IGCSE CHEMISTRY 0620 – MARK SCHEME

Exam-style Practice Paper: The Mole and Stoichiometry

Maximum mark: **34**

How to use this mark scheme

- **;** separates marking points: award 1 mark for each point.
- **/** separates alternative answers for the same marking point.
- **allow** = accept this answer. **do not allow** = do not give a mark for this answer.
- ( ) words in brackets are not needed for the mark. Underlined words must be present.
- **ecf** = error carried forward: give the mark if a wrong earlier answer is used correctly.
- Award full marks for a correct final answer with no working, unless the question says “show your working”.

Question	Answer	Marks	Guidance
1(a)	sum of the relative atomic masses of all the atoms in the formula	1	allow: total of the A_r values of the atoms shown in the formula
1(b)	CO_2 = 44 ; MgO = 40 ; $CaCO_3$ = 100 ;	3	1 mark each. do not allow units (e.g. 44 g).
1(c)(i)	$2Mg + O_2 \rightarrow 2MgO$	1	allow multiples, e.g. 4, 2, 4
1(c)(ii)	$2Na + 2H_2O \rightarrow 2NaOH + H_2$	1	allow multiples
2(a)	6.02×10^{23} (per mole)	1	allow 6×10^{23}
2(b)(i)	8.8 ÷ 44 = 0.20 (mol)	1	
2(b)(ii)	$0.20 \times 6.02 \times 10^{23} = 1.2 \times 10^{23}$	1	allow 1.204×10^{23}; ecf from (b)(i)
2(b)(iii)	$0.20 \times 24 = 4.8$ (dm^3)	1	ecf from (b)(i)
2(c)	0.25 × 100 = 25 (g)	1	ecf from M_r of $CaCO_3$ in 1(b)
2(d)	H_2: 1.0 ÷ 2 = 0.5 mol molecules so 1.0 mol (of H) atoms **and** He: 1.0 ÷ 4 = 0.25 mol atoms ; hydrogen contains more atoms (four times as many) ;	2	Second mark depends on a correct comparison of moles of atoms. do not allow: hydrogen has more atoms because it is lighter (no moles).
3(a)(i)	25.0 ÷ 100 = 0.25 (mol)	1	
3(a)(ii)	M_r CaO = 56 ; 0.25 × 56 = 14 (g) ;	2	ecf from (a)(i). Correct answer with no working = 2 marks.
3(a)(iii)	$0.25 \times 24 = 6.0$ (dm^3)	1	ecf from (a)(i)
3(b)(i)	(11.2 ÷ 14.0) × 100 = 80 (%)	1	ecf from (a)(ii)

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Question	Answer	Marks	Guidance
3(b)(ii)	any one from: not all the $CaCO_3$ decomposed / not heated for long enough ; some solid lost (e.g. when transferring or spitting out) ;	1	allow: reaction incomplete do not allow: human error / mistakes in measuring (too vague)
4(a)	the simplest whole-number ratio of the atoms of each element in a compound	1	allow: simplest ratio of atoms / moles of atoms do not allow: ratio of elements (no 'simplest')
4(b)	dividing each percentage by A_r: C 40.0 ÷ 12 = 3.33, H 6.7 ÷ 1 = 6.7, O 53.3 ÷ 16 = 3.33 ; ratio 1 : 2 : 1 ; CH_2O ;	3	M1 for dividing all three by A_r M2 for dividing by the smallest M3 for the correct formula CH_2O with no working = 1 mark only
4(c)	M_r of CH_2O = 30 and 180 ÷ 30 = 6 ; $C_6H_{12}O_6$;	2	ecf from (b) allow: atoms in any order
5(a)(i)	4.0 ÷ 0.250 = 16 (g/dm^3)	1	do not allow: 4.0 ÷ 250
5(a)(ii)	16 ÷ 40 = 0.40 (mol/dm^3)	1	allow (4.0 ÷ 40) ÷ 0.250. ecf from (a)(i)
5(b)(i)	20.05 ; 19.95 ; 20.00 (all three correct)	1	all three needed, to 2 decimal places
5(b)(ii)	(20.05 + 19.95 + 20.00) ÷ 3 = 20.00 (cm^3)	1	do not allow: mean that includes the rough titre (20.18)
5(b)(iii)	moles NaOH = 0.0250 × 0.100 = 0.00250 ; moles H_2SO_4 = 0.00250 ÷ 2 = 0.00125 ; concentration = 0.00125 ÷ 0.0200 = 0.0625 (mol/dm^3) ;	3	ecf at each step, including from (b)(ii) allow 0.063 M3: volume must be in dm^3 (÷ 1000)
5(c)	M_r NH_4NO_3 = 80 and mass of N = 28 ; (28 ÷ 80) × 100 = 35 (%) ;	2	do not allow 14 ÷ 80 × 100 = 17.5% (only one N counted) for M2, but award M1 if M_r = 80 is shown
	Total	**34**	

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