

Chemistry B

General Certificate of Secondary Education **B641/02**

Unit 1: Modules C1, C2, C3

Mark Scheme for June 2010

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Question		Expected Answers	Marks	Additional Guidance
1	(a)	emulsifier (1)	1	
	(b)	no because there is no E-number between 200 and 299 / AW (1)	1	no mark for just saying no allow E-numbers on label are not preservatives allow there are no E-numbers in the preservative range allow yes because salt or sugar are preservatives
	(c)	$2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$ correct reactants and products (1) correct balancing (1)	2	allow any correct multiple, including fractions allow = instead of arrow not + heat allow heat written on arrow not and / & for + allow 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark dependent on correct formulae
	(d)	name of chemical used: limewater / calcium hydroxide (solution) (1) result: (limewater) turns milky / turns cloudy / forms white solid / forms white precipitate (1)	2	result mark is dependent on correct reagent but test with limewater (calcium carbonate) can score 2 nd mark allow turns foggy or misty allow bicarbonate indicator (1) changes from red to yellow (1)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	nylon is not breathable / Gore-Tex is breathable (1)	1	assume answer refers to nylon if not stated allow nylon does not let water vapour through ignore nylon does not allow sweat or water or air to escape ignore references to hard wearing and waterproof
	(b)	(i) holes too small to allow (liquid) water to pass through (1) holes big enough to allow (water) vapour / water molecules / evaporated sweat to pass through (1)	2	allow rain for water ignore references to air not water molecules / particles not just sweat allow particles for molecules allow holes are small enough to let (water) vapour out but not water in scores (2) allow does not let water in but lets (water) vapour out scores (1)
		(ii) PTFE layer is fragile / weak / not strong / nylon strengthens / toughens (PTFE layer) (1)	1	assume 'it' refers to PTFE unless qualified ignore hard-wearing / durable / waterproof ignore nylon is strong
Total			4	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	C_2H_6 (1)	1	not C_2H_6 / C^2H^6 allow H_6C_2
	(b)	(ethane contains) single (covalent) bonds only / AW (1)	1	allow general formula for alkanes e.g. C_nH_{2n+2} scores (1) ignore it is saturated ignore references to double bonds allow has a single bond between carbon atoms (1)
	(c)	(ethene) decolourises bromine water / changes bromine water from red / orange / brown / yellow to colourless (1)	1	ignore red / orange / brown / yellow to clear allow (turns) colourless ignore just changes colour ignore goes clear not it discolours
	(d)	any three from: idea of (long chain molecules are) changed into smaller molecules (1) idea of (random) breaking of carbon-carbon or intramolecular bonds (1) saturated / alkane is made (1) unsaturated / alkene is made (1) idea of more useful substances are made (1)	3	allow (larger) molecules or hydrocarbons broken down or split up ignore references to intermolecular bonds allow named alkanes allow named alkenes except ethene (given in (b)) allow idea that alkenes can be used to make polymers or plastics / ethene made can be used to make ethanediol or ethanol (1) ignore petrol is made but allow more petrol is made (1) allow higher level answers in terms of the idea that cracking enables (an oil refinery) to match supply with demand (1)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	can same height above burner / same volume, mass or amount of fuel / same volume, mass or amount of water / use same burner each time / same temperature increase / same can / same size flame or wick / same time of burning fuel / same starting temperature of water (1)	1	allow measure mass of fuel before or after allow weight for mass
	(b)	10,080(J) scores (2) BUT energy released = $100 \times 4.2 \times 24$ (1)	2	look for correct answer first , 10,080(J) on own scores (2) despite any other working out allow 10.08kJ (2) unit not needed – ignore incorrect units, unless a con, e.g. 10,080kJ allow 1 mark for ecf if incorrect temperature change used
	(c)	greater population / energy requirements increasing / AW (1)	1	allow more transport / more cars / use more electrical appliances / more aeroplanes / more industrialisation / more people are using it must be an implication of more use of a fossil fuel ignore more demand unless qualified with a use e.g. more technology
		Total	4	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	any time less than 55 seconds (1)	1	unit not needed
		(ii)	more collisions (1)	1	allow collisions more often / greater collision frequency / collisions more likely / more collisions per second / more chance of collisions (1) not faster collisions just successful collisions scores (0)
	(b)		particles are moving faster / particles have more (kinetic) energy (1) more collisions (1)	2	allow more collisions per second or collide more often or increased collision frequency or more chance of collisions (1) allow more successful or energetic collisions (2) ignore references to particles vibrate more ignore references to particles move around more
	(c)		decreases / slower / lower rate of reaction (1) smaller surface area / fewer collisions (per second) (1)	2	ignore references to time e.g. 'takes longer' or 'the time taken will increase' both marks could be scored in the explanation section allow less chance of a collision allow reverse argument for powder
	(d)		$\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ correct formulae of reactants and products (1) correct balancing (1)	2	allow any correct multiple allow = for arrow not and or & for + allow 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark is dependent on correct formulae
			Total	8	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	any value between 77 and 80 (1)	1	
	(b)	(i)	1	<p>allow makes less carbon monoxide / makes less oxides of nitrogen (1) ignore references to harmful / polluting gases</p> <p>incorrect references to carbon dioxide scores (0) e.g. makes least amount of carbon monoxide, oxides of nitrogen and carbon dioxide scores (0)</p>
		(ii)	1	<p>allow converts carbon monoxide into carbon dioxide (1) allow converts oxides of nitrogen into nitrogen (1) answer must be specific as to which gas is being converted into carbon dioxide or nitrogen to score the mark</p>
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
7	(a)	cannot reach inner layers of the Earth because it is too hot / can't drill or dig deep enough / AW (1)	1	allow problems of studying in adverse or difficult conditions / can't drill or dig through the crust ignore references to cost or time
	(b)	crust and top part of the mantle / (tectonic) plates / oceanic plates / continental plates (1)	1	
	(c)	shape of coastlines fit together (1) same type of fossils found in both continents (1)	2	if one wrong tick maximum mark of 1 if two wrong ticks scores 0
	(d)	fast cooling small crystals / slow cooling large crystals (1)	1	
	(e)	sand (1)	1	allow silicon dioxide or sandstone
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	iron + water + oxygen --> hydrated iron(III) oxide (1)	1	allow hydrated iron oxide not hydrated iron(II) oxide allow = for arrow not and or & for +
	(b)	aluminium is less dense / car (body) will weigh less (1) improved fuel consumption / AW (1)	2	assume unqualified comments refer to aluminium ignore aluminium is lighter or lightweight allow ora if specified allow car is cheaper to run / better fuel economy ignore references to efficiency ignore car goes faster ignore references to pollution or the environment
Total			3	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	argon (1)	1	allow Ar
	(b)	aluminium / potassium / sodium (1)	1	allow Al / K / Na
	(c)	aluminium (1)	1	allow Al
Total			3	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	colour of bromine – red / brown / red-brown (1) state of iodine - solid (1)	2	allow any combination of red, brown and orange e.g. orange-red allow rusty red not combinations where one of the colours is incorrect e.g. black-brown or yellow-brown ignore references to pale or dark
	(b)	melting point of fluorine:-190 to -250 (1) boiling point of astatine: 310 to 400 (1)	2	allow answers given as a range if it falls within the stated values
	(c)	one sodium ion drawn with a full outer shell or an empty one and a charge of +1 (1) one chloride ion drawn with 8 electrons in outer shell and a charge of -1 (1)	2	alternatively mark as below to give the candidate the best mark (do not mix & match the 2 mark schemes) allow correct electronic structure of sodium ion and chloride ion (1) allow correct charges on the ions - this is independent of the electronic structure drawn (1) allow +1 /-1 / 1+ /1- ignore inner shells allow correct electronic structure written rather than drawn, i.e. Na ⁺ 2.8 and Cl ⁻ 2.8.8. not if a covalent structure drawn scores (0) if structures drawn are not labelled, answer scores (0)
		Total	6	

Question			Expected Answers	Marks	Additional Guidance
11	(a)		(oxygen has electrons in) two (occupied) shells or orbits (1)	1	allow oxygen is in the second row of the periodic table allow has two outer shells or orbits allow has two rings or layers or levels or circles
	(b)	(i)	positive (1)	1	allow + / +ve allow correct answer ticked, circled or underlined in list if answer line is blank
		(ii)	same number of electrons and protons / AW (1)	1	ignore references to neutrons / charges
			Total	3	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	hydrogen + oxygen → water (1)	1	allow hydrogen oxide instead of water allow = instead of → allow $H_2 + O_2 \rightarrow H_2O$ allow mix of formulae and names not and / &
	(b)	covalent (1)	1	
	(c) (i)	$2H^+ + 2e^- \rightarrow H_2$ correct reactants and products (1) correct balancing (1)	2	allow = instead of → allow any correct multiple, including fractions not and / & for+ allow 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark is dependent on the correct formulae allow $H^+ + e^- \rightarrow H_2$ (1)
	(ii)	loss of electrons / AW (1)	1	
Total			5	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	any two from copper carbonate / it changes colour (1) limewater goes milky / cloudy (1) bubbles (1) movement of copper carbonate powder (1)	2	allow two marks for changes colour from green to black (2) but changes from incorrect colour to black e.g. changes colour from blue to black scores (1) ignore gas / carbon dioxide given off
	(b)	precipitation (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
Total			3	

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