Making Standard Solutions

What is a standard solution?

A **standard solution** is a solution whose concentration is known accurately. Its concentration is usually given in mol dm^{-3}. 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 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 needed to make up a solution with the required volume and concentration.

   Show your working in the space below.

moles = concentration x volume

concentration is in mol dm^{-3} … and …

volume is in dm^3, so if the volume is given in cm^3, divide it by 1000 to get dm^3

2. Now work out the relative formula mass, M_r, of the chosen substance. Show your working in the space below.

To find the M_r of carbon dioxide, CO_2:
CO_2 has … 1 carbon atom … 1 x 12 = 12
2 oxygen atoms … 2 x 16 = 32
add together … = 44

3. Work out the mass of substance needed using your answers from steps 1 and 2. Show your working in the space below.

It helps to remember that:
"mass is mister mole", or
mass = M_r x mole

Making up the solution

- Take a watch glass and place it on the balance. Tare the balance (set it to zero).
  Carefully weigh out the required mass of substance.
- Transfer this amount to a beaker. Add water from a wash bottle to dissolve it.
  Use some of the water to rinse all the substance off the watch glass. Do this at least twice.
- Stir with a glass rod until all the solid is dissolved, then transfer the solution to the volumetric flask.
  Use more water from the wash bottle to rinse out the beaker and the glass rod. Do this at least twice.
- Add water to just below the line on the volumetric flask.
  Add the final drops with a teat pipette to ensure that the bottom of the meniscus is on the line.
- **Put the lid on the flask** and turn the flask over a couple of times to mix the solution.
- **Label your solution** with your **name**, the **date**, and the **contents**, e.g. 2.0M NaCl. Then tidy up!

