

Formulas and Balanced Equations

Q1. (2018) – 2b

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	carbon dioxide	Allow CO ₂ Reject carbon monoxide/ CO	(1) AO 1 1

Q2. (2018) – 3b

Question Number	Answer	Additional guidance	Mark
3(b)	(splint) (re)lights	allow alternatives indicating that splint burns e.g. flame allow glows more brightly reject squeaky pop	(1) AO 1 1

Q3. (2018) – 3e

Question Number	Answer	Additional guidance	Mark
3(e)	2H ₂ O ₂ (aq) → 2H ₂ O(l) + O ₂ (g) (2) OR 2H ₂ O ₂ (1) state symbols l, g (1)	do not allow first marking point if equation unbalanced allow capital or small letters for state symbols do not allow words for state symbols	(2) AO 1 1 AO 2 1

Q4. (2018)

Question Number	Answer	Additional guidance	Mark
6(a)	SO ₂	allow O ₂ S reject SO ₂ , SO ²	(1) AO 2 1

Q5. (2018)

Question Number	Answer	Additional guidance	Mark
9(a)	Na : O $\frac{0.92}{23} : \frac{0.32}{16}$ (1) $\frac{0.04}{2} : \frac{0.02}{1}$ (1) (empirical formula from ratio) Na ₂ O (1)	formula alone scores 0 2 nd MP is either for working out correct number of moles OR for finding the correct ratio by dividing by the smaller number from an incorrect first step 3 rd MP is for correctly converting a ratio to a formula with whole numbers only example $\frac{23}{0.92} : \frac{16}{0.32}$ 25 : 50 (0) 1 : 2 (1) Na ₂ O (1)	(3) AO 2 1

Q6. (2018) – 10c (ii)

Question Number	Answer	Mark
10(c)(ii)	C -COOH The only correct answer is C <i>A is not correct because this is functional group of alcohols</i> <i>B is not correct because this is a methyl group</i> <i>D is not correct because this is not a functional group</i>	(1) AO 1 1

Q7. (2019) – 1d

Question number	Answer	Mark
1(d)	B a glowing splint will relight when placed in the gas is the only correct answer A describes the test for carbon dioxide C describes the test for hydrogen D describes the test for an alkaline gas such as ammonia	(1)

Q8. (2019)

A)

Question number	Answer	Mark
7(a)(i)	An explanation linking one of the following pairs - the test only detects that ion (1) - so no confusion with other ions (1) OR - if same result is given by more than one ion (1) - do not know which ion is present (1)	(2)

B)

Question number	Answer	Additional guidance	Mark
7(a)(ii)	carbon dioxide	allow CO ₂ ignore CO ² / CO2 / Co ₂	(1)

C)

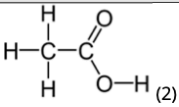
Question number	Answer	Additional guidance	Mark
7(a)(iii)	(3)	chloride ion – white precipitate (1) iodide ion – yellow precipitate (1) sulfate ion – white precipitate (1) 1 mark for each line If more one line connects a left hand box to those on the right, do not award that mark	(3)

Q9. (2019) – 10b

A)

Question number	Answer	Mark
10 (b)(i)	B oxidised is the only correct answer A, C and D are factually incorrect	(1)

B)

Question number	Answer	Additional guidance	Mark
10 (b)(ii)	 or correct carboxylic acid group (1) correct methyl group (1)	allow correct dot and cross diagram ignore incorrect bond angles allow OH for O-H reject methyl group with additional carbons max 1 mark if double bond present 2 carbons	(2)

Q10. (2020)

Question number	Answer	Additional guidance	Mark
3(a)(i)	potassium + lead (1) → lead + potassium (1) iodide nitrate iodide nitrate left hand side (1) right hand side (1)	ignore formulae	(2)

Q11. (2020) – 4b (i), 4c (i, ii)

A)

Question number	Answer	Mark
4(b)(i)	solution solution of P solution of Q anion bromide • carbonate • chloride • iodide • sulfate Each line 1 mark Do not award mark if more than one line join the left hand boxes with those on the right	(2)

B)

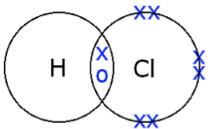
Question number	Answer	Additional Guidance	Mark
4(c)(i)	- green (1) - precipitate / (insoluble) solid (1)	allow any shades of green e.g. light green, grey green, blue green but no other colours (1)	(2)

C)

Question number	Answer	Mark
4(c)(ii)	C sodium sulfate A,B and D are incorrect because they are not products of the reaction	(1)

Q12. (2020) – 5b (iii, iv)

A)

Question number	Answer	Additional guidance	Mark
5(b)(iii)		6 electrons drawn in outer shell of Cl (1) ignore inner shells of electrons even if incorrect	(1)

B)

Question number	Answer	Additional guidance	Mark
5(b)(iv)	covalent	ignore other words reject ionic / metallic	(1)

Q13. (2020) – 7b (ii)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} \quad (2) $	allow 1 for any molecule containing 2 carbon atoms and one single C-C bond OR any molecule containing one C-O-H allow the OH without bond between allow dot-and-cross diagrams	(2)

Q14. (2021) – 4c

Question number	Answer	Additional guidance	Mark
4(c)	An explanation linking use hydrochloric acid (rather than sulfuric acid) (1) (as) sulfuric acid contains sulfate ions (1)	Allow nitric acid allow use a different acid	(2) AO3

Q15. (2021) – 5b

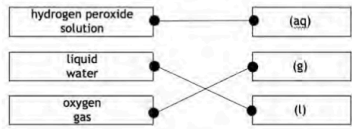
Question number	Answer	Additional guidance	Mark
5(b)	$\frac{1.19}{119}$ and $\frac{1.42}{35.5}$ (1) 0.01 : 0.04 (1) SnCl_4 (1)	allow ECF	(3) AO2

Q16. (2021)

A)

Question number	Answer	Additional guidance	Mark
6(a)(i)	hydrogen peroxide → water + oxygen	allow symbol equation if all symbols and balancing are correct	(1) AO2

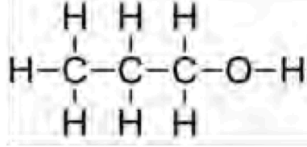
B)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	 (2) all correct (2) 1 correct (1)	reject multiple lines	(2) AO1

C)

Question number	Answer	Additional guidance	Mark
6(b)	A description to include glowing splint (1) relights (1)	MP2 is dependent on MP1	(2) AO1

Q17. (2021)

Question number	Answer	Additional guidance	Mark
7(a)(i)	 (2) OR hydroxyl group on a carbon (1) rest of molecule correct (1)	allow OH for O-H reject any multiple bonds drawn	(2) AO1

Q18. (2022)

A)

Question number	Answer	Additional guidance	Mark
3(a)(i)	A description to include • add water (1) • shake/ stir (1)	allow: solvent / liquid Ignore: acid or alkali for MP1 but can score MP2 allow: mix; ignore dissolve MP2 depends on MP1 reject whole answer if referring to melting	(2) AO1 2

B)

Question number	Answer	Mark
3(a)(ii)	pipette / dropper	(1) AO1 2

C)

Question number	Answer	Mark
3(a)(iii)	A aq is the only correct answer B, C and D are incorrect as the substance is a solution in water	(1) AO2 2

D)

Question number	Answer	Additional guidance	Mark
3(b)(i)	solid/ goes cloudy	allow forms of solid e.g. powder/ sediment / goes milky ignore substance ignore any colours/ colour change reject answers involving fixing/ bubbles/ effervescence	(1) AO1 2

E)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	bromide	reject bromine allow Br ⁻ (allow br ⁻ , BR ⁻ , bR ⁻)	(1) AO3 2

F)

Question number	Answer	Additional guidance	Mark
3(c)(i)	potassium chloride	allow KCl (must be capital K, capital C and small l with no charges)	(1) AO3 2

Q19. (2022) – 4b (v)

Question number	Answer	Additional guidance	Mark
4(b)(v)	formula: NH ₄ NO ₃ (1) name: ammonium nitrate (1)	letters must be capitals and 4, 3 must be subscripts allow NH ₄ ⁺ NO ₃ ⁻ allow N ₂ H ₄ O ₃ ignore state symbols ignore NH ₄ ⁺ + NO ₃ ⁻ reject ammonia nitrate	(2) AO2 1

Q20. (2022)

Question number	Answer	Mark
7(a)	D C ₃ H ₆ is the only correct answer A, B and C are incorrect formula	(1) AO2 1

Q21. (2022) – 10a (ii)

Question number	Answer	Mark
10(a)(ii)	nitric acid	(1) AO1 1

Q22. (2023)

A)

Question number	Answer	Additional guidance	Mark
1(a)	CH ₄	allow H ₄ C / C ₁ H ₄ reject CH ₄ / H ₄ C / CH ₄ / CH ₄ / ch ₄	(1) AO3-1

B)

Question number	Answer	Additional guidance	Mark
1(b)	name of compound carbon dioxide methane structure of molecule $\begin{array}{c} \text{H} \\ \\ \text{O} \\ \\ \text{H} \end{array}$ $\text{O}=\text{C}=\text{O}$ $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{S}-\text{H} \end{array}$ $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$ one mark for each line	do not award mark if more than one line join a left hand box with those on the right	(2) AO1-1

Q23. (2023) – 3b

Question number	Answer	Mark
3(b)	C red-brown precipitate is the only correct answer. A, B and D are incorrect results for this test	(1) AO1-2

Q24. (2023) – 3c

A)

Question number	Answer	Additional guidance	Mark
3(c)(i)	carbon dioxide	allow CO ₂ do not accept CO ²	(1) AO1-2

B)

Question number	Answer	Additional guidance	Mark
3(c)(ii)	{remove / loosen / slacken} {bung / stopper/lid} of right-hand test tube	allow any change that allows gas to bubble through the limewater	(1) A03-3

Q25. (2023) – 3d

Question number	Answer	Additional guidance	Mark
3(d)	ammonia	allow NH_3 / NH_3 reject ammonium / NH_3^+	(1) A01-2

Q26. (2023) – 4c (ii)

Question number	Answer	Mark
4(c)(ii)	B put a glowing splint into the gas and it relights A, C and D are incorrect tests for oxygen	(1) A01-2

Q27. (2023) – 5g

Question number	Answer	Additional guidance	Mark
5(g)	turns {orange / red / yellow}	allow combinations of red, orange & yellow ignore 'changes colour'	(1) A02-2

Q28. (2023) – 6b (iv)

Question number	Answer	Additional guidance	Mark
6(b)(iv)	NaCl / Na^+Cl^-	allow ClNa ignore upper case A, upper case L, lower case n ignore numbers in front of formula reject $\text{Na}^+ + \text{Cl}^-$ as final answer / Na^+Cl^+	(1) A03-1

Q29. (2023) – 7b (ii)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	C_3H_7 (1)	allow non subscript numbers <u>but</u> reject C^3H^7 ignore 2 in front of correct empirical formula	(1) A03-1

Q30. (2024)

A)

Question number	Answer	Mark
3(a)	D s is the only correct answer A, B and C are incorrect as the substance is a solid.	(1) A01 1

B)

Question number	Answer	Additional guidance	Mark
3(b)	a description including - any suitable scientific apparatus for making solution / adding sodium hydroxide (1) - dissolve solid A in water (1) {mix / swirl / stir / shake} (the mixture)	allow any suitable scientific container ignore 'add sodium hydroxide' alone ignore references to PPE allow add solid A to water ignore 'make a solution' mix solid and water (2)	(3) AO1 2

C)

Question number	Answer	Additional guidance	Mark
3(c)(i)	green AND {solid/ precipitate} OR green solution {becomes paler / decolourises}	allow any shade of green but reject other colours ignore any other products / observations	(1) AO1 2

D)

Question number	Answer	Mark
3(c)(ii)	D Fe ²⁺ is the only correct answer A, B and C are incorrect as it is an Fe(II) ion	(1) AO2 1

E)

Question number	Answer	Additional guidance	Mark
3(d)(i)	the compound does not contain {aluminium / copper / iron((II))} (ions)	allow 'contains no ions that form a precipitate'	(1) AO3 2

Q31. (2024) – 4b (v)

Question number	Answer	Additional guidance	Mark
4(b)(v)	Ba ²⁺	allow Ba ⁺² / Ba2+ ignore any other ions reject subscript reject incorrect cases	(1) AO2 1

Q32. (2024) – 5a (iv)

Question number	Answer	Mark
5(a)(iv)	C X and Z only is the only correct answer. A, B and D are incorrect as Y has 2 extra hydrogen atoms	(1) AO2 1

Q33. (2024)

Question number	Answer	Additional guidance	Mark
7(a)(i)	(covalent / molecular) bond	allow shared pair of electrons / chemical bonds ignore 'double bond(s)' alone reject ionic / intermolecular	(1) AO3 1

Q34. (2024)

Question number	Answer	Additional guidance	Mark
9(a)	A description to include - add glowing splint (1) - it relights (1)	reject lit splint/ flame ignore description of forming glowing splint e.g. light splint and blow it out MP2 depends on MP1	(2) AO1 2

Q35. (2024) – 10a (ii, iv)

A)

Question number	Answer	Mark
10(a)(ii)	silver nitrate	(1) AO1 1

B)

Question number	Answer	Additional guidance	Mark
10(a)(iv)	An explanation linking - use {a different / sulfuric/ nitric} acid (1) (as) hydrochloric acid contains chloride/Cl^- (ions) (1)	mark independently MP1 is not scored if any additional substances are added except silver nitrate or "K" allow because otherwise silver chloride forms reject 'contains chlorine' allow chlorine ions / Cl^- ions	(2) AO1 2

Q36. (2024) – 10b

Question number	Answer	Additional guidance	Mark
10(b)	$\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$ (3) fully correct, balanced equation (3) all three formulae only (2) any two correct formulae (1)	 allow incorrect cases/ subscripts	(3) AO2 1