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| Topic | Making a standard solution of NaOH | Level | Any course for students aged 14-18 |
| Outcomes | To make a standard solution of NaOH by following a standard method | | |

There is nothing standard about a standard solution!

What is a standard solution?

Today you are going to make a 0.20 mol dm^{-3} standard solution of NaOH. A **standard solution** is a solution whose concentration is known accurately.

Concentration is usually given the unit mol dm^{-3} or M. When making up a standard solution it is important that the correct mass of substance is accurately measured. It is also important that all of this substance is successfully transferred to the volumetric flask used to make up the solution. The following procedure will make sure that this happens.

Background calculations

1. Work out the number of moles of NaOH needed to make up a solution of 250 cm^3 of 0.2 mol dm^{-3} NaOH.

2. Using your answer from step 1, work out the mass of NaOH (s) that you will need to dissolve to make your solution. Show your working in the space below.

Before you start, read the method below and list the apparatus below that you will require:

Method

| Steps | Questions (note down your answers below) |
|---|---|
| Put on gloves and lab coat | What is the hazard associated with NaOH? |
| Take a weighing boat and place it on the balance. Tare the balance (set it to zero). Carefully weigh out the required mass of NaOH pellets that you calculated above. Use tweezers to move individual pellets. You only need to be accurate to 2 dp. Crush the tablet if necessary. | Why does NaOH come in pellet and not powdered form? |
| Transfer this amount of solid to a large beaker. Add approx. 50 cm ³ of water from a wash bottle and using a stirring rod dissolve the NaOH. | Why not place the NaOH directly into the volumetric flask? |
| Use some extra water from the wash bottle to rinse all the NaOH off the weighing boat. | Why rinse the weighing boat? |
| Once the NaOH is fully dissolved, transfer the solution to the volumetric flask using a glass funnel. Be careful not to spill even a drop. | Why use a glass funnel and not a plastic funnel? |
| Use more water from the wash bottle to rinse out the beaker and the glass rod. Do this at least twice. Be careful not to add too much water or else you will over fill the volumetric flask. | Why perform the rinse twice? |
| Add water to the volumetric flask so that the bottom of the meniscus is on the line of the flask. Put the stopper on the flask and invert the flask over a couple of times to mix the solution. Ensure you firmly hold onto the stopper. | What would you need to do if you overfilled the volumetric flask? |

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| Label your solution with your name, the date, and the concentration | Why label your bottle with the date? |
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Questions

1. When you are finished, bring your flask to the front of the class and place on the teacher's bench.
2. Answer the questions listed in the table in your books or on paper.
3. With your partner, plan how you could determine the concentration of your standard solution to prove that it is of concentration 0.2 mol dm^{-3} ?

Progress: further resources on amounts of substance are available here <http://www.thescienceteacher.co.uk/moles/>