Handling Dilution Problems

Questions involving the **dilution** of solutions seem to cause students some difficulty.

It is important to successfully carry out dilution calculations with confidence.

A simple equation can be used. It is explained below.

Consider a small volume of aqueous solution of sodium chloride in a large beaker. Now consider adding a volume of water to dilute the salty water. The volume and concentration have obviously changed. **BUT** the number of moles of salt that were dissolved, before and after, are unchanged.

The number of moles **before** dilution, n_1, can be calculated from the volume before, v_1, and the concentration before, c_1.

Also, the number of moles **after** dilution, n_2, can be calculated from the volume after, v_2, and the concentration after, c_2.

So $n_1 = c_1 \times v_1$ & $n_2 = c_2 \times v_2$

But $n_1 = n_2$

So

$$c_1 \times v_1 = c_2 \times v_2$$

Question:

If you diluted 300 cm^3 (v_1) of 2.00 mol dm^{-3} (c_1) hydrochloric acid with 200 cm^3 of water, what would the new concentration (c_2) be?

Answer:

The final volume, v_2 , must be 300 cm^3 +200 cm^3= 500cm^3

$$c_2 = (c_1 \times v_1)/v_2 = (2.00 \times 300)/500 = \mathbf{1.20} \text{ mol } dm^{-3}$$

Rearranging this equation allows you to successfully handle dilution calculations.

Just make sure you can pick out c_1, v_1, c_2, and v_2, in a question!

Now have a go at the quiz.