necessary for the procedure. Do not leave excessive amounts of an oxidizer in the vicinity of the process.
- Perchloric acid digestions and other procedures using perchloric acid at elevated temperatures must not be performed in a standard chemical fume hood. A specially designed Perchloric Acid Fume Hood must be utilized for this purpose. Contact IUEHS for your respective campus ([see Laboratory Safety Contacts](#)) for more information.

#### 3.6.3. Storage

- Oxidizers should be stored in a cool, dry place.
- Oxidizers must be segregated from organic material, flammables, combustibles and strong reducing agents such as zinc, alkaline metals, and formic acid.
- Oxidizing acids such as perchloric acid and nitric acid must be stored separately in compatible secondary containers away from other acids.

For the purpose of storage, the Uniform and International Building Code and the National Fire Protection Association classify oxidizers based on the increase in the burning rate of the combustible material with which it comes into contact. See Appendix B of this document for the definitions and a list of examples. Contact IUEHS for your respective campus (see [Laboratory Safety Contacts](#)) for more information.