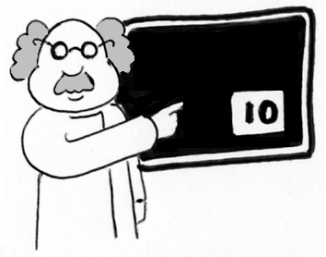


STARTER FOR 10...

0.2.9. Moles and concentration

To calculate the concentration of a solution we use the equation:

$$\text{concentration (mol dm}^{-3}\text{)} = \frac{\text{amount of substance (mol)}}{\text{volume (dm}^3\text{)}}$$

Use the equation to help you complete each of the statements in the questions below.

1. a. 1.5 mol of NaCl dissolved in 0.25 dm^3 of water produces a solution with a concentration of.....mol dm^{-3}. (1 mark)

b. 250 cm^3 of a solution of HCl(aq) with a concentration of 0.0150 mol dm^{-3} contains .....moles. (1 mark)

c. A solution with a concentration of 0.85 mol dm^{-3} that contains 0.125 mol has a volume of .....dm^3. (1 mark)

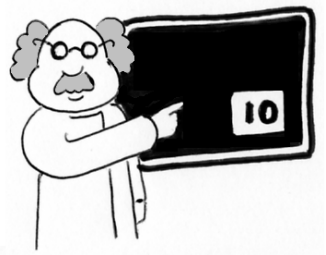
2. In this question you will need to convert between an amount in moles and a mass as well as using the equation above.

Space for working is given beneath each question.

a. 5.0 g of $NaHCO_3$ dissolved in 100 cm^3 of water produces a solution with a concentration of .....mol dm^{-3}. (2 marks)

b. 25.0 cm^3 of a solution of NaOH(aq) with a concentration of 3.8 mol dm^{-3} contains ..... g of NaOH. (2 marks)

c. The volume of a solution of cobalt(II) chloride, $CoCl_2$, with a concentration of 1.3 mol dm^{-3} that contains 2.5 g of $CoCl_2$ is .....cm^3. (3 marks)



STARTER FOR 10...

0. TRANSITION SKILLS Answers

0.2.8. Moles and mass

1. a. 32.0 g ÷ 16.0 g mol^{-1} = 2 mol *(1 mark)*
b. 175 g ÷ 100.1 g mol^{-1} = 1.75 mol *(1 mark)*
c. 0.2 g ÷ 180.0 g mol^{-1} = 0.0011 mol *(1 mark)*

2. a 20 mol × 180 g mol^{-1} = 3 600 g *(1 mark)*
b 5.00×10^{-3} mol × 63.5 g mol^{-1} = 0.318 g *(1 mark)*
c 42.0 mol × 249.6 g mol^{-1} = 10 500 g *(1 mark)*

3. a. i. 3.09 g ÷ 0.0250 mol = 123.6 g mol^{-1} *(1 mark)*
ii. $CuCO_3$ *(1 mark)*
b. molar mass of chromium carbonate = 4.26 g ÷ 0.015 mol = 284 g mol^{-1} *(1 mark)*
$Cr_2(CO_3)$ *(1 mark)*

BONUS QUESTION
6.02×10^{23} p ÷ 7 500 000 000 people = 8.03×10^{13} p per person or 803 000 million pounds per person!

0.2.9. Moles and concentration

1. a. 1.5 mol ÷ 0.25 dm^3 = 6.0 mol dm^{-3} *(1 mark)*
b. 0.25 dm^3 × 0.0150 mol dm^{-3} = 3.75×10^{-3} mol *(1 mark)*
c. 0.125 mol ÷ 0.85 mol dm^{-3} = 0.15 dm^3 *(1 mark)*

2. a. 5.0 g ÷ 84.0 g mol^{-1} = <u>0.0595 mol</u> *(1 mark)*
0.0595 mol ÷ 0.100 dm^3 = <u>0.60 mol dm^{-3}</u> *(1 mark)*
b. 0.025 dm^3 × 3.8 mol dm^{-3} = <u>0.095 mol</u> *(1 mark)*
0.095 mol × 40.0 g mol^{-1} = <u>3.8 g</u> *(1 mark)*
c. 2.5 g ÷ 129.9 g mol^{-1} = <u>0.0192 mol</u> *(1 mark)*
0.0192 mol ÷ 1.3 mol dm^{-3} = <u>0.015 dm^3</u> *(1 mark)*
0.0148 dm^3 = <u>15 cm^3</u> (to 2 sig. fig.) *(1 mark)*