OCR
Oxford Cambridge and RSA

GCSE

Chemistry B

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

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

Annotations

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

/ = 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	**A** (1**)**	1	**allow** ethanoic acid
b	**E** (1)	1	**allow** ethene / C_2H_4
c	**C and F** (1)	1	**allow** butane **and** methylpropane
d	poly(tetrafluoroethene) (1)	1	**allow** name without brackets **allow** Teflon / ptfe
	Total	**4**	

Question	Answer	Marks	Guidance
2 a	do not contain carbon and hydrogen only / contain more elements than just hydrogen and carbon (1)	1	**allow** C and H for carbon and hydrogen (1) **allow** it contains oxygen / has three elements / has the symbol O in the formula (1) **not** contains an oxygen **molecule** (in the formula) **not** reference to a **mixture** **not** does not contain carbon and hydrogen **molecules** or **compounds** only **not** does not contain carbon and hydro only
b	$C_7H_{14}O_2$ (1)	1	**allow** any order of atoms credit correct answer if written in box in table but answer line takes precedence
c	ethyl ethanoate (1) **any two from:** dissolves the best in water (1) has a low boiling point (so evaporates easily) (1) is a liquid at room temperature (1)	3	incorrect ester = 0 mark for question **allow** dissolves easily / (very) soluble in water **ignore** reference to melting point
	Total	**5**	

Question	Answer	Marks	Guidance
3	**Level 3** **States the correct percentage of both of the gases** **AND** **Describes the effect of two of these processes on the percentage of oxygen and carbon dioxide**. Quality of communication does not impede communication of science at this level. (5-6 marks) **Level 2** **States the correct percentage of both of the gases** **OR** **Describes the effect of two of the processes on the percentage of oxygen and carbon dioxide** **OR** **States the correct percentage of one of the gases** **And describes the effect of one of the processes on the percentage of oxygen and carbon dioxide**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **States the correct percentage of one of the gases** **OR** **Describes the effect of one of the processes on the percentage of oxygen and carbon dioxide**. Quality of communication impedes communication of the science at this level. (1 – 2 marks) Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** • Percentage of oxygen is any value between 20 and 22% • Percentage of carbon dioxide is any value between 0.03 and 0.04% • Respiration and combustion decrease percentage of oxygen and increase percentage of carbon dioxide • Photosynthesis increases percentage of oxygen and decreases percentage of carbon dioxide **Use the L1, L2, L3 annotations in Scoris, do not use ticks**
	Total	**6**	

Question	Answer	Marks	Guidance
4 a	**any three from:** amount of pollution / type of pollution (1) cost (1) availability (1) toxicity / is it safe / is it harmful / is it dangerous (1) ease of use (1) storage (1) flammability (1) is it finite source / is it a fossil fuel (1)	3	**ignore** colour of flame **allow** the gases produced (during combustion) eco-friendly is **not** sufficient
b	**any two from:** lack of oxygen (1) incomplete combustion (1) forms soot / forms carbon (1)	2	 **allow** ora if specified just 'amount of oxygen' is insufficient **allow** flame not hot enough (1) **allow** sodium (ions) injected into flame (1)
	Total	**5**	

Question	Answer	Marks	Guidance
5 a	pie-chart (1)	1	**allow** any other way of indicating the correct answer such as a tick or a circle but answer line takes precedence
b	bar chart (1)	1	**allow** any other way of indicating the correct answer such as a tick or a circle but answer line takes precedence
c	**C** because it has most solvent (1)	1	answer must be **comparative**
d	thermochromic paint changes colour with temperature (1) phosphorescent pigment glows in the dark (1)	2	**allow** thermochromic pigment changes colour when it gets hot or cold **allow** references to heat instead of temperature **allow** phosphorescent paint releases light in the dark **not** phosphorescent pigment changes colour
	Total	**5**	

Question	Answer	Marks	Guidance
6 a	<table><tr><th>Alloy</th><th>Metallic element</th></tr><tr><td>amalgam</td><td>(copper)</td></tr><tr><td>bronze</td><td>mercury</td></tr><tr><td>solder</td><td></td></tr></table> (2)	2	**All four** correct (2) **Two** or **three** correct (1) **Ignore** any extra metals or alloys included in the table
b	(copper oxide has had) oxygen removed (1)	1	**allow** copper is made (1) **allow** (copper ions have) gained electrons (1) **allow** hydrogen gains oxygen (1)
c	duralumin (no mark) low density (1) high strength / strong (1)	2	**allow** steel because it has the highest strength / steel because it is strong for **one mark**
	Total	**5**	

Question	Answer	Marks	Guidance
7 a i	does not rust in boiled water / no rusting in tube **A** (1) does not rust in dry air / no rusting in tube **D** (1)	2	**allow** tube with no air no rusting **allow** tube with no water no rusting **A** and **D** rust slower is **not** sufficient
ii	salt (water) (1)	1	**allow** sea water **not** sodium
b	$4Al + 3O_2 \rightarrow 2Al_2O_3$ formulae (1) balancing - conditional on correct formulae (1)	2	**allow** any correct multiple e.g. $2Al + {}^3/_2O_2 \rightarrow Al_2O_3$ **allow** = or ⇌for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors of case, subscript and superscript e.g. $4AL + 3O^2 \rightarrow 2Al_2o_3$ (1)
	Total	**5**	

Question	Answer	Marks	Guidance
8 a i	air (1)	1	**allow** other ways of indicating answer e.g. tick or circle but the answer on the answer line takes precedence
ii	recycled (1)	1	**allow** sent round again / it is reacted together (again)
b	**[Level 3]** **Extracts the correct conditions from the graph AND states at least two costs of making ammonia**. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] **Extracts one correct condition from the graph and states at one cost of making ammonia**. **OR** **Extracts the correct conditions from the graph** **OR** **States at least two costs of making ammonia**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Extracts one correct condition from the graph** **OR** **States one cost of making ammonia**. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0marks)	6	**This question is targeted at grades up to C.** **Costs** • cost of starting materials • labour costs • cost of the plant / apparatus or equipment • cost of catalyst • rent or rates • health and safety • pollution control **ignore** references to advertising / environment / transport / storage / packaging / energy / temperature and pressure **Conditions** • any temperature from 350°C or below • any pressure from 400 atmospheres or above **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**8**	

Question	Answer	Marks	Guidance
9 a	idea of increased crop yield / faster growth (1)	1	**allow** to get bigger crops **ignore** vague answers e.g. to get better crops **ignore** reference to nutrients **ignore** speeds up crop yield
b	nitrogen (1) phosphorus (1)	2	**allow** N **allow** P **not** O / oxygen **not** H / hydrogen i.e. nitrogen, phosphorus and oxygen = 1 mark phosphorus, oxygen and hydrogen = 0 mark
c i	potassium hydroxide + nitric acid → potassium nitrate + water one correct product: potassium nitrate / water (1) remainder of word equation correct(1)	2	equation must be totally correct for 2 marks **allow** correct formulae or mix of names and formulae i.e. $KOH + HNO_3 \rightarrow KNO_3 + H_2O$ **allow** hydrogen oxide
ii	add a few drops of universal indicator to solution (1) check against colour chart / idea that colour indicates pH (1)	2	**allow** use pH paper / pH indicator **not** litmus **allow** specific reference to colour and pH e.g. green is pH 7 **allow** second marking point even if incorrect indicator is used
	Total	**7**	

Question	Answer	Marks	Guidance
10 a	(2 × 23) + 12 + (3 × 16) (1)	1	mark is for the working out and **not** for the final answer **allow** 23 + 23 + 12 + 16 + 16 + 16 etc.
b i	gas produced / gas escapes / carbon dioxide made / steam made (1)	1	**not** name or formula of incorrect gas **ignore** references to evaporation unless linked with water
ii	5.3	1	unit **not** needed
iii	**any two from** reaction not complete / AW did not heat for long enough / temperature not high enough (1) some solid spits out of the test-tube (1)	2	**allow** not all the water escapes (1) **allow** a mistake in the mass reading (1)
	Total	**5**	

Question	Answer	Marks	Guidance
11 a	**Level 3** **Describes two stages of extracting drug from plant material** **AND** **Explains why the drug is impure using both melting point and chromatography data**. Quality of communication does not impede communication of science at this level. (5-6 marks) **Level 2** **Answer describes one stage of extracting drug from plant material AND explains why the drug is impure using <u>either</u> melting point <u>or</u> chromatography data** **OR** **Answer describes two stages of extracting drug from plant material**. **OR** **Explains why the drug is impure using <u>both</u> melting point and chromatography data**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Describes one stage of extracting drug from plant material** **OR** **Explains why the drug is impure using <u>either</u> melting point <u>or</u> chromatography data**. Quality of communication impedes communication of the science at this level. (1 – 2 marks) Level 0 **Insufficient or irrelevant science. Answer not worthy of credit.** (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points for extraction may include:** • Crushing (plant material) • Boiling (with a solvent) • Dissolving (with a solvent) / solvent extraction • Chromatography • Crystallisation • Evaporation • Filtration **Indicative scientific points for analysis may include:** • Drug is impure • Chromatography shows that there are (at least) two substances (so not pure) • Melting point is below that of the pure sample so not pure • Melting point is a range so not pure **Use the L1, L2, L3 annotations in Scoris, do not use ticks**

Question	Answer	Marks	Guidance
b	**any two from** idea that the drug must be as pure as possible (1) idea that the drug must have no side effects / needs to be safe to use / not addictive (1) idea that the drug must have been extensively trialled / idea that the drug does what it is supposed to do (1)	2	
	Total	**8**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>12 a</td><td>thermometer (1)</td><td>1</td><td>allow temperature probe</td></tr>
<tr><td>b</td><td>fair test / easier to compare results (1)</td><td>1</td><td>ignore to make the results reliable</td></tr>
<tr><td>c</td><td><table><tr><th>Fuel</th><th>Temperature change of water in °C</th></tr><tr><td>A</td><td>23</td></tr><tr><td>B</td><td>26</td></tr><tr><td>C</td><td>27</td></tr><tr><td>D</td><td>30</td></tr></table>Correct temperature changes (1)
Fuel D (1)</td><td>2</td><td>allow ecf from incorrect temperature changes</td></tr>
<tr><td>d</td><td>exothermic (1)</td><td>1</td><td></td></tr>
<tr><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
13 a	zinc + (dilute) hydrochloric (acid) → zinc chloride + hydrogen	1	any order for reactants any order for products **allow** unbalanced symbol equation e.g. Zn + HC*l* → Zn Cl_2 +H_2 **allow** mix of name and correct formula
b i	zinc has a greater gradient / iron has a smaller gradient (1) less gas is made with zinc / more gas is made with iron (1)	2	**allow** reaction with zinc is faster / reaction with iron is slower / takes less time to react
ii	Powder has more surface area / more collisions (per second) / more exposed particles (1)	1	assume answers refer to powder unless lump is specified **allow** or a lump has less surface area / less collisions (per second) / less exposed particles
iii	**any three from:** higher temperature / heat (1) greater concentration (1) add a catalyst (1) use a finer powder (1) shake or stir (1)	3	 **ignore** increase pressure
	Total	**7**	

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