

IGCSE CHEMISTRY 4335-2H MARK SCHEME

Question Number	Correct Answer	Mark
1 (a) (i)	hydrogen peroxide → water + oxygen	(1)
1 (a) (ii)	catalyst	(1)
1 (b)	over water / displacement of air with downward delivery / upward displacement of air. Could be shown on a diagram.	(1)
1 (c)	relights a glowing splint	(1)
1 (d) (i)	Red (ignore pale/dark), crimson / scarlet	(1)
1 (d) (ii)	electron transfer from lithium to oxygen Li atoms each lose one electron and O atom gains two electrons	1 1 1 (3)
1 (d) (iii)	Li ⁺ O ²⁻	1 1 (2)

(Total 10 marks)

Question Number	Correct Answer	Mark
2 (a)	Brown / red brown (reject "light", accept "dark") Grey (reject "light", accept "dark")/ black	1 1 (2)
2 (b) (i)	diffusion	(1)
2 (b) (ii)	$\text{Br}_2(\text{l}) \rightarrow \text{Br}_2(\text{g})$ <i>Reactants = 1, products = 1</i>	(2)
2 (b) (iii)	moving (faster) further apart owtte	1 1 (2)
2 (c) (i)	bromine + hydrogen \rightarrow hydrogen bromide	(1)
2 (c) (ii)	hydrobromic (acid)	(1)
2 (d) (i)	melt/molten/fused (lead (II) bromide)	(1)
2 (d) (ii)	(A) electrons (B) lead(II) ions / Pb^{2+} (C) bromide ions / Br^-	1 1 1 (3)
2 (e)	Gain of electrons (by Pb^{2+})	(1)

(Total 14 marks)

Question Number	Correct Answer	Mark
3 (a) (i)	neutralisation	(1)
Question Number	Correct Answer	Mark
3 (a) (ii)	$\text{KOH} + \text{HNO}_3 \rightarrow \text{KNO}_3 + \text{H}_2\text{O}$ <i>Reactants = 1, products = 1</i>	(2)
Question Number	Correct Answer	Mark
3 (b) (i)	burette	(1)
Question Number	Correct Answer	Mark
3 (b) (ii)	pink / red (reject purple) colourless	1 1 (2)
Question Number	Correct Answer	Mark
3 (c)	<p>Same volumes without indicator Heat/warm/boil/leave(in a warm) to evaporate water Cool (not given if not heated) filter off crystals dry between filter paper/ in (warm) oven (not leave to dry) if no attempt at M2, max 1 if heat to dryness in M2, max 2</p> <p>OR</p> <p>Boil titration mixture with charcoal and filter Heat/warm/boil/leave(in a warm) to evaporate water Cool (not given if not heated) filter off crystals dry between filter paper/ in (warm) oven (not leave to dry) if no attempt at M2, max 1 if heat to dryness in M2, max 2</p>	1 1 1 1 1 (5)

(Total 11 marks)

Question Number	Correct Answer	Mark
4 (a) (i)	$C_2H_4 + H_2O \rightarrow CH_3CH_2OH$	(1)
4 (a) (ii)	(concentrated) phosphoric acid	(1)
4 (b)	sugar / sucrose / glucose yeast two from dissolve in water absence of air temperature in range 20 - 40 °C Any two conditions for 1 mark each	1 1 2 (4)
4 (c) (i)	$CH_3CH_2OH(l) + CH_3COOH(l) \rightarrow CH_3COOCH_2CH_3(l) + H_2O(l)$ Reactants = 1, products = 1, state symbols (dependent on correct formulae) = 1	(3)
4 (c) (ii)	pleasant/fruity/glue smell / oily drops	(1)

(Total 10 marks)

Question Number	Correct Answer	Mark																				
5 (a) (i)	number of electrons in outer shell is same as group OR number of shells with electrons in is same as period	(1)																				
5 (a) (ii)	2.8.8.2	(1)																				
5 (b)	ATOMS with (If atoms omitted, max 1) same atomic number/same number of protons/same element(1) different numbers of neutrons/mass number (1)	(2)																				
5 (c) (i)	<table border="1"> <thead> <tr> <th>Number of neutrons</th> <th>Number of protons</th> <th>Atomic number of isotope</th> <th>Mass number of isotope</th> <th>Percentage isotope in the element</th> </tr> </thead> <tbody> <tr> <td>12 (1)</td> <td>12(1)</td> <td>12</td> <td>24</td> <td>79</td> </tr> <tr> <td>13</td> <td>12</td> <td>12</td> <td>25(1)</td> <td>10(1)</td> </tr> <tr> <td>14</td> <td>12</td> <td>12(1)</td> <td>26</td> <td>11</td> </tr> </tbody> </table>	Number of neutrons	Number of protons	Atomic number of isotope	Mass number of isotope	Percentage isotope in the element	12 (1)	12(1)	12	24	79	13	12	12	25(1)	10(1)	14	12	12(1)	26	11	(5)
	Number of neutrons	Number of protons	Atomic number of isotope	Mass number of isotope	Percentage isotope in the element																	
	12 (1)	12(1)	12	24	79																	
	13	12	12	25(1)	10(1)																	
14	12	12(1)	26	11																		
5 (c) (ii)	Magnesium/Mg	(1)																				
5 (c) (iii)	<p>cq on percentages in table. If use only two isotopes max 1. evidence of multiplication of mass numbers by percentages</p> <p>correct answer answer to 3 sig figs. 24.3 = 3 24.32 = 2</p>	1																				
		1																				
		1																				
5 (c) (iv)	Effervescence/ bubbles/ same/no difference same electronic configuration / same element / same number of electrons / number of neutrons has no effect	(3) 1 1 (2)																				

(Total 15 marks)

Question Number	Correct Answer	Mark
6 (a) (i)	electrons	1
	able to move/can flow/mobile (dependent on first mark)	1 (2)
6 (a) (ii)	layers/rows/lines (of ions /atoms) not electrons	1
	slide/slip / move over each other (dependent on first mark)	1 (2)
6 (b)	left hand electrode labelled (pure) copper	1
	right hand electrode labelled impure copper	1
	electrolyte labelled as any soluble copper salt (solution)	1 (3)
6 (c) (i)	solution has lower melting point/melting point of aluminium oxide is too high.	(1)
6 (c) (ii)	Carbon (accept graphite)	(1)
6 (d)	Copper: electrical wires / coins / water pipes / allow pans /	1
	Associated property (conductor must be qualified).	1
	Aluminium: overhead cables/ specified transport/ pans / cooking foil / drink cans	1
	Associated property (conductor must be qualified).	1 (4)
6 (e)	either: electrolysis (1) more reactive than C/can not be reduced by C/similar reactivity to Al/Al is extracted by electrolysis. (1)	
	OR react with a NAMED more reactive metal (1) Ti less reactive than metal used/metal used more reactive than Ti/ metal will displace Ti. (1)	(2)

(Total 15 marks)

Question Number	Correct Answer	Mark
7 (a)	$\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$ reagents = 1 products = 1 balanced = 1 (dependent on first two marks given)	(3)
7 (b)	exothermic/gives out (heat) energy	(1)
7 (c)	<ul style="list-style-type: none"> • make chlorides into solutions/add water • green ppt • brown ppt • correct linking of at least one observation to a cation 	(4)

(Total 8 marks)

Question Number	Correct Answer	Mark
8 (a) (i)	contain oxygen/contains an element other than C and H	(1)
8 (a) (ii)	CH ₃ / H ₃ C	(1)
8 (a) (iii)	any TWO from <ul style="list-style-type: none"> • same general formula • members differ by CH₂ • same/similar chemical reactions /same functional group • gradation in physical properties 	(2)
8 (a) (iv)	6 C-H bond pairs and one C-C bond pair. No other outer electrons Not ethane = 0	1 1 (2)
8 (a) (v)	poly(propene)/polypropene/polypropylene	(1)
8 (a) (vi)	1 correct repeat unit shown with continuation bonds (dependent on correct structure)	1 1 (2)
8 (a) (vii)	E has double bond/unsaturated polymer no double bond/saturated	1 1 (2)
8 (b)	three correct structures from: but-1-ene but-2-ene methylpropene cyclobutane methylcyclopropane	(3)

(Total 14 marks)

Question Number	Correct Answer	Mark
9 (a) (i)	= 64	(1)
9 (a) (ii)	2 (cq) (128/a(i))	(1)
9 (a) (iii)	6 (cq) (a(ii) x 3)	(1)
9 (a) (iv)	6x12 =72 cq (a(iii) x 12)	(1)
9 (b) (i)	Ca(OH) ₂	(1)
9 (b) (ii)	water/H ₂ O carbon dioxide/CO ₂	1 1 (2)
9 (c) (i)	correct bonds/numbers identified (2 x 412 + 1 x 837 + 2 x 431) 2523	1 1 (2)
9 (c) (ii)	correct bonds/numbers identified (4 x 412 + 1 x 348 + 2 x 338) 2672	1 1 (2)
9 (c) (iii)	Cq (c)(i) - (c)(ii) -149	(1)

(Total 12 marks)

Question Number	Correct Answer	Mark
10 (a)	giant / macromolecular	(1)
10 (b)	<ul style="list-style-type: none"> • break covalent bonds (between atoms) • covalent bonds strong • need lots of energy to overcome/break 	(3)
10 (c)	<ul style="list-style-type: none"> • weak forces between layer • slide/slip 	(2)
10 (d) (i)	<ul style="list-style-type: none"> • weak forces between molecules • little energy to overcome • no (covalent) bonds broken / in diamond (covalent) bonds broken 	(3)
10 (d) (ii)	<p>if yes:</p> <p>any two from</p> <ul style="list-style-type: none"> • (molecules) round/balls/football shaped • weak forces between molecules • roll <p>if no:</p> <ul style="list-style-type: none"> • (strong) covalent bonds • hold atoms in place/need lots of energy to break (dependent on M1) 	(2)

(Total 11 marks)