

Delivery and Storage of Hydrogen Peroxide

When designing and constructing Hydrogen Peroxide storage and handling equipment, four rules govern the use of H₂O₂:

1. **Never contaminate** - Hydrogen Peroxide can be contaminated by heat or energy, by contact with incorrect materials of construction or by externally introduced materials. Indications of contamination are activation of relief devices, peroxide is rapidly bubbling, temperatures are increasing or steam is evolving from the peroxide solution.

Hydrogen Peroxide is extremely stable at ambient temperatures with losses of less than 1% per year at 72° Fahrenheit, but assay loss increases with temperature rise. For example, losses are 1% per week at 150° Fahrenheit and are 2% per day at 218° Fahrenheit.

Hydrogen Peroxide is compatible with a select list of materials. High purity aluminum and low carbon stainless steel as well as polyethylene, is acceptable for storage tanks. Piping is made from low carbon stainless steel or high purity aluminum and gaskets from teflon or teflon related products. Materials to avoid are copper, brass carbon steel, lead and lubricating oils. All wetted surfaces must be thoroughly cleaned and passivated.

Historically, severe accidents involving Hydrogen Peroxide result from gross contaminations. Examples are wrong materials delivered to a storage tank, process backfeeds into peroxide storage tanks or used peroxide is returned to original container.

2. **Never confine** - Hydrogen Peroxide always decomposes only the rate varies. Any peroxide storage and handling system must be designed with relief devices where peroxide may be trapped. For example, relief devices are required between isolation valves or between a pump and a valve. All ball valves must be specially designed with vented cavities.

3. **Never contact** - personal contact and contact with flammable or combustible materials must be avoided. Personal Protective Equipment is required and varies by the task to be performed. Chemical safety goggles and rubber gloves are required for typical daily work involving peroxide. If exposure potential is increased due to spillage, maintenance or sampling, additional items are required (vinyl acid suit, neoprene boots, full-face shield). Failure to wear the proper PPE could lead to injuries to personnel or ignition of cotton clothes or leather boots.

Any storage or handling area must be clear of combustible materials, such as wood, leaves, paper, etc.

Always have water available whenever Hydrogen Peroxide is used, a reliable water source must be readily available to address spills or contact issues. Safety showers and eyewashes with potable water sources are recommended to address personnel exposure emergencies. A water hose is required to address spills, to put out fires or to cool the tank exterior in the event of decomposition.

FMC Engineering Services has provided solutions to Hydrogen Peroxide storage and handling challenges for nearly 50 years by using these basic principles.