OCR
Oxford Cambridge and RSA

GCSE

Chemistry B

Unit **B742/01**: Modules C4, C5, C6 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2016

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction
L1	Level 1
L2	Level 2
L3	Level 3

Subject-specific Marking Instructions

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	17 (1)	1	
ii	7 (1)	1	
iii	3 (1)	1	
b	atoms with the same atomic number / same number of protons / same proton number (1) but different mass numbers / different numbers of neutrons (1)	2	**allow** an element with the same atomic number (1) but different mass number (1) **allow** atoms with same number of protons but different mass for (2)
	Total	**5**	

Question	Answer	Marks	Guidance
2 a	lithium / rubidium / caesium / francium (1)	1	**allow** Li / Rb / Cs / Fr (1)
b	**any two from:** bubbles or gas or hydrogen given off (1) (sodium) reacts quickly (1) (sodium) melts (1) (sodium) skates across surface of water (1) (sodium) floats (1)	2	 **allow** fizz (1) **allow** (yellow) flame observed (1) **allow** sodium gets smaller or disappears (1) **allow** forms a colourless solution (1)
c	potassium hydroxide (1) hydrogen (1)	2	order unimportant **allow** correct formulae i.e. H_2 (1) and KOH (1) **not** H
	Total	**5**	

Question	Answer	Marks	Guidance
3 a i	aluminium and boron (1)	1	**both** required **allow** Al and B (1)
ii	potassium and bromine (1)	1	**both** required **allow** K and Br (1)
iii	silver (1)	1	**allow** Ag (1)
b	**any two from:** arranged elements in order of atomic mass (1) left gaps for elements not yet discovered (1) predicted properties of elements (1) arranged elements in periods (1) arranged elements in groups (1)	2	**allow** predicted properties of 'missing' elements for (2) **allow** arranged elements together with similar chemical properties (1)
	Total	**5**	

Question	Answer	Marks	Guidance
4	**[Level 3]** **Identifies compounds A and B, with explanations AND** **constructs the word equation** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Identifies either compound A or B, <u>or</u> the elements or ions present in either A or B AND** **constructs the word equation** **OR** **Identifies both compounds A and B, or the elements or ions present in both A or B, with explanations** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Identifies one element or ion present in either A or B** **OR** **constructs the word equation** 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 C** **Indicative scientific points may include:** **Word equation** potassium chloride + silver nitrate → silver chloride + potassium nitrate **allow** correct formulae or mix of words and formulae **allow** $KCl + AgNO_3 \rightarrow AgCl + KNO_3$ **Compound A** • compound **A** contains sodium (ions) • compound **A** contains chloride (ions) • compound **A** is sodium chloride **Reasons** • because sodium gives a yellow flame test colour • because chloride ions give a white ppt with silver nitrate **Compound B** • compound **B** contains iron(II) (ions) • compound **B** contains bromide (ions) • compound **B** is iron(II) bromide **Reasons** • iron(II) (ions) give a green ppt with sodium hydroxide • bromide (ions) give a cream ppt with silver nitrate **allow** solid instead of ppt **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
		6	

Question	Answer	Marks	Guidance
5 a	halogens (1)	1	
b i	**any two from:** idea of water sterilisation (1) (making) plastics (1) (making) pesticides (1) (making) bleach or disinfectant (1) (making) pharmaceuticals (1) (making) solvents (1)	2	**ignore** cleaning water
ii	antiseptics or to sterilise wounds (1)	1	
	Total	**4**	

Question	Answer	Marks	Guidance
6 a	**any two from:** medicines – idea of avoiding overdose / avoiding harm (1) idea of getting correct concentration (1) baby milk – idea of (to get correct concentration) to avoid harming the baby (1)	2	 **ignore** can have too many chemicals or preservatives **ignore** progressively dilute heroin to wean addicts off the drug **allow** idea that doses are weaker or could be harmful if left undiluted (1)
b	96 (1)	1	
	Total	**3**	

Question	Answer	Marks	Guidance
7	**A** – chloride (ions) **B** – iodide (ions) and sulfate (ions) **C** – sulfate (ions) **all correct (2)** **BUT** **one or two correct (1)** **then any two from:** white ppt with lead nitrate indicates chloride (ions) (1) yellow ppt with lead nitrate indicates iodide (ions) (1) white ppt with barium chloride indicates sulfate (ions) (1)	4	 **allow** chlorine and iodine (ions) **ignore** names of compounds **allow** lead ions rather than lead nitrate **allow** barium ions rather than barium chloride
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	sulfur (1)	1	**allow** S (1)
b	$2SO_2 + O_2 \rightarrow 2SO_3$ formulae (1) balancing conditional on correct formulae (1)	2	**allow** any correct multiple e.g $4SO_2 + 2O_2 \rightarrow 4SO_3$ (2) **allow** = or ⇌ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. $2So_2 + O^2 \rightarrow 2SO_3$ (1)
c i	(as temperature decreases so yield) increases (1)	1	**allow** ora if specified
ii	25 - 40 (1)	1	**allow** anywhere in range
	Total	**5**	

Question	Answer	Marks	Guidance
9 a i	50 (cm^3) (1)	1	
ii	any value between 48 and 50 (seconds) (1)	1	
b	idea that acid runs out or magnesium runs out (1)	1	**allow** idea that reactant(s) run(s) out (1) **ignore** no more gas given off **ignore** graph levels off
c i	sulfuric acid – 6.12 (g) (1) hydrogen – 0.16 (g) (1)	2	
ii	**LOOK FOR ANSWER FIRST OF ALL** **IF mass = 50 g AWARD 2 MARKS** idea of 1 x 10 / 2 x 5 / 0.5 x 20 (1)	2	 **allow** 10 x 10/2 or 10 x 5/1 or 10 x 2.5/0.5 (1)
	Total	**7**	

Question	Answer	Marks	Guidance
10	**[Level 3]** **Complete description of a titration to include detection of endpoint and safety precautions** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Description of a titration to include detection of endpoint** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Rudimentary description of a titration** 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 at level 3 may include:** • many of the points at levels 1 and 2 and in addition • idea of repeating to obtain concordant results • use pipette filler to avoid sucking alkali or acid into mouth • safety goggles as liquids are corrosive • fill burette above eye level **Indicative scientific points at level 2 may include:** • acid in burette, alkali in flask (or vice versa) • use pipette to accurately measure alkali (or acid) • add acid to alkali (or vice versa) • use of an indicator • named indicator such as methyl orange, litmus or phenolphthalein • colour changes at end point or when solution is neutral • use of pH meter • idea of measuring titre **Indicative scientific points at level 1 may include:** • acid in burette, alkali in flask (or vice versa) • add acid to alkali (or vice versa) • use of safety goggles • use of pipette filler **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
		6	

Question	Answer	Marks	Guidance
11 a i	**x** = 3 **y** = 8 **z** = 3 **all** correct (1)	1	
ii	contains oxygen / does not contain carbon and hydrogen **only** (1)	1	**allow** has O in the formula / contains three elements (1) **allow** C and H for carbon and hydrogen (1) **not** contains an oxygen **molecule** (in the formula) **not** is not a **mixture** of carbon and hydrogen only **not** does not contain carbon and hydrogen **molecules** or **compounds** only **not** does not contain carbon and hydro only
b i	contains a (carbon-carbon) double bond (1)	1	**allow** has a C=C in its formula (1) **allow** (has a) double bonded carbon (1)
ii	bromine (water) (1) goes (from brown to) colourless / is decolourised (1)	2	**allow** Br_2 (1) **not** bromide this marking point is **dependent** on correct reagent or bromide **allow** colour fades (1) **allow** any colour from orange-red, orange, brown-red, brown for colour of bromine (1) **ignore** clear **not** if wrong starting colour of bromine is given **not** discoloured

Question	Answer	Marks	Guidance
c	**any two from:** (making) biodiesel (1) (making) margarine (1) (making) soap (1)	2	 **allow** butter / cooking oil / cooking for **one** mark **ignore** used in foods
	Total	**7**	

Question	Answer	Marks	Guidance
12 	**[Level 3]** **Answer gives some properties of CFCs that makes them suitable for use as a propellant** **AND** **Explains why CFCs have now been banned in the UK** Quality of communication does not impede communication of science at this level. (5-6 marks) **[Level 2]** **Answer gives one property of CFCs that make it suitable for use as a propellant and explains why CFCs have now been banned in the UK** **OR** **Answer gives some properties of CFCs that makes them suitable for use as a propellant** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Answer gives one property of CFCs that make it suitable for use as a propellant** **OR** **States a reason why CFCs have now been banned in the UK** 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 about properties may include:** • non-flammable • inert / unreactive • non-toxic / not poisonous • low boiling point / gas / evaporates easily • insoluble in water **Indicative scientific points about banning may include:** • causes ozone depletion • increased risk of skin cancer • increased risk of cataracts • increased ageing of skin • increased risk of sunburn • society or government have accepted evidence from scientists **Use the L1, L2, L3 annotations in RM Assessor, do not use ticks**
	Total	**6**	

Question	Answer	Marks	Guidance
13 a	copper **and** iron(II) sulfate (1) only reaction in which there is no change in observation (1)	2	**Mark independently** **allow** Cu **and** $FeSO_4$ (1) **allow** solution stays green / solution does not change colour (1)
b	magnesium, iron, copper, silver (1) **AND** **any two from:** magnesium will displace iron or magnesium reacts with iron(II) sulfate so magnesium is more reactive than iron (1) iron will displace copper so iron reacts with copper(II) sulfate so iron is more reactive than copper (1) magnesium will displace copper or magnesium reacts with copper(II) sulfate so magnesium is more reactive than copper (1) copper will displace silver or copper reacts with silver nitrate so copper is more reactive than silver (1)	3	**allow** Mg, Fe, Cu, Ag (1)
	Total	**5**	

Question	Answer	Marks	Guidance
14	No there is no change with any results with washing-up liquid (1) volume of lather decreases with hard water using soap (1)	2	**No marks for no, marks are for explanation** If **yes** no marks for this question **allow** volume of lather stays at 60 cm^3 (1) **allow** idea that volume of lather changes with hard water (1) **BUT** do not allow volume of lather increases with hard water **allow** volume of lather with hard water is less than 30 cm^3 (1)
	Total	**2**	

Question	Answer	Marks	Guidance
15 a i	7.5 (g) (1)	1	**allow** 7.4 to 7.6 (1)
ii	75 (g) (1)	1	**allow** ecf from (i) i.e. 10 x answer to (i)
b i	potassium (1) bromine (1)	2	**allow** K (1) **allow** Br_2 (1) **do not allow** bromide
ii	ions can move / ions go to electrodes (1)	1	**allow** ions move to anode / ions move to cathode (1) **do not allow** electrons can move
	Total	**5**	

Question	Answer	Marks	Guidance
16 a i	1500 (1)	1	units **not** needed
ii	decreases / gets smaller / gets less (1)	1	**allow** goes up to start with and then goes down / AW (1)
b	**any three from:** (UK decreases but) world is increasing (1) world uses more fertilisers than UK / AW (1) both UK and world use less phosphorus than nitrogen / ora (1) idea that 'blip' on graph for UK in 1997 not shown in the world / AW (1)	3	 **allow** graph (a) for UK and graph (b) for world
c i	**E** because idea that uses smallest amount of pesticides (1) idea that uses smallest amount of fertilisers (1)	2	**No marks for E, marks are for explanation** **allow** cannot tell because the figures give are mean values and so other countries may use lots of fertilisers and pesticides on some fields and none on others for (2) **allow** other countries with correct justification
ii	1.4×10^9 / 1 400 000 000 (1)	1	unit **not** needed
d	nitrous oxide (1) largest source from farming (1)	2	N_2O (1) it is 88% is **not** sufficient but **allow** 88% from farming (1) **allow** fertilisers contain nitrogen and this gas contains nitrogen (1) **ignore** just quoting numbers
	Total	**10**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553