

## Oxidizing Agents-Generic Procedures for Safe Handling and Storage<sup>1</sup>

Oxidizing agents are chemicals that spontaneously evolve oxygen at room temperature or with slight heating and promote combustion. 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 oxidized compounds, such as metals, metal hybrids or organics. Because oxidizing agents possess varying degrees of instability, they can be explosively unpredictable.

### Examples of Oxidizing Agents

Gases:	fluorine, chlorine, ozone, nitrous oxide, oxygen
Liquids:	hydrogen peroxide, nitric acid, perchloric acid, sulfuric acid
Solids:	nitrites, nitrates, perchlorates, peroxides, chromates, picrates, bromates, chlorites, chlorates, permanganates

### Handling

- Appropriate PPE (safety goggles, gloves, lab coat, etc.) should be worn when working with oxidizers.
- If a reaction is potentially explosive, or if the reaction is unknown, use a lab 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 must not be heated in a regular chemical fume hood. A specially designed perchloric acid hood must be utilized for this purpose and there are no perchloric acid fume hoods currently at DRI. For more information refer to [Guidelines for Using and Storing Perchloric Acid](#) on the safety webpage.

### 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. Different spill containment devices in a single cabinet will suffice.

<sup>1</sup>Additional topics, such as appropriate PPE, spill procedures, disposal, etc., must be added in order to use this document as a stand alone training tool to satisfy lab specific training requirements.