

IGCSE DA Chemistry 4437 5H

Mark Scheme (Results)

Summer 2008

IGCSE

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4437-5H MARK SCHEME

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1 (a)(i)	electrolysis			(1)
1 (a)(ii)	graphite / carbon			(1)
1 (a)(iii)	- on left and + on right			(1)
1 (a)(iv)	aluminium oxide / alumina cryolite	accept correct formulae ignore bauxite		1 1 (2)
1 (a)(v)	electricity (ignore qualifications) / electrical energy (not energy alone)	Anode/positive electrode replacement	Cathode /electrode replacement	(1)
1 (b)(i)	oxygen			(1)
1 (b)(ii)	<ul style="list-style-type: none"> •carbon dioxide / carbon monoxide •graphite/carbon/electrode oxidised/burned/reacts with oxygen 	accept correct formulae (ignore lower case)	lists equation	1 1 (2)
				9

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)(i)	Any two from: <ul style="list-style-type: none"> •same or similar chemical properties / same functional group • gradation in physical properties •neighbouring/successive members differ by CH₂ 	Gradation of specified physical property (eg: boiling point/bp(t), melting point/mp(t), viscosity)	NOT a specified chemical property different/same physical properties	(2)
2 (a)(ii)	alkene			(1)
2 (b)(i)	<ul style="list-style-type: none"> •(H) one electron shown •(C) two electrons in first shell and four in second shell 	Accept any symbol for electrons.	Electrons on nucleus	1 1 (2)
2 (b)(ii)	<ul style="list-style-type: none"> •all five atoms and four shared pairs of electrons •no extra outer electrons. 	IGNORE inner electrons		1 1 (2)
2 (c)(i)	<ul style="list-style-type: none"> •(compounds with) same molecular formula •(but) different structural formulae /displayed formula/structure / atoms arranged differently (same) elements = 0 marks 	Mark independently	same chemical formula. Reject substances.	1 1 (2)

2 (c)(ii)	Correct structures of butane and methylpropane. ALL bonds shown Penalise sticks with missing H once only			1 1 (2)
				11
3 (a)(i)	any two from •effervescence / fizzing / bubbles • cloudiness / white precipitate /milky / white suspension •Ca get smaller / disappears (ignore dissolves). •Ca moves up and down	Ignore gas made ignore floats/moves	List	(2)
3 (a)(ii)	Ca(OH) ₂			(1)
3 (a)(iii)	•blue •alkali / OH ⁻ / hydroxide / pH >7 (ignore base) •stated pH value in range 8-14		purple	1 1 (2)
3 (b)(i)	•grey / silver(y) •white			1 1 (2)
3 (b)(ii)	any two from •over/through water / downward displacement of water • (gas) syringe •upward delivery / downward displacement of air	a description of this suitable diagrams	gas cylinder	(2)
3 (b)(iii)	hydrogen + oxygen → water / steam	ignore heat	formulae	(1)
				10
4 (a)(i)	diffusion			(1)
4 (a)(ii)	•mention of particles (if particles named, must be correct) in correct context •moving (randomly)	(accept molecules/ ions) move (from high to low concentration)		1 1 (2)
4 (b)(i)	•(blue) ppt - colour not needed but penalise ppt if colour is wrong •deep/dark/royal blue •solution / dissolves	ignore changes to colour of solution	Dark/royal/deep blue ppt	1 1 1 (3)
4 (b)(ii)	[Cu(H ₂ O) ₂ (NH ₃) ₄] ²⁺ / [Cu(NH ₃) ₄ (H ₂ O) ₂] ²⁺	Formulae without []		(1)
				7

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5 (a)(i)	Any three from <ul style="list-style-type: none"> •float/on surface •fizz/bubble (ignore gas) •move/dart about •melt/form sphere/ball •Na gets smaller / disappears (ignore dissolves) 	ignore references to flames / igniting	Apply list rule	(3)
5 (a)(ii)	$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ <ul style="list-style-type: none"> •correct formulae •balancing (dependent on first mark being awarded) 	Na(OH) any multiple		(2)
5 (a)(iii)	Moves/bubbles faster/(more) violent/more vigorous/catches fire/flame/ explodes		Reaction faster/ it is faster	(1)
5 (b)(i)	<ul style="list-style-type: none"> •sodium loses electron(s) • oxygen gains electrons •correct number of electrons for each atom marks could be gained by suitable additions to printed diagram	Indication of 2 Na and 1 O	Any reference to sharing /covalent gives 0	(3)
5 (b)(ii)	<ul style="list-style-type: none"> •strong attractive forces / bonds (regardless of what these are between) •between <u>ions</u> •require a lot of energy to overcome / difficult to break (regardless of what these are between) 		second mark not given if atoms / molecules / intermolecular	1 1 (3)
				12

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (a)	any five from: <ul style="list-style-type: none"> •add magnesium carbonate to acid •stir/mix •excess magnesium carbonate • filter / centrifuge and decant •heat or evaporate filtrate and stop evaporation at a suitable point / heat filtrate and leave to cool / leave filtrate to evaporate or to crystallise or for suitable time / place in oven below 100 °C •dry crystals with (filter) paper /desiccator 	Ignore indicators <ul style="list-style-type: none"> •If use sodium carbonate (or other soluble carbonate)only points 2,5,6 •If use other insoluble carbonate, all bar first point. •Wrong method of prep. Then get 5 and 6 only. 	Heat to dryness, can not get 5 or 6	(5)
6 (b)	<ul style="list-style-type: none"> •colourless •to pink 	if just state "pink" with no start colour, then score 1	purple / red	1 1 (2)
				7
7 (a)(i)	<ul style="list-style-type: none"> •add (named) acid •bubbles/effervescence/fizzing OR gas produced turns limewater milky 	2 nd mark possible only if acid added		1 1 (2)
7 (a)(ii)	2NaOH + CO ₂ → Na ₂ CO ₃ + H ₂ O formulae = 1 balancing = 1 (only if formulae correct)	Accept any multiple		(2)
7 (b)(i)	<ul style="list-style-type: none"> •Mr NaHCO₃ = 84 •moles = 4.2 ÷ 84 •= 0.05(0) ignore any units Correct answer scores 3 If M _r incorrect, max 2 (107 gives 0.039; 168 gives 0.025)			1 1 1 (3)
7 (b)(ii)	(i) ÷ 2 = 0.025 ignore any units	cq		(1)
7 (b)(iii)	(ii) x 24 (dm ³) =0.6 unit not required but penalise incorrect units.	cq	answer in cm ³	(1)
				9
8 (a)	any in range 40 to 100			(1)
8 (b)(i)	H ₂ + Cl ₂ →2HCl formulae = 1 balancing = 1 (only if formulae correct) accept any multiples		CL	(2)

8 (b)(ii)	<p>water:</p> <ul style="list-style-type: none"> • paper becomes red (NOT orange) • acidic / H⁺ ions produced <p>methylbenzene:</p> <ul style="list-style-type: none"> • no change / orange • no H⁺ ions formed / not acidic / does not ionise (indep. of colour) 	<p>red/orange</p> <p>ignore refs to being neutral</p>	<p>Orange ionizes alone</p> <p>Green References to acidity of methyl benzene</p>	<p>1 1 1 1 (4)</p>
				7
9 (a)(i)	galvanising / sacrificial protection			(1)
9 (a)(ii)	railings / cars /bridges / buckets / watering cans / lamp posts etc.	accept ships/boats even though zinc blocks and not a continuous layer used	bikes	(1)
9 (a)(iii)	<ul style="list-style-type: none"> •zinc more reactive (than iron) • zinc reacts/corrodes/oxidises in preference to /before /instead of iron 	It is more reactive than iron	It is more reactive zinc rusts protective coating of zinc oxide	1 1 (2)
9 (b)	<ul style="list-style-type: none"> •zinc •loses electron(s) / oxidation number increases 		If not zinc = zero	1 1 (2)
9 (c)	<ul style="list-style-type: none"> • make solution of nickel nitrate • add metal • if reaction occurs then metal is more reactive than nickel <p>OR</p> <ul style="list-style-type: none"> • work down from top of list until no reaction occurs / work up from bottom of list until reaction does occur. 	Displacement reaction without making a solution is max 2	Reaction with anything else (such as HCl(aq)) is zero react with metal (for 2 nd mark)	1 1 1 (3)
				9
10 (a)	<ul style="list-style-type: none"> •Increased •endothermic (left to right) or description of endothermic / ΔH is positive 	ignore references to rate	If decreased or stays the same = zero	1 1 (2)
10 (b)	<ul style="list-style-type: none"> • correct structure with minimum 4 carbons •continuation bonds shown (not just dots) (brackets not required) 	Ignore "n" subscripts	any structure with C=C or based on wrong repeat unit = 0	1 1 (2)

10 (c)	If calculate empirical first: •Correct empirical formula with some correct working = 3			If A _r incorrect/ use Z in place of A _r then lose first mark If NO working shown, then max 1 each for the two answers regardless of order of answers	If first step totally wrong, zero.			
	division by A _r	38.7/12 = 3.23	9.70/1 = 9.70				51.6 / 16 = 3.23	1
	division by smallest	3.23 / 3.23 = 1	9.70 / 3.23 = 3				3.23 / 3.23 = 1	1
	empiric al	CH ₃ O					1	
	•Correct molecular formula (with any correct working)= 2							
	mass of empirical	31					1	
	molecular	C ₂ H ₆ O ₂					1	
	If calculate molecular first							
	mass of each element	38.7 x .62 = 24	9.70 x 62 = 6				51.6 x .62 = 32	2
	division by A _r	24 / 12 = 2	6 / 1 = 6				32 / 16 = 2	(5)
	C ₂ H ₆ O ₂							
correct molecular with some working = 3								
Correct empirical = 2								
					9			

PAPER TOTAL 90 MARKS