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 2014

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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 used in scoris

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction

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	**any two from:** to see if the perfume is toxic / poisonous (1) to see if the perfume irritates the skin (1) so the perfume can be approved by government (1)	2	 to check for side effects is **not** sufficient **allow** whether the person is allergic (to perfume) **allow** harmful to the skin / gives a reaction with the skin **allow** to see if it is corrosive / too acidic **allow** is it harmful, is it dangerous or is it safe if no other mark has been awarded **ignore** references to the perfume having a pleasant smell **ignore** references to whether they wash away or dissolve in water
b i	**J** because it is insoluble in water / will not wash off (1) it has a low boiling point / it will evaporate easily / it is volatile (1)	2	**no mark** for the choice of perfume on its own. **allow I** because it is insoluble in water / will not wash off **allow K** because it has a low boiling point / it will evaporate easily / it is volatile **ignore** references to other properties

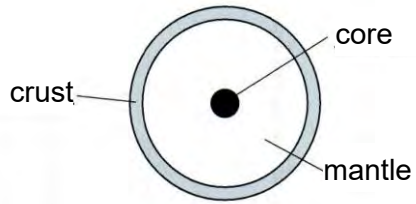
Question	Answer	Marks	Guidance
1 b ii	**any one from:** does it have a nice smell / what is its smell / the smell / how long the smell lasts (1) does it react with water (1) does it irritate the skin (1) is the perfume toxic / poisonous / harmful / health and safety (1)	1	**ignore** is it volatile / does it evaporate easily / boiling point / does it dissolve in water **allow** does it react with other cosmetics **allow** what is the melting point **allow** are the raw materials available to make it **allow** consider the ethical nature of the process **allow** the constituents **allow** the energy needed in manufacture **allow** how long it takes to make **allow** the pH of the perfume **allow** is it flammable
	Total	**5**	

Question	Answer	Marks	Guidance
2 a	used up faster than they are made (1)	1	**allow** takes a long time to be made / takes millions of years to make **allow** it is a finite resource / will eventually run out cannot be produced again is **not** sufficient **not** cannot be reused / can be reused
b	sulfur + oxygen → sulfur dioxide (1)	1	**allow** $S + O_2 \rightarrow SO_2$ **allow** mix of formulae and names **allow** = in the equation **not** & or and instead of + **not** sulfur oxide but **allow** sulfur(IV) oxide
c	**any two from:** corrodes metals / rusts iron / rusts (ferrous) metals (1) reacts with marble or limestone (statues) (1) damages statues / damages buildings / erodes stonework / AW (1) kills plants / damages trees / can damage crops (1) kills (aquatic) animals / destroys animal habitats (1) increases amount of heavy metal ions in water / increases concentration of aluminium in water (1)	2	 **not rusts** aluminium or other non-ferrous metals **allow** erodes or dissolves rocks such as limestone and chalk **allow** dissolves buildings **allow** corrodes buildings **allow** deforestation **allow** harms plants **allow** harms animals pollutes the environment or habitats is **not** sufficient **allow** causes or triggers asthma **not** damages the ozone layer **not** greenhouse gas / global warming

Question	Answer	Marks	Guidance
2 d	$2NO_2 + H_2O \rightarrow HNO_2 + HNO_3$	1	**allow** in the question if answer line is blank **ignore** errors in case, subscript and superscript
e	lime water / calcium hydroxide (solution) / $Ca(OH)_2$ (1) goes milky / cloudy / white / white precipitate / white solid (1) This mark is **dependent** on the correct test chemical	2	 **allow** white suspension **not** white solution
	Total	**7**	

Question	Answer	Marks	Guidance
3 a	**D** and **E** (1)	1	**both needed**
b	**A** and **F** (1)	1	**both needed**
c	**B** contains carbon and hydrogen (1) only / AW (1) **C** contains oxygen / has oxygen in the formula / does not contain only carbon and hydrogen (1)	3	**allow** (formula) has only (1) H and C (1) the only is **not** an independent mark and must be linked to the carbon and hydrogen **not** contains carbon and hydrogen molecules / contains a mixture of carbon and hydrogen **not** hydro atoms but **ignore** for the third marking point **allow C** has three elements / **C** has three different atoms (1) **not C** contains oxygen molecules
	Total	**5**	

Question	Answer	Marks	Guidance
4 a	**Level 3** **Answer applies knowledge and understanding of the properties of a plastic and its use. Explanation as to why the plastic used to make the sandwich box needs to be non-biodegradable and insoluble in water. One other property needed by the plastic explained.** Quality of communication does not impede communication of science at this level. (5-6 marks) **Level 2** **Answer applies knowledge and understanding of the properties of a plastic and its use.** **Two properties of the plastic needed are explained.** **OR** **One property of the plastic needed is explained and one extra property is given.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Answer applies knowledge and understanding of the properties of a plastic and its use.** **One property of the plastic needed is explained.** **OR** **One extra property is given.** 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:** **Explanations** • Non-biodegradable so the plastic does not rot, decay, decompose or breakdown • Insoluble in water so it will not dissolve / so moist foods can be stored / idea that water cannot enter **Extra properties** • Non-toxic material (so it will not contaminate the food or make the food dangerous to eat) • Non-reactive (so will not react with chemicals in the food) • Ability to shape the plastic • Plastic must be air-tight to prevent entry by bacteria • Transparent / colourless / clear • Waterproof • Does not react with water • Cannot be crushed easily • Low density **ignore** references to can be coloured / is strong / is hard / tough / durable / melting point / boiling point / recycling **ignore** disadvantages **Use the L1, L2, L3 annotations in Scoris, do not use ticks**
b	**any two from:** land-fill site (1) idea of recycling (1) incinerated / combusted / burned (1) cracked / broken down to form monomers (1)	2	**ignore** heated to make fossil fuels
	Total	**8**	

Question	Answer	Marks	Guidance
5 a	 **all three** labels correct (2) **but** **one** or **two** labels correct (1)	2	**allow** inner or outer core for core
b	rock **B** because (rock **B**) contains large crystals (1)	1	candidates must identify rock **B and** give explanation for the mark **allow** larger grains / bigger pieces / bigger blocks **ignore** rock is bigger / larger structure
c	3 / three (1)	1	**ignore** Cu, Fe, S
	Total	**4**	

Question	Answer	Marks	Guidance
6 a	nitrogen (1)	1	**allow** N **ignore** nitrate
b	sulfuric (acid) (1)	1	**allow** H_2SO_4
c	**any one benefit from**: idea of increasing food supply / bigger crop yield / produce bigger plants / plants grow faster (1) **and** **any one problem from**: harms or death of aquatic organisms / eutrophication / pollution of water supplies / produces an algal bloom (in rivers) (1)	2	**allow** replace essential elements / replace nitrogen / replace potassium / replace phosphorus / replace nutrients / replace minerals **allow** fertilisers contain nutrients / contain vital minerals **allow** to make more money **ignore** to make plants grow / to help plants grow / to produce better crops **ignore** makes plants healthier **not** kills weeds / kills pests **allow** contamination of water supplies effect organisms in river is **not** sufficient washed into rivers is **not** sufficient

Question	Answer	Marks	Guidance
6 d	**[Level 3]** **Answer describes costs of making nitric acid AND includes the word equation for the reaction.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Answer describes costs of making nitric acid** **OR** **includes the word equation for the reaction and a cost of making nitric acid.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Answer describes a cost of making nitric acid** **OR** **includes the word equation for the reaction.** 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. (0 marks)	6	**This question is targeted at grades up to E** **Indicative scientific points may include:** **Word equation** ammonia + oxygen $\rightarrow$ nitric acid + water **allow** correct formulae but equation does not need to balance e.g. $NH_3 + O_2 \rightarrow HNO_3 + H_2O$ **allow** mix of correct formulae and words **Costs** • energy / gas / electricity / heating / lighting / temperature / pressure • raw materials / starting materials / ammonia / oxygen / catalyst • labour / wages / salaries / staff / workers • equipment / plant / maintenance • marketing • taxes / rates / rent • safety / H&S • pollution control **ignore** R&D, distribution, transport, packaging, advertising , storage **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**10**	

Question	Answer	Marks	Guidance
7 a i	transparent (1)	1	**allow** insoluble (in water) / waterproof / does not react with water (1) **allow** clear / see through / colourless (1) **allow** does not biodegrade / does not decompose / does not decay (1) **allow** does not photodegrade (1) **ignore** shatterproof / strong
a ii	(aluminium car body) will corrode less / does not corrode (1)	1	**assume unqualified answer refers to aluminium** **allow** (aluminium car body) will have a longer lifetime (1) **allow** aluminium does not rust (1) but **not** aluminium does not rust as easily (0) **allow** aluminium does not oxidise (in air) (1) **ignore** aluminium is less corrosive **allow** car will have better fuel economy (1) **allow** ora for steel **ignore** aluminium is easier to mould / is more flexible **not** stronger
b	(PVC) has high flexibility / is flexible / aw (1) (PVC) has low (electrical) conductivity / is a poor (electrical) conductor / does not conduct (electricity) / aw (1)	2	**ignore** references to density **allow** is an (electrical) insulator (1)
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	$2Na + Cl_2 \rightarrow 2NaCl$ correct reactants and products (1) correct balancing (1)	2	**allow** any correct multiple, including fractions **allow** = instead of → **not** and / & instead of '+' balancing mark is dependent on the correct formulae but **allow** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g. 2NA + Cl2 → 2NACl
b i	to sterilise (water) / to make solvents / (to make household) bleach / to make plastics (1)	1	**allow** swimming pools cleans water or cleaning pools is **not** sufficient
ii	(moist) litmus paper (1) bleaches (1) This mark is **dependent** on the correct reagent	2	**allow (**damp) litmus paper **allow** (moist Universal) indicator paper / (damp Universal) indicator paper **allow** removes colour / turns white

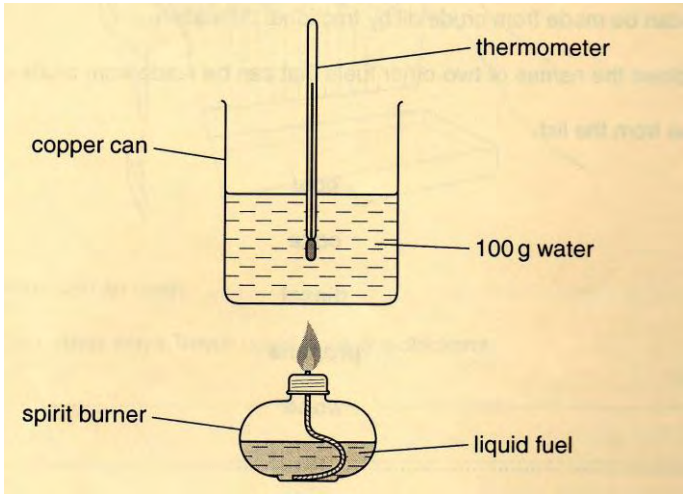
Question	Answer	Marks	Guidance
8 c	Yes (no mark) because no metal has four 1's (1) idea that if a metal corrodes fast it is not suitable to store the chemical / to be used the container should corrode very slowly (1)	2	No mark for yes if answer is no 0 marks for question **allow** each metal has at least one 3 (1) **allow** can only use a metal if it is 1 **allow** each metal will corrode fast with at least one chemical / there is no metal that corrodes slowly with every chemical (2)
	Total	**7**	

Question	Answer	Marks	Guidance
9 a	diamond (1)	1	
b	**any two from:** high melting point (1) high boiling point (1) grey / black (1) conducts electricity (1) insoluble in water (1) lustrous / shiny (1) opaque (1)	2	**ignore** dark **not** dull **not** flexible **ignore** strong / hard
c	idea that can cage medicine, drug or chemical inside the fullerene (1)	1	**ignore** spherical in shape
	Total	**4**	

Question	Answer	Marks	Guidance
10 a	**[Level 3]** **Explanation that the results do not support the prediction with reference to experimental data AND an explanation using reacting particle model that reaction in experiment 4 is faster or the reaction time is shorter than experiment 3.** Quality of communication does not impede communication of science at this level. (5-6 marks) **[Level 2]** **Explanation that the results do not support the prediction with reference to experimental data AND an explanation that the reaction in experiment 4 is faster or the reaction time is shorter than experiment 3 because acid is more concentrated** **OR** **an explanation using reacting particle model that reaction in experiment 4 is faster or the reaction time is shorter than experiment 3.** Quality of written communication partly impedes communication of the science at this level. (3-4 marks) **[Level 1]** **Explanation that the results do not support the prediction with reference to experimental data** **OR** **An explanation that the reaction in experiment 4 is faster or reaction time is shorter than experiment 3 because the acid is more concentrated.** Quality of communication impedes communication of the science at this level (1-2 marks) **[Level O]** 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 evaluation could include:** • identification that experiments **1** and **3** must be compared • results show as volume increases reaction time does not change **Indicative scientific points for experiments 3 and 4 could include:** • concentration is higher in experiment **4** • acid particles are more crowded in experiment **4** / acid particles are closer together / more acid particles per unit volume / more acid particles per cm^3 / more acid particles in the same space • more (successful) collisions (per second) **Use the L1, L2, L3 annotations in Scoris, do not use ticks**

Question	Answer	Marks	Guidance
b	any time less that 30 seconds (1) the reaction will be faster (1)	2	 **allow** higher level answers such as particles have more energy / particles move faster / there are more collisions between particles
	Total	**8**	

Question	Answer	Marks	Guidance
11 a i	no undesired products made / all the atoms that react end up in the product / only one product made (1)	1	**ignore** no waste is produced but **allow** no waste products **allow** no atoms have been wasted **ignore** all the atoms are used up
ii	14 (1)	1	unit **not** needed
b	6 (1)	1	unit **not** needed
c	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 / made on demand (1)	2	two marks can only be awarded if a reference is made to **both** batch and continuous processes **allow** batch takes place when the product is required
d	46 % (2) but 46.2 / 46.15 / 46.154 (1)	2	answer must have **two** sig figs for two marks **allow** one mark for $\frac{2.4}{5.2}\times 100$
	Total	**7**	

Question	Answer	Marks	Guidance
12 a	exothermic (1)	1	**allow** any other indication of the correct answer e.g. tick, or circle providing answer line is blank
b i	suitable container of water (1) **but** container of water above spirit burner (2) thermometer in water (1)	3	**allow** any suitable container e.g. beaker / can / metal can 
ii	points plotted correctly to within a half a square (1) mass of paraffin is 2.5 g (1)	2	**ignore** any line drawn unit **not** needed **allow** any value between 2.4 to 2.6 **allow** 2 marks for correct answer **allow** ecf from any incorrect line drawn
	Total	**6**	

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