

Formulas and Balanced Equations

Q1. (2018) – 8a (ii)

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	$N_2 + 3H_2 \rightarrow 2NH_3$ (2) left hand side formulae (1) balancing of correct formulae (1)	accept multiples allow = or $\rightleftharpoons$ in place of $\rightarrow$ ignore state symbols even if incorrect do not allow N2, n2, etc	(2) AO 2 1

Q2. (2019) – 4d

Question number	Answer	Additional guidance	Mark
4(d)(i)	100 with or without working scores 2 $40 + 12 + 3 \times 16$ (1) $= 100$ (1)	ignore any units ecf for MP2 if using 12,16 and 40, using addition and multiplication only	(2)

Q3. (2019)

Question number	Answer	Additional guidance	Mark
5(a)(i)	14(.2) with or without working scores 3 1kg = 1000g (1) .142 (1) 1000 $\times 100\% = 14(.2)$ (1)	If the percentage of non nickel compounds is calculated to give 85.8%/86% score 2 .142 or 0.142 will score MP1 and MP2 1000 $.142 \times 100 = 14200$ scores (1) 1	(3)

Q4. (2019) – 5b

Question number	Answer	Additional guidance	Mark
5(b)(i)	$2NiS + 3O_2 \rightarrow 2NiO + 2SO_2$ (2) all four formulae (1) balancing correct formulae only (1)	allow = for $\rightarrow$ allow multiples if wrong subscript or misuse of capital/small letter e.g. O2, O ² , niO, NIS, allow MP1 but cannot score MP2 if more than 4 formulae, can score MP1 but not MP2 ignore state symbols	(2)

Q5. (2020) – 1b

Question number	Answer	Additional guidance	Mark
1(b)	final answer of 14 with or without working (3) OR $\frac{2.9}{5.0} = 0.58$ (1) $0.58 \times 100 = 58\%$ (1) 14 (1)	allow ECF allow 13.8-14.0	(3)

Q6. (2020) – 2c

Question number	Answer	Additional guidance	Mark
2(c)	Na_2SO_4	allow SO_4Na_2 allow upper case A ignore any charges on ions reject non-subscript 2 & 4	(1)

Q7. (2020)

A)

Question number	Answer	Additional guidance	Mark
3(a)(i)	Left : H_2SO_4 (1) Right : CuSO_4 (1)	reject superscript numbers reject superscript numbers incorrect balancing max 1	(2)

B)

Question number	Answer	Mark
3(a)(ii)	$63.5 + 12 + 3 \times 16$ (1) $= 123.5$ (1)	(2)

Q8. (2020) – 10b (ii)

Question number	Answer	Additional guidance	Mark
10(b)(ii)	$\text{NH}_3 + \text{HNO}_3 \rightarrow \text{NH}_4\text{NO}_3$ LHS (1) RHS (1)	allow multiples	(2)

Q9. (2021) – 2b, 2c (i)

A)

Question number	Answer	Additional guidance	Mark
2(b)	molecular formula: C_2H_4 (1) empirical formula: CH_2 (1)	allow H_4C_2 allow H_2C allow use of small letter / superscripts / non-subscripts	(2) AO2

B)

Question number	Answer	Additional guidance	Mark
2(c)(i)	$\text{Cl}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{HCl}(\text{aq}) + \text{HClO}(\text{aq})$ (3)	all three formulae (only) on correct sides of equation with no incorrect balancing (2) two formulae correct regardless of any other error (1) all three state symbols (1) Do not allow incorrect symbols or non subscripts eg CL^2	(3) AO2

Q10. (2022)

Question number	Answer	Mark
2(a)	A solid aqueous aqueous liquid is the only correct answer B is incorrect because hydrochloric acid is aqueous C and D are incorrect as barium hydroxide is a solid	(1) AO1-1

Q11. (2022) – 3c

Question number	Answer	Additional guidance	Mark
3(c)	$\text{MgCO}_3 + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ (1)	reject any number in front of MgCl_2 reject upper case {G / L} / lower case m allow non-subscript 2 but reject superscript 2. ignore correct charges	(1) AO2-1

Q12. (2022) – 6b (ii)

Question number	Answer	Mark
6(b)(ii)	C $\text{Ti}(\text{SO}_4)_2$ is the only correct answer A, B and D are incorrect formulae	(1) AO1-1

Q13. (2022) – 7b

Question number	Answer	Additional guidance	Mark
7(b)	$2 \text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$ (2) MP1 : formula of product (1) MP2 : balancing (of correct formulae) (1)	MP2 dependent on MP1 allow correct multiples throughout	(2) AO2-1

Q14. (2023) – 2b, 2c

A)

Question number	Answer	Additional guidance	Mark
2(b)	in either order: calcium chloride (1) water (1)	allow phonetic spellings but reject calcium chlorine allow CaCl_2 but formula must be correct for the mark ignore 'solution' / any state symbols allow H_2O but formula must be correct for the mark if three products given, allow (1) only if both correct products are given. four or more products scores (0)	AO2 1 (2)

B)

Question number	Answer	Mark
2(c)	C s aq is the only correct answer A, B and D are not correct because the calcium hydroxide is a solid and the acid is an aqueous solution.	AO2 1 (1)

Q15. (2023)

Question number	Answer	Additional guidance	Mark
5(a)(i)	$\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ (3)	MP1: three formulae and no others on correct sides of an equation. allow incorrect cases and subscripts e.g. n^2 (1) MP2 depends on MP1: balancing these correct formulae, allow multiples (1) MP3: stand alone mark: equilibrium symbol, allow $\rightleftharpoons$, $\approx$ (1) allow equation written in reverse	AO2 1 (3)

Q16. (2023)

Question number	Answer	Additional guidance	Mark
9(a)(i)	$\text{C}_6\text{H}_8\text{N}_2\text{SO}_2$	Letters can be in any order e.g $\text{C}_6\text{N}_2\text{H}_8\text{O}_2\text{S}$ (1) must be written as a formula numbers do not have to be subscripts ignore any formula with brackets	AO2 1 (1)

Q17. (2024)

Question number	Answer	Mark
2(a)(i)	$\text{Ba}(\text{OH})_2(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{BaCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$	(1) AO2-1

Q18. (2024) – 5b (ii)

Question number	Answer	Mark
5(b)(ii)	C $\text{Cd}_3(\text{PO}_4)_2$ is the only correct answer A, B and D are incorrect formulae of cadmium phosphate	(1) AO1-1