How many ml of water have to be added to 300 mL of NaCl 0.25 to achieve a final concentration of 0.1 M?

	concentration (M)	volume (mL)
initial	0.25	300
final	0.1	?

$$c_1 \cdot V_1 = c_2 \cdot V_2$$

$$V_2 = \frac{c_1}{c_2} \cdot V_1 = \frac{0.25}{0.1} 300 = 750\ mL$$

350 mL (V_2-V_1) have to be added

55 ml of hydrochloric acid at 21%(w/w) with density 1.22 g/ml are mixed with 35 m of the same acid at 30% (w/w) with density 1.45 g/ml.

What is the molar concentration of the final solution?

1. Mass of 55 ml with d=1.22 g/ml → 55 x 1.22 = 67.1 g

   mass of HCl in 21% sol → 67.1 x 0.21=14.1 g

2. Mass of 35 ml with d=1.45 g/ml → 35 x 1.45 = 50.75 g

   mass of HCl in 30% sol → 50.8 x 0.3 = 15.2 g

3. Moles of HCl $mass_1+mass_2/MW$ → 14.1 + 15.2 / 36.46 = 0.8 mol

4. Final concentration Mol_{HCl} / Final Volume → 0.8 / 0.05+0.035 = 9.45 M

Calculate the final concentration of a solution obtained by mixing 45 ml of potassium sulphate 50% w/w (d=1.2g/ml) with 50ml of a 0.8 M solution of the same salt.

1. Mass of 50 ml, d=1.2 mg/ml → 50 ml x 1.2 g/ml = 60 g

2. Mass of K_2SO_4 → 60g x 0.5 = 30 g

3. Moles of K_2SO_4 g/MW → 30 / 174.26 = 0.172 moles

4. K_2SO_4 in 50 ml of 0.8 M solution → C x V ; 0.8 x 0.05 = 0.04 moles

5 . Final concentration $Mol_1 + Mol_2 / V_1 + V_2$

0.174 + 0.04 / 0.05 + 0.05 = 2.14 M