Hydrogen peroxide

Substance	Hazard	Comment
Concentrated hydrogen peroxide solution *(if less than 8.3 M but 2.3 M or more)* *or* *(if '100 volume strength' or less but over '28 volume strength) or* *(if 30% w/v or less but over 8%)*	 **CORROSIVE**	DANGER: causes serious eye damage and may be harmful if swallowed. This is the most-concentrated solution found in schools. Take care to avoid skin contact. It decomposes slowly to produce oxygen gas (see CLEAPSS Student Safety Sheet 51); pressure may build up and care needs to be taken when opening a bottle. It should be stored in the dark. Decomposition is speeded up by catalysts such as some metal oxides and some enzymes. The oxygen formed will assist fires.
Dilute hydrogen peroxide solution *(if less than 2.3 M but 1.5 M or more)* *or* *(if less than '28 volume strength' or but '18 volume strength' or more) or* *(if less than 8% w/v but 5% or more)*	 **IRRITANT**	WARNING: irritating to the eyes (and to the skin, although not officially classified as such). The typical concentration used in school science practical work. It decomposes slowly to produce oxygen gas (see CLEAPSS Student Safety Sheet 51); pressure may build up and care needs to be taken when opening a bottle. It should be stored in the dark. Decomposition is speeded up by catalysts such as some metal oxides and some enzymes.
Very dilute hydrogen peroxide solution *(if less than 1.5 M) or* *(if less than '18 volume strength') or* *(if less than 5% w/v)*	**Currently not classified as hazardous**	It is used for bleaching hair. It decomposes slowly to produce oxygen gas (see CLEAPSS Student Safety Sheet 51); pressure may build up and care needs to be taken when opening a bottle. It should be stored in the dark. Decomposition is speeded up by catalysts such as some metal oxides and some enzymes. Old stock may have insufficient peroxide molecules for the intended activity.

Additional information: Concentration of hydrogen peroxide solutions may be expressed in several different ways:
- Molarity: as with any chemical, the concentration may be given as x mol dm-3, or x M, ie x mol in 1 dm3 of solution
- Percentage, w/v: a y % w/v solution will contain y g hydrogen peroxide in 100 cm3 of solution
- Volume strength: 1 cm3 of z volume strength will give z cm3 of oxygen when it decomposes.

Typical control measures to reduce risk

- Use the lowest concentration and smallest volume possible.
- Wear eye protection for all but the most-dilute solutions.
- Store concentrated solutions away from heat and light, in bottles with special vented caps. Beware of a rapid release of pressure when opening a bottle.
- Avoid accidental contamination of solutions which may speed up the formation of oxygen and pressure build-up.

Assessing the risks

- What are the details of the activity to be undertaken? What are the hazards?
- What is the chance of something going wrong?
  eg could an impurity / catalyst cause rapid decomposition and frothing?
- How serious would it be if something did go wrong?
  eg if the solution splashes onto the skin, is it sufficiently concentrated to cause burns?
- How can the risk(s) be controlled for this activity?
  eg can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

- In the eye — Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111.
- In the mouth/swallowed — Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
- Spilt on the skin or clothing — Remove and soak contaminated clothing. Irrigate the skin affected area with gently-running tap water for at least 20 minutes. Call 999/111 as appropriate.
- Spilt on the floor, bench, etc — For large spills, and especially for (moderately) concentrated solutions, cover with mineral absorbent (eg, cat litter) and scoop into a bucket. Dilute with at least ten times its own volume of water. Rinse the floor etc with plenty of water.
  Wipe up small amounts with a damp cloth and rinse it well.

 ©CLEAPSS® 2022