GCSE and IGCSE Chemistry: Moles and Calculations Worksheet - Mark Scheme

Year 10-11 · GCSE (AQA 4.3) and Cambridge IGCSE 0620 topic 3 · Exam-style questions

Section A: Relative formula mass and percentage by mass [11 marks]

1	H_2O 18; CO_2 44; NaOH 40; H_2SO_4 98; $Ca(OH)_2$ 74; $(NH_4)_2SO_4$ 132. Guidance: 1 mark each for the correct Mr (working shown).	**6**
2	(a) 16 ÷ 40 × 100 = 40% (2). (b) Mr = 160 (1); 112 ÷ 160 × 100 = 70% (2). Guidance: Allow 1 mark for each correct Mr.	**5**

Section B: The mole [8 marks]

3(a)	36 ÷ 18 (1) = 2 mol (1)	**2**
3(b)	0.5 × 44 (1) = 22 g (1)	**2**
3(c)	4.9 ÷ 98 (1) = 0.05 mol (1)	**2**
3(d)	0.5 × 6.02 × 10^{23} (1) = 3.01 × 10^{23} (1)	**2**

Section C: Reacting masses and limiting reactants [11 marks]

4(a)	2.4 ÷ 24 = 0.1 mol	**1**
4(b)	0.1 mol (1 : 1 ratio)	**1**
4(c)	0.1 × 2 (1) = 0.2 g (1)	**2**
5	Moles Mg = 6 ÷ 24 = 0.25 mol (1); moles MgO = 0.25 mol (1); mass = 0.25 × 40 = 10 g (1)	**3**
6	Moles H_2 = 4 ÷ 2 = 2 mol; moles O_2 = 16 ÷ 32 = 0.5 mol (1). 0.5 mol O_2 needs 1 mol H_2, so hydrogen is in excess and oxygen is limiting (1). Moles water = 1 mol (1). Mass = 1 × 18 = 18 g (1).	**4**

Section D: Concentration, gases and yield [14 marks]

7(a)	250 cm^3 = 0.25 dm^3 (1); 5 ÷ 0.25 = 20 g/dm^3 (1)	**2**
7(b)	0.025 × 0.10 (1) = 0.0025 mol (1)	**2**
7(c)	Moles NaOH = 0.025 × 0.10 = 0.0025 mol (1); 1 : 1 ratio so moles HCl = 0.0025 (1); volume = 0.020 dm^3 (1); concentration = 0.0025 ÷ 0.020 = 0.125 mol/dm^3 (1)	**4**
7(d)	0.2 × 24 (1) = 4.8 dm^3 (1)	**2**
7(e)	9 ÷ 12 × 100 (1) = 75% (1)	**2**
8	Any two: reaction is reversible / does not go to completion; some product is lost when separating; side reactions make other products; some reactants do not react. Guidance: 1 mark each.	**2**

Total: 44 marks. Accept any scientifically correct alternative wording.