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 2017

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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
	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

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

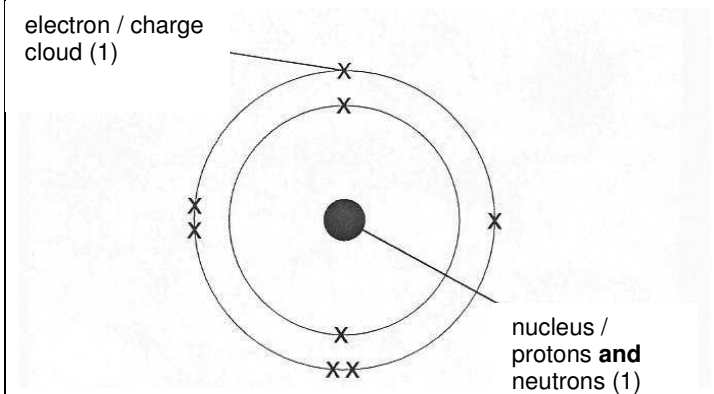
/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
( )	=	words which are not essential 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

MARK SCHEME

Question	Answer	Marks	Guidance
1 a	CO_2 (1)	1	
b	Mg^{2+} (1)	1	
c	Na (1)	1	
d	MgF_2 (1)	1	**allow** F_2Mg **allow** $Mg^{2+}(F^-)_2$ **not** $Mg^{2+}F_2^-$
e	solid sodium chloride does not conduct (1) solution of sodium chloride does conduct (1)	2	**allow** liquid sodium chloride conducts (1)
	Total	**6**	

Question	Answer	Marks	Guidance
2	**any three from:** hard (1) high density (1) high tensile strength / strong (1) (good) conductors of electricity (1) (good) conductors of heat (1) malleable (1) ductile / can be made into wires (1) sonorous / when hit makes ringing sound (1) lustrous / shiny (1) high boiling point (1)	3	**allow** good conductors (1) if no marks awarded for conductors of heat and electricity **allow** can be hammered into shape (1) **ignore** bendy / flexible **ignore** durable / tough / hardwearing / long lasting **ignore** high melting point (stem of question)
	Total	**3**	

Question	Answer	Marks	Guidance
3 a	toilet flushing and baths and taps (1)	1	**both** required
b	21 (%) (1)	1	
c	idea of having fewer baths and/or more showers (1) baths use more water than showers / ora (1)	2	**allow** collect more rainwater (1) **allow** put bricks in cistern to reduce toilet flushing (1) **allow** use water from washing to flush toilet (1) **allow** idea of flushing toilet less frequently (1) **allow** other suitable ideas **ignore** install a water meter
d	lakes (1) rivers (1)	2	 **allow** sea (1) **allow** streams (1)
	Total	**6**	

Question	Answer	Marks	Guidance
4 a		2	**allow** phonetic spelling of nucleus
b	carbon **and** tin (1) idea of same vertical arrangement (1)	2	**both required** **allow** same number of electrons in outer shell (1) **allow** they are both in Group 4 (1)
	Total	**4**	

Question	Answer	Marks	Guidance
5	**Level 3** **Interprets data to identify the correct order of reactivity** **AND** **fully explains the reasoning** **AND** **writes a correct word equation.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Interprets data to identify the correct order of reactivity** **AND** **either gives a simple explanation or attempts a word equation.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Interprets data to identify at least two halogens in correct order of reactivity** **OR** **attempts a 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 grade C.** **allow** correct name of halogen or halide instead of **Y** and **X** except in order of reactivity **Indicative scientific points may include:** **order of reactivity** • chlorine > **Y** > **X** **Explanation** • idea that chlorine displaces bromine from sodium bromide so more reactive than both **X** and **Y** • idea that chlorine displaces iodine from sodium iodide • **X** displaces nothing so must be least reactive • **Y** displaces iodine from sodium iodide so more reactive than **X** • idea that Cl_2 reacts or displaces with two solutions • idea that Y_2 only reacts or displaces with halide containing X / reacts or displaces with one solution • idea that X_2 does not react / no displacement happens **Word equation** chlorine + sodium bromide → sodium chloride + bromine **allow** symbol equation which does not need to be balanced $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

		6	
Question	**Answer**	**Marks**	**Guidance**
6 a	pipette (1)	1	
b i	15 (cm^3) (1)	1	
ii	20 (cm^3) (1)	1	
c	(starts) red or pink (1) changes to blue or purple (1)	2	
	Total	**5**	

Question	**Answer**	**Marks**	**Guidance**
7 a	cm^3 **and** dm^3 (1)	1	**both required**
b	g/dm^3 **and** mol/dm^3 (1)	1	**both required**
c	add water (1) **but** 1 part sugar solution and 3 parts water (2)	2	 **allow** specific quantities e.g. 10 cm^3 of sugar solution added to 30 cm^3 of water (2)
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	0.67 (1)	1	
b	mass is conserved in the reactions / mass of magnesium + mass of oxygen = mass of magnesium oxide (1) as mass of magnesium increases so does the mass of oxygen / mass of magnesium increases so does the mass of magnesium oxide / mass of oxygen increases so does the mass of magnesium oxide (1)	2	**allow** correct ideas about direct proportionality (2) for example • if you double (or any other multiple) the mass of magnesium you double (or the appropriate multiple) the mass of magnesium oxide made (1) • if you double (or any other multiple) the mass of magnesium you double (or the appropriate multiple) the mass of oxygen used (1)
c	any answer between 59.7 and 60.6 (%) (2) **but if answer is incorrect then** $\frac{0.2 \times 100}{0.33}$ / $\frac{0.4 \times 100}{0.67}$ / $\frac{0.6 \times 100}{1.00}$ / $\frac{1.0 \times 100}{1.67}$ (1)	2	
	Total	**5**	

Question	Answer	Marks	Guidance
9 a	Pete is correct (no mark) because reaction faster (at start) / more gas is made (1) Sue is correct (no mark) because half as much gas made (at end) / half the volume is made (at end) (1)	2	**not** if Pete is incorrect **allow** ora **not** if Sue incorrect but **allow** Sue is **not** correct since the result at three or four minutes is not half **allow** ora
b	5 (minutes) (1)	1	**allow** any value above 4 and up to 5 minutes
c	**D** (1) (because) idea of greatest volume of gas in first minute (1)	2	
	Total	**5**	

Question	Answer	Marks	Guidance
10	**Level 3** **Candidate describes how to prepare and purify a sample of lead iodide** **AND** **writes a correct symbol equation.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Candidate mixes solutions together, filters the mixture and** **EITHER** **washes or dries the precipitate** **OR** **writes a correct symbol equation.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Candidate mixes lead nitrate and sodium iodide solutions** **OR** **attempts a symbol 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. (0marks)	6	**This question is targeted at grades up to grade C.** **Marks can be awarded from a labelled diagram.** **Indicative scientific points at level 3 may include in addition:** • mixing or reacting of solutions • filters off lead iodide / precipitate • washes with water • dries in an oven or on window sill **Indicative scientific points at level 2 may include in addition:** • mixing or reacting of solutions • filters off lead iodide / precipitate • washes with water OR dries in oven or on window sill **Indicative scientific points at level 1 may include:** • mixing or reacting of solutions **Symbol equation** $Pb(NO_3)_2 + 2NaI \rightarrow PbI_2 + 2NaNO_3$ **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		6	

Question	Answer	Marks	Guidance
11 a i	**B** (1)	1	
ii	**A** (1)	1	
b	magnesium / Mg^{2+} (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
	Total	**3**	

Question	Answer	Marks	Guidance
12 a	8 (1)	1	
b	alkanes (1) hydrocarbons (1)	2	**allow** correct answers ticked, circled or underlined in list if answer lines are blank
c	**any two from:** (increased risk of) sunburn (1) accelerated ageing of skin (1) **skin** cancer (1) (increased risk of eye) cataracts (1)	2	 **allow** damage to skin **cells** (1) **ignore** just 'skin damage' **allow** (idea of) mutation in skin (1) **ignore** just cancer **allow** cause lens or eyes to go cloudy (1) **allow** causes damage to the **retina** (1) **ignore** just 'eye damage' **ignore** causes blindness
d	idea that Julie is correct because the ozone hole area is increasing and decreasing even though the world use of CFCs has (generally) declined (1) idea that Phil is incorrect because the (graph shows that) the hole in the ozone layer is bigger in 2015 than in 1989 / ora (1)	2	**allow** idea that Julie is correct because the ozone hole area increases after the world use of CFCs has (generally) declined (1)
	Total	**7**	

Question	Answer	Marks	Guidance
13 a	(to provide) electrical power (1)	1	**allow** idea of providing power for heating / lighting (1) **allow** to provide water that can be used by astronauts (1)
b	$2Zn + O_2 \rightarrow 2ZnO$ formulae (1) balancing - conditional on correct formulae (1)	2	**allow** any correct multiple, including multiples e.g. $4Zn + 2O_2 \rightarrow 4ZnO$ **allow** = or ⇌ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with incorrect use of case, subscript or superscript e.g. 2ZN + O2 → 2znO
	Total	**3**	

Question	Answer	Marks	Guidance
14 a	correct order (1) magnesium zinc iron (Tin)	1	**allow** correct symbols, i.e. Mg, Zn, Fe
b	copper is deposited on the magnesium strip (1) (because) magnesium is more reactive that copper / copper is less reactive than magnesium / magnesium is higher in the reactivity series (than copper) / copper is lower in the reactivity series (than magnesium) (1)	2	**allow** solution goes colourless / magnesium turns orange or brown (1) **allow** magnesium displaces copper / magnesium sulfate formed (1)
c	oxygen **and** water (1)	1	**both required for mark** **allow** correct formulae **allow** air **and** water / moist air / damp air (1) **allow** salty water for water

	Total	4	
Question	**Answer**	**Marks**	**Guidance**
15 a	**Level 3** **Gives three reasons why washing powder C is the best** **AND** **gives at least two advantages of washing clothes at low temperatures** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Gives two reasons why washing powder C is the best** **AND** **gives one advantage of washing clothes at low temperatures** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Gives one reason why washing powder C is the best** **OR** **gives one advantage of washing clothes at low temperatures** 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:** **Explanations for C** Pete is correct because • best or excellent stain removal • best or excellent whiteness • best or good for preventing fading **ignore** just quoting data **Advantages of washing clothes at low temperatures:** • idea that energy is saved • idea that less greenhouse gases are produced • idea that (delicate) fabrics aren't damaged • idea that colours won't run • idea of preventing enzymes (in detergents) denaturing **ignore** costs less **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**
b	(dry cleaning) does not involve water / solvent is not water / washed in organic solvent (1) stain will not dissolve in water / stain will only dissolve in organic solvent (1)	2	**ignore** references to washing machine **allow** idea that water will damage fabric (1) **ignore** references to temperature of wash

	Total	8	

Question	Answer	Marks	Guidance
16 a i	40 (°C) (1)	1	
ii	solubility decreases as temperature increases / ora (1)	1	assume unqualified answer refers to temperature increasing
iii	yes (no marks) idea that 1 kg can dissolve 2.5 g (1) so 3 kg can dissolve 3 x 2.5 (g) (1)	2	if no = 0 marks for the question **no** marks for 7.5 kg on its own – marks are for the working out
b	quoting a solubility for carbon dioxide from any temperature (1) and show it is less than the solubility of sulfur dioxide at the same temperature (1)	2	**allow** much larger y-axis scale (1) **allow** the (solubility) values for sulfur dioxide are greater than the values for carbon dioxide at all temperatures (2)
c i	as pH (of ocean) goes down the percentage of carbon dioxide (in air) goes up (1)	1	**ignore** just quoting data

Question	Answer	Marks	Guidance
16 c ii	**any two from:** as pH (of ocean) goes down the mass of carbon dioxide dissolved (per kg of sea water) goes up (1) as percentage of carbon dioxide (in air) goes up the mass of carbon dioxide dissolved (per kg of sea water) goes up (1) as years increase the pH (of ocean) goes down (1) as years increase the as percentage of carbon dioxide (in air) goes up (1) as years increase the mass of carbon dioxide dissolved (per kg of sea water) goes up (1)	2	**allow** ora
iii	the mass of carbon dioxide dissolved (per kg of sea water) changes with temperature / solubility of carbon dioxide (in sea water) changes with temperature (1)	1	**allow** to have a fair test / to control all the variables **allow** a more general statement about the solubility of gases e.g. solubility of gases change with temperature **allow** change in temperature changes pH temperature is an important factor is **not** sufficient **not** temperature depends on the mass of carbon dioxide
	Total	**10**	

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