

Empirical Formulae

- 1 Solvents are used to dissolve substances that cannot dissolve in water.

A sample of one solvent contains 1.2 g of carbon, 0.30 g of hydrogen and 0.80 g of oxygen.

Relative atomic masses: H = 1; C = 12; O = 16.

Calculate the empirical (simplest) formula of the solvent.

You must show all of your working to gain full marks for this question.

$$1.2/12 \qquad 0.30/1 \qquad 0.80/16 \quad [1\text{mark}]$$

$$= 0.1 \qquad 0.30 \qquad 0.05 \quad [1 \text{ mark}]$$

$$2 \qquad 6 \qquad 1 \quad [1\text{mark}]$$

$$\text{Formula} = \text{C}_2\text{H}_6\text{O}_1 \quad [1 \text{ mark}]$$

You won't get full marks if you only show the answer for this question. If you make a mistake with the numbers, but do the correct working, you lose only one mark.

(4 marks)

- 2 A powder that can be used to make paints contains the following proportions of elements.

38.0 lead (Pb) 6.5% chlorine (Cl) 1.1% carbon (C) 4.4% oxygen (O)

Calculate the empirical formula of this compound.

To gain full marks you must show all your working.

Relative atomic masses: C = 12 ; O = 16 ; Cl = 35.5 ; Pb = 207

$$38/207 \qquad 6.5/35.5 \qquad 1.1/12 \qquad 4.4/16 \quad [1\text{mark}]$$

$$= 0.183 \qquad 0.183 \qquad 0.091 \qquad 0.275 \quad [1 \text{ mark}]$$

$$2 \qquad 2 \qquad 1 \qquad 3 \quad [1\text{mark}]$$

$$\text{Formula} = \text{Pb}_2\text{Cl}_2\text{CO}_3 \quad [1 \text{ mark}]$$

Some funny looking numbers in this one, so important that you calculate carefully. If you get numbers like this, i.e. not whole numbers or simple decimals then always double check.

(4 marks)

- 3 A sample of a lead oxide used in paint was found to contain 12.42g of lead and 1.28g of oxygen.

Calculate the empirical (simplest) formula of this compound. You must show all your working to gain full marks.

Relative atomic masses: O = 16; Pb = 207.

$$12.42/207 \qquad 1.28/16 \qquad [1\text{mark}]$$

$$= 0.06 \qquad 0.08 \qquad [1 \text{ mark}]$$

$$3 \qquad 4 \qquad [1\text{mark}]$$

$$\text{Formula} = \text{Pb}_3\text{O}_4 \qquad [1 \text{ mark}]$$

If you divided through by the smallest, you get a 1 : 1.333 ratio. You can't have decimals but if you look, you can see the numbers simplify to 3 : 4

(4 marks)