



91 Sodium hydroxide and other hydroxides

Sodium hydroxide		Caustic soda	NaOH
Lithium hydroxide			LiOH
Potassium hydroxide		Caustic potash	KOH
Corrosive		<p>R35: Causes severe burns.</p> <p>Solutions equal to or stronger than 0.5 mol dm^{-3} are CORROSIVE. Solutions equal to or stronger than 0.05 mol dm^{-3} but less than 0.5 mol dm^{-3} are IRRITANT.</p> <p>Dangerous with: WATER. An exothermic reaction may eject hot solution if only a small amount of water is present.</p> <p>ZINC, ALUMINIUM. Hydrogen is evolved.</p> <p>TRICHOETHANE. A dangerous reaction may occur.</p> <p>WEL (mg m⁻³): 1.0 (STEL) - Lithium hydroxide; 2.0 (STEL) - Sodium/potassium hydroxide.</p> <p>Emergencies: see standard procedures on <i>Hazard E</i>, BUT ALSO:</p> <p>If solution is splashed into the eyes: Flood the eye with gently-running tap water until a first-aid arrives. Unless the solution is very dilute, send the affected person to hospital and ensure that irrigation is continued during the journey.</p>	
Store: CS It absorbs both water and carbon dioxide from the atmosphere. If the solid forms a cake, it may be necessary to dispose of it.		Disposal: W1, W5 W5: Dissolve the solid to make a 1 mol dm^{-3} solution; acidify and pour the solution down a foul-water drain.	
Soda lime and Carbosorb			
Corrosive		<p>R34: Causes burns.</p> <p>If particles are blown into the eyes: Flood the eye with gently-running tap water until a first-aid arrives. Send the affected person to hospital and ensure that irrigation is continued during the journey.</p>	
Store: CS Composition by mass: 5% NaOH, 1% KOH, 0.2% silica, 14-19% water and $\text{Ca}(\text{OH})_2$ to make a total of 100%. It is used to absorb carbon dioxide. <i>Carbosorb</i> is a self-indicating version supplied by VWR containing over 80% sodium hydroxide on a silicate base: it is more efficient than soda lime but more expensive.		Disposal: W1, Wspec Wspec: Add to 1 mol dm^{-3} nitric(V) acid with stirring. When the solid has dissolved, pour the solution down a foul-water drain with more water.	

The use of eye protection must be strictly enforced even when using dilute solutions.

Activity	User	Control measures	Experimental points
Use of alkali solutions	Y7	Wear eye protection.	Solutions should be less than 0.5 mol dm^{-3} . Determine the smallest concentration that enables a procedure to work satisfactorily.
	Y9	Wear goggles.	Solutions should be less than 2 mol dm^{-3} . Determine the smallest concentration that enables a procedure to work satisfactorily.
Use of solid hydroxides	Y9	Wear goggles.	Access should be limited to the quantity that is required. The solid absorbs water. Spatulas or forceps must be used to transfer the solid.
Fehling's solution B and the test for reducing sugars	Y9	Wear goggles.	Avoid the use of Fehling's solution if possible. Use Benedict's solution for food testing with Y7 upwards. Fehling's solution is required for testing with aldehydes. Fehling's solution B is CORROSIVE and, after mixing with copper sulfate(VI) solution, it must be heated in a boiling water bath. Direct heating causes bumping. See <i>Recipe Card 25</i> for its preparation.
Enthalpy changes	Y9	Wear goggles.	2 mol dm^{-3} solutions of alkalis are mixed with 2 mol dm^{-3} acid solutions or 2 mol dm^{-3} salt solutions. These reactions are performed in disposable, expanded-polystyrene cups which should be supported in glass beakers.
Saponification of oils (hydrolysis of lipids and the making of soap)	Y9	Wear goggles. Wear disposable nitrile gloves. Y9 will require very close supervision.	Hot concentrated sodium hydroxide solution is VERY CORROSIVE. Use no more than 15 cm^3 of 5 mol dm^{-3} sodium hydroxide solution per activity. With some pupils it may be better to have beakers with the required amount of solution already measured out and, for others, this is better as a demonstration. Use borosilicate glass beakers for the reaction. Spills are most likely to occur during stirring of hot liquids. Students above Y12 should use <i>Quickfit</i> or similar apparatus. Pupils must not put the soap they make on their skin.
Making solutions	Y12	Wear goggles.	Add solid pellets a few at a time to water with stirring. (See <i>Recipe Card 65</i> .) A great deal of heat is generated.
Using soda lime in spirometers	TT	Wear goggles or a face shield. Ensure air is breathed <i>out</i> through the soda lime.	Full details are provided in <i>Handbook 14.5</i> . Take care not to raise dust when handling the solid. There is no need for pupils to wear eye protection when using the spirometer.