Activity 2: Chemical storage

This practical activity examines how the storage of chemical substances may have an effect on the chemical’s condition.

Different chemical substances have different storage requirements to ensure that, when a chemical is required, it behaves in the expected manner (for example, it may react in a certain way or at a certain rate). Many chemical substances decompose over time, becoming potentially hazardous or unpredictable in their behaviour.

Equipment

* Solutions A, B, C and D (hydrogen peroxide solutions that were prepared at the same concentration but have been stored differently)
* 12 🞨 paper discs
* Catalase solution
* Glass rod
* 50cm3 measuring cylinder/pipette
* 4 🞨 boiling tubes
* Small beaker
* Boiling tube rack
* Stopwatch
* Eye protection

Safety

Wear eye protection

Refer to [CLEAPSS Student Safety Sheet 57](https://science.cleapss.org.uk/resource/sss057-hydrogen-peroxide.pdf)

Procedure

1. Collect a sample of solution A (freshly prepared 1.7mol dm-3 hydrogen peroxide), catalase solution, and 12 paper discs.
2. Using a small beaker, soak the paper discs in catalase solution.
3. Using a measuring cylinder or pipette, accurately measure 25cm3 of solution A and add to a boiling tube.
4. Place a paper disc on the end of a glass rod, and place at the base of the hydrogen peroxide solution. Start timing immediately.
5. If the paper disc does not drop off the end of the glass rod, try gently tapping the end of the rod you are holding with a pencil.
6. You will see some fizzing in the boiling tube as the catalase enzyme catalyses the decomposition of hydrogen peroxide into oxygen and water, according to the equation:

H2O2 🡪 O2 + 2H2O

1. After a short period, you will see the paper disc rise, as the oxygen generated creates enough buoyancy to lift the disc.
2. When the disc reaches the hydrogen peroxide surface, stop timing.
3. Repeat steps 3 to 7 two more times and calculate an average ‘disc rise time’ for the freshly prepared hydrogen peroxide solution. The disc rise time is a relative measure of the concentration of the solution. The faster the disc rise time, the more concentrated the solution is.
4. Now repeat the entire investigation using three further samples of hydrogen peroxide. All samples were prepared at the same concentration, but have been stored differently:

Solution B – Stored in a darkened glass bottle for 3 months.

Solution C – Stored in a darkened glass bottle for 6 months.

Solution D – stored in a clear glass bottle for 3 months.

Conclusions

1. Select an appropriate means to display your results.
2. Describe the effects on the storage of hydrogen peroxide of:

a. time

b. presence of light.

1. Use data from your experiment to support your descriptions.
2. Suggest why it might be dangerous to store hydrogen peroxide in unsuitable conditions.
3. Explain why the correct storage of chemical substances is important in the workplace.