OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry B

General Certificate of Secondary Education

Unit **B641/02:** Modules C1, C2, C3 (Higher Tier)

Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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1 Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
allow	=	answers that can be accepted
( )	=	words which are not essential to gain credit
__	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	(a)		to improve the colour or appearance of food / to stop food reacting with oxygen / to stop oil and water from separating / flavour enhancer / stabiliser (1)	1	**allow** to give it colour **allow** to improve texture **allow** to stop the food going mouldy **allow** to preserve food **allow** to stop ingredients from separating **allow** to add flavour or taste **ignore** to make it last longer to keep food fresh is **not** sufficient but **allow** so it does not go off more appetising is **not** sufficient
	(b)	(i)	self-cooling drinks can (1)	1	more than one tick scores 0
		(ii)	**any two from:** (packaging) controls or reacts to things which are taking place inside the package (1) idea of improving the quality or safety (of the product) (1) idea of making it more difficult for bacteria or microbes or mould to grow (1)	2	**allow** (active packaging) uses a polymer and a catalyst as a packaging film (1) **allow** to reduce the risk of food poisoning **ignore** to keep it fresh for longer **allow** stop it going mouldy **ignore** stop it rotting **allow** kills bacteria / kills microbes **ignore** kills germs
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		**any two from:** **EITHER** (propane) is more convenient / portable (as it is stored in small cylinders) (1) (propane) is easy to light (1) (propane) has a high energy value (1) **OR** (oil) is a liquid (1) (oil) has a high energy value (1) (oil) is easy to light (1) (oil) can be stored easily (1)	**2**	no mark for propane / oil - marks are for explanation if coal / natural gas scores 0 **allow** easy to carry
	(b)	**(i)**	100 x 4.2 x 19 (1) **but** 7980 scores (2)	**2**	look for correct answer first, 7980 on own scores (2) despite any other working out **allow** 7.98kJ **allow** 119.7(J) or 1.5 x 4.2 x 19 (1)
		(ii)	2800(J) (1)	**1**	**allow** 2.8kJ unit not needed - ignore incorrect units, unless a contradiction e.g. 2800kJ
	(c)		more energy is given out during bond making than is taken in during bond breaking (1)	**1**	more than one tick scores 0 tick in second box ☐ ☑ ☐ ☐
			Total	**6**	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		solvent (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
	(b)	(i)	$C_4H_8O_2$ (1)	1	**allow** symbols in any order **allow** $CH_3CO_2C_2H_5$ / $CH_3CO_2CH_2CH_3$ / $CH_3COOC_2H_5$ / $CH_3COOCH_2CH_3$ **not** C4H8O2 / $C^4H^8O^2$
		(ii)	(hydrocarbons contain) **only** carbon and hydrogen / AW / contains oxygen / has an O in the formula / contains three elements / AW (1)	1	**not** references to carbon molecules / hydrogen molecules / oxygen molecules **not** a mixture of hydrogen and carbon **ignore** references to double bonds
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		**X** = petrol **Y** = diesel **Z** = bitumen all **three** correct (2) **one** or **two** correct (1)	**2**	
	(b)	**(i)**	LPG (1)	**1**	**allow X** / name given for fraction **X** in part (a)
		(ii)	**Z** / bitumen (1)	**1**	**allow** ecf from fraction **Z** in part (a) e.g. petrol (1), if petrol is given as name of fraction **Z** in part (a)
			Total	**4**	

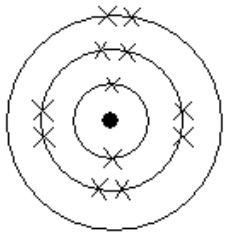
Question			Expected Answers	Marks	Additional Guidance
5	(a)		contains **only** single (covalent) bonds / AW / contains no double bonds (1)	1	**ignore** contains single bonds **ignore** it is a hydrocarbon ending in 'ane' **allow** it is saturated **allow** follows general formula for alkanes / C_nH_{2n+2} **ignore** contains the maximum number of hydrogens
	(b)		$2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$ formulae (1) balancing (1)	2	**allow** any correct multiple, including fractions **allow** = instead of arrow **not** and or & for + balancing mark dependent on correct formulae **BUT** **allow** 1 mark for balanced equation with a minor error in subscripts / formulae e.g. $2CH_3OH + 3O_2 \rightarrow 2CO2 + 4H_2O$
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		low melting point / melts easily (1)	1	**ignore** references to electrical conductivity
	(b)		low density / AW (1)	1	**allow** lightweight **allow** because of its density **ignore** it is light but **allow** the aeroplane body is light
	(c)		advantage – low density so better fuel economy / corrodes less so has longer lifetime (1) disadvantage – expensive compared to iron or steel (1)	2	**allow** one correct advantage and one correct disadvantage for 1 mark (i.e. explanation is missing) assume unqualified answer refers to aluminium **allow** ora if clearly stated **allow** lightweight **ignore** aluminium is light but **allow** the car is lighter so better fuel economy **allow** aluminium does not rust so has longer lifetime **ignore** references to strength
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
7	(a)		warning of hot cup / (electric) kettles / pans / thermometer (on someone's head) / baby baths / battery testing / T-shirts that change colour / mood rings / beer cans (1)	1	**allow** temperature of babies' baths or food spoons **allow** (novelty) mugs / wallpaper / radiators **allow** to show if something is hot or cold **ignore** references to cooker hobs
	(b)		(oil is) oxidised / (oil) reacts with oxygen (1)	1	**allow** binding medium is oxidised / binding medium reacts with oxygen **ignore** references to binding medium hardens
	(c)		particles are mixed and dispersed through a liquid (1) solid particles are suspended in a liquid (1)	2	If more than two ticks, deduct one mark for each additional tick down to zero ☑ ☐ ☐ ☑ ☐
			Total	4	

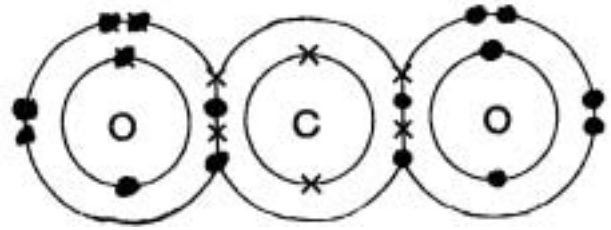
Question			Expected Answers	Marks	Additional Guidance
8	(a)		18 (seconds) (1)	1	**allow** 16 to 19
	(b)		more crowded particles / more particles in the same volume / more particles per cm^3 (1) more (frequent) collisions (1)	2	assume answer refers to concentrated acid but **allow** ora if dilute acid is specified **ignore** more particles / reaction is faster **allow** particles are closer together **allow** more chance of collisions **not** faster collisions / quicker collisions
	(c)		more (surface) area (1) more frequent collisions / more collisions per second / more chance of a collision (1)	2	**allow** more surface / more exposed particles **ignore** particles closer together / particles more crowded / more particles **ignore** particles have more energy **not** faster collisions / quicker collisions **allow** 1 mark for more (successful) collisions if no other mark awarded
	(d)		$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$ correct formulae of reactants and products (1) balancing (1)	2	**allow** correct multiples including fractions **allow** = instead of arrow **not** and or & for + balancing mark is dependent on correct formulae **BUT** **allow** 1 mark for balanced equation with a minor error in subscripts / formulae e.g. CA + $2HCl \rightarrow CaCl_2 + CO_2 + H_2O$
			Total	7	

Question			Expected Answers	Marks	Additional Guidance
9	(a)		continental (1)	1	
	(b)		tectonic plates are less dense than the mantle (1)	1	assume unqualified answer refers to tectonic plates **allow** less dense **ignore** lighter
	(c)		convection currents (in the mantle) (1)	1	
	(d)		subduction (1)	1	
	(e)		crust **and** outer part of the mantle (1)	1	**both** required for the mark **allow** crust **and** upper part of the mantle
			Total	5	

Question			Expected Answers	Marks	Additional Guidance
10	(a)		proton: positive / + / +ve / +1 (1) neutron: 1 / one (1)	2	 **not** -1
	(b)	(i)	(number of) protons and neutrons (in an atom) (1)	1	**not** number of electrons and neutrons
		(ii)	2.8.2 (1)	1	**allow** correct diagram 
		(iii)	same number of protons as electrons (1)	1	
			Total	5	

Question			Expected Answers	Marks	Additional Guidance
11	(a)		hydrogen (1)	1	**allow** H / H_2 **not** H2 / H^2
	(b)		sodium hydroxide (1)	1	**allow** NaOH
	(c)		lilac (1)	1	**allow** pink / purple / violet
	(d)		reaction time less than 6 seconds (1) **any two from the following for <u>one</u> mark** • explosive or indication of how it is more reactive than potassium; • skates across surface; • catches fire; • gas given off / hydrogen given off; • alkaline solution formed; • melts (1)	2	mark independently **allow** any reaction time between 1 and 5 seconds
			Total	5	

Question			Expected Answers	Marks	Additional Guidance
12	(a)		aluminium oxide → aluminium + oxygen (1)	1	**allow** correct formulae or mix of correct formulae and words **allow** $Al_2O_3 \rightarrow Al + O_2$ **allow** = instead of arrow **not** and or & for +
	(b)		(graphite) anode / positive (electrode) (1)	1	
	(c)		$Al^{3+} + 3e^- \rightarrow Al$ correct formulae (1) balancing (1)	2	**allow** $Al^{3+} \rightarrow Al - 3e^-$ **allow** correct multiples including fractions **allow** = instead of arrow **allow** e for e^- **not** and or & for + balancing mark is dependent on correct formulae **BUT** **allow** 1 mark for balanced equation with a minor error in subscripts / formulae e.g. Al3+ + $3e^-$ → Al
			Total	4	

Question			Expected Answers	Marks	Additional Guidance
13	(a)		conducts electricity when molten (1)	1	**allow** correct answer underlined, ticked or circled on list if answer line is blank
	(b)		electrons move / delocalised or free or sea of electrons (1) **but** **delocalised** electrons move / free electrons move / sea of electrons moves / cloud of electrons moves (2)	2	**allow** electrons free to move scores 1 **but** free electrons move scores 2
	(c)		idea of electrons **transferred** between atoms (1)	1	**not** swap electrons **allow** idea that atoms gain or lose electrons **allow** electrons are passed on to another atom **not** metals receive electrons from non-metals
	(d)		 one pair of electrons shared (1) rest correct (1)	2	can be all dots or all crosses **ignore** inner electrons and nuclei
			Total	6	

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