OCR
RECOGNISING ACHIEVEMENT

GCSE

Chemistry B

General Certificate of Secondary Education

Unit **B741/01:** Modules C1, C2, C3 (Foundation Tier)

Mark Scheme for June 2013

Oxford Cambridge and RSA Examinations

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

- For answers marked by levels of response:
  a. **Read through the whole answer from start to finish**
  b. **Decide the level** that **best fits** the answer - match the quality of the answer to the closest level descriptor
  c. **To determine the mark within the level,** consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

  d. Use the L1, L2, L3 annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6 mark extended writing questions include:
a. appropriate use of correct scientific terms
b. spelling, punctuation and grammar
c. developing a structured, persuasive argument
d. selecting and using evidence to support an argument
e. considering different sides of a debate in a balanced way
f. logical sequencing.

- **Annotations**

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore

Annotation	Meaning
	reject
	contradiction
	Level 1
	Level 2
	Level 3

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

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

Question			Answer	Marks	Guidance
1	(a)	(i)	oxygen carbon dioxide (1)	1	**both** required for the mark
		(ii)	increases decreases (1)	1	**both** required for the mark
	(b)		(carbon monoxide is formed by) incomplete combustion (of petrol or diesel in car engines) (1) (carbon monoxide is a problem because) it is poisonous (1)	2	 **allow** it is toxic **ignore** it is harmful **ignore** it will kill you
	(c)		as (the concentration of) smoke increased, the number of deaths increased / ora (1) as (the concentration of) sulfur dioxide increased, the number of deaths increased / ora (1)	2	**allow** as concentration increases deaths increase (1) **allow** idea that graphs have the same shape (1) **allow** the higher the (concentrations of) smoke and sulfur dioxide, the more deaths (per day) (2)
	(d)		carbon monoxide / nitrogen monoxide (1)	1	**allow** CO / NO
			Total	**7**	

Question			Answer	Marks	Guidance
2	(a)		**A** / **D** (1)	1	**allow** correct formula ticked, circled or underlined if answer line is blank
	(b)		3 / three (1)	1	
	(c)		chloroethene (1)	1	
	(d)		polymer **B** (1) it is stiff (1) it is strong(er) (than polymers **A** or **C**) (1)	3	**allow** maximum useable temperature (above summer temperatures) / high melting point so it won't melt in the summer / AW
			Total	**6**	

Question			Answer	Marks	Guidance
3	(a)		**any two from:** evaporates easily (1) non-toxic (1) does not react with water (1) does not irritate the skin (1)	2	 **allow** volatile **allow** non-poisonous **ignore** sticks to skin / stains clothes
	(b)		**any two from:** (people object because) animals may be harmed / it is cruel (1) (people object because) animals have no control over what happens to them (1) (people think there are) other ways of testing products (that are less damaging to living things) (1) animals might react differently to humans (1) people say they feel safer if the perfumes have been tested on animals (1) people say animals should be used because an animal's reaction closely mimics the reaction in a human (1)	2	 **allow** if we test on animals we will find out any side effects that might harm humans / less risky than testing on humans
	(c)	(i)	**C** (1)	1	
		(ii)	all the solvents remove a higher percentage of the stain at 60°C / ora (1)	1	**allow** percentages go up at higher temperatures
			Total	**6**	

Question			Answer	Marks	Guidance
4			**Level 3 (5–6 marks)** **Describes the process of fractional distillation and lists the fractions in correct order.** Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** **Describes the process of fractional distillation, but answer may be simplistic and lacking in detail** **OR** **lists the fractions in the correct order.** Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** **Appreciates that fractional distillation works because of differences in boiling point.** Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C.** **Indicative scientific points at levels 2 and 3 may include:** • crude oil is heated • fractionating column has temperature gradient (cold at top and hot at bottom) • fractions containing mixtures of hydrocarbons are obtained • order of fractions, from top, is LPG, petrol, paraffin, heating oil, fuel oils, bitumen. **allow** higher level answers in terms of intermolecular forces and molecular size linked to boiling point **Use the L1, L2, L3 annotations in scoris, do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
5	(a)	(i)	4 (1)	1	
		(ii)	15 (1)	1	
	(b)		sulfuric acid / H_2SO_4 (1)	1	
	(c)		**benefits** increases crop yield / increase food supply (1) **problems** cause death of aquatic animals (1)	2	to score **two** marks answer must have **one** benefit and **one** problem **allow** helps crops grow faster **allow** eutrophication / pollution of water supplies / contaminates water supplies / blue baby syndrome **ignore** damages soil
			Total	**5**	

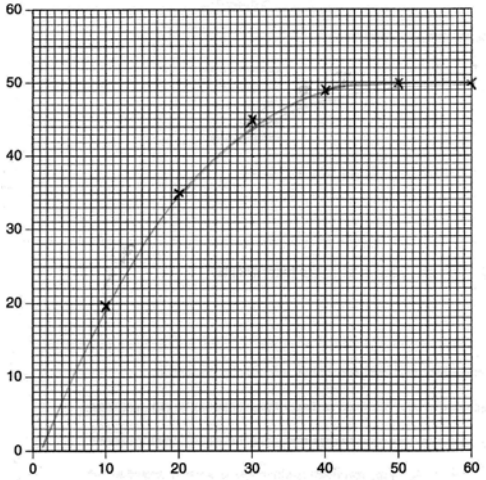
Question			Answer	Marks	Guidance
6			**Level 3 (5–6 marks)** **Candidates apply their knowledge and understanding of the link between properties and uses to suggest the important properties necessary for a metal to be used in construction of overhead power cables.** **AND** **Candidates analyse the data and explain why aluminium is the best choice of the metals.** **If copper is chosen as the metal with correct explanations a mark of 5 can be credited.** Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** **Candidates apply their knowledge and understanding of the link between properties and uses to suggest some properties necessary for a metal to be used in construction of overhead power cables** **AND** **choose a metal with a suitable reason for their choice.** Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** **Candidates apply their knowledge and understanding of the link between properties and uses to suggest two properties a metal should have** **OR** **choose a metal with a suitable reason for their choice.** Quality of written communication impedes communication of the science at this level **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C.** **Indicative scientific points may include:** **general properties of metals needed for overhead power cable construction:** • good electrical conductor • low density • strong • does not corrode • does not cost too much • flexible • able to be drawn into a wire / ductile. **properties that make aluminium suitable from table:** • good electrical conductor • low density • does not corrode. **properties that make copper suitable:** • good electrical conductor. **properties that make iron suitable:** • low cost • strong. **Use the L1, L2, L3 annotations in scoris, do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
7	(a)	(i)	$2CuO + C \rightarrow 2Cu + CO_2$ formulae correct (1) balancing (1)	2	**allow** any correct multiple, including fractions **allow** = / ⇌ instead of → **not** and / & **not** '+ heat' in equation balancing mark is dependent on the correct formula **but** **allow** 1 mark for a balanced equation with minor errors of case, subscripts, superscripts, etc 2CuO + C → 2CU + CO2
		(ii)	carbon dioxide given off (1)	1	**allow** gas given off **not** the name of a wrong gas given off
	(b)		electrolysis (1)	1	**allow** other ways of indicating correct response eg ringing or ticking the correct answer but answer on answer line takes precedence
	(c)		**any two from:** reduces problems of disposing of copper (1) uses less energy (1) idea that copper ore needs lots of processing to make copper (1)	2	**allow** saves digging up copper ore / malachite / copper carbonate **allow** to extract copper from its ore is difficult and takes a lot of time / lot of equipment required to extract copper from its ore
			Total	**6**	

Question			Answer	Marks	Guidance
8	(a)		H_2O (1)	1	**allow** other ways of indicating correct response eg ringing or ticking the correct answer **but** answer on answer line takes precedence
	(b)		(moist) litmus paper / pH paper (1) bleaches / (goes red) then white (1)	2	**allow** indicator paper for litmus
			Total	**3**	

Question			Answer	Marks	Guidance
9	(a)		reversible (1)	1	**allow** reaction goes both ways / goes backwards and forwards / reaction forms an equilibrium mixture
	(b)		50% (1)	1	**allow** any value 50 − 51
	(c)		**any three from:** cost of starting materials (1) labour costs / wages (1) equipment (1) plant / cost of rent / cost of rates (1) cost of catalyst (1) transportation costs (1)	3	 **allow** cost of nitrogen / hydrogen **allow** cost of high pressure container **allow** research costs **allow** environmental costs
			Total	**5**	

Question			Answer	Marks	Guidance
10	(a)		carbon (1)	1	**allow** C
	(b)		**any three from:** diamond has a high melting point (1) lustrous (1) colourless (1) does not conduct electricity (1) insoluble in water (1) transparent (1)	3	 **ignore** strong / rare / expensive **allow** shiny **allow** clear
			Total	**4**	

Question			Answer	Marks	Guidance
11	(a)		magnesium + hydrochloric acid → magnesium chloride + hydrogen (1)	1	**allow** = for → **not** and or & for + **allow** mix of correct formulae and words in an unbalanced equation eg Mg + HCl → MgCl_2 + H_2
	(b)	(i)	 all points plotted correctly (1) correct best fit line (1)	2	**allow** error of half a square **allow** curve half a square either side of points **not** dot to dot instead of curve
		(ii)	**any one from:** magnesium used up (1) hydrochloric acid used up (1) reactant(s) used up (1)	1	no more gas given off on its own scores 0
	(c)		smaller surface area of magnesium (1) less collisions between acid and magnesium (1)	2	**allow** higher level answers less frequent / less often / less chance of collision
			Total	**6**	

Question			Answer	Marks	Guidance
12	(a)		a continuous process makes large amounts / a continuous process works 24/7 (1) in a batch process chemicals are made for a set time and then process is stopped and repeated at a later date / a batch process makes small amounts (1)	2	two marks can only be awarded if a reference is made to **both** batch and continuous processes **allow** batch process is more labour intensive than continuous process (1)
	(b)		**Level 3 (5–6 marks)** **Candidates correctly calculate the percentage yield and describe some reasons why the yield in this reaction is less than 100%.** Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** **Candidates correctly calculate the percentage yield** **OR** **describe some reasons why the yield in this reaction is less than 100%.** Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** **Candidates suggest a reason why the yield is less than 100% in this reaction** **OR** **attempt to calculate the % yield e.g. 3/4.** Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C.** **Indicative scientific points may include:** • percentage yield is 75% • percentage yield = $\frac{actual}{predicted} \times 100$ **reasons why yield is not 100% include:** • loss in filtering solution of magnesium sulfate • some product / solution may bubble over the side of beaker • some solid / solution may be lost in evaporation • loss in transferring solutions / solids • not all reactants react to make product. **Use the L1, L2, L3 annotations in scoris, do not use ticks.**
			Total	**8**	

Question			Answer	Marks	Guidance
13	(a)		**A** (1)	1	
	(b)	(i)	methylated spirits (1)	1	
		(ii)	correct mass (100g) and temperature change (20°C) substituted in equation (1) **but** correct answer of 8400 (J) (2)	2	**allow** 84 (J) for one mark mark answer on answer line 8400 (J) (2)
			Total	**4**	

Question			Answer	Marks	Guidance
14	(a)		$CuCO_3$ → CuO + CO_2 (1)	1	**allow** = for → **not** and or & for + **allow** any correct multiples
	(b)	(i)	4.40 g (1)	1	
		(ii)	8.80 g (1)	1	**allow** ecf from part (i) ie 2 × answer (i)
			Total	**3**	

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