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 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.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning of annotation
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.

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		beryllium / calcium / strontium/ barium / radium (1)	1	**allow** Be / Ca / Sr / Ba / Ra (1)
	b		sodium / aluminium / silicon / phosphorus / sulfur / chlorine / argon (1)	1	**allow** Na / A*l* / Si / P / S / C*l* / Ar (1)
	c		group 2 (1) 3rd period (1)	2	
			Total	**4**	

Question		Answer	Marks	Guidance
2	a	colour of chlorine – (pale) green (1) state of bromine – liquid (1) use of iodine – sterilise wounds / antiseptic (1)	3	**allow** light green (1) **ignore** yellow / green **allow** disinfectant / pharmaceuticals / medicines / photographic chemicals / printing ink / dyes / making animal feeds / added to salt (to avoid thyroid disease) / making ethanoic acid / making polymers (1) **allow** sterilisation (1) **allow** testing for starch (1) **ignore** cleaning medical equipment
	b	sodium + bromine → sodium bromide (1)	1	**allow** correct formulae i.e. Na + Br_2 → NaBr or mix of words and correct formulae If formulae used balancing is not necessary
		Total	**4**	

Question	Answer	Marks	Guidance
3 a	**any two 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)	2	**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
b	strong (1) low density / lightweight (1) does not corrode (1)	3	**mark first three points but ignore irrelevant reasons e.g. hardwearing or durable** **allow** stays rigid (1) **ignore** so it doesn't fall apart **ignore** light **allow** does not rust (1) **allow** a property (1) and a linked explanation (1) for example strong (1) so the frame will not buckle (1) **ignore** references to cost
	Total	**5**	

Question	Answer	Marks	Guidance
4 a	**Level 3** **Recall or deduce one piece of information about atomic number AND one about mass number AND** **deduces the number of protons, neutrons and electrons.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Recall or deduce one piece of information about atomic number AND one about mass number OR** **deduces the number of protons, neutrons and electrons.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Recall or deduce one piece of information about atomic number** **OR** **recall or deduce one piece of information about mass number** **OR** **deduce the number of protons or neutrons or electrons.** 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.** **Indicative scientific points may include:** • bottom number is atomic number or proton number • atomic number or proton number is 13 • atomic number or proton number is the number of protons in the nucleus • atomic number or proton number is the number of electrons • top number is mass number or atomic mass • mass number or atomic mass is 27 • mass number or atomic mass is the total number of protons and neutrons in the nucleus • number of protons is 13 • number of neutrons is 14 • number of electrons is 13 **allow** higher level answers at level 3 such as: • electronic structure is 2.8.3. • A*l* is in the 3rd period or row • A*l* is in Group 3 or column 3 • A*l* forms 3+ ions **allow** 2 or more higher level answers with no other points - 5 marks **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

b	(J.J. Thomson) discovered the electron (1) (Rutherford) suggested the nuclear atom (1)	2	**allow** references to discovery of electron and nuclear atom without assigning names (up to 2 marks) **allow** more detailed answers re J. J. Thomson or Rutherford for 2 marks
		8	

Question	Answer	Marks	Guidance
5 a	increased / got bigger (1) using more electricity / using more energy / more electricity generated (1)	2	**allow** in 2000 17000 to 19000 (megalitres) used and in 2006 24000 to 28000 (megalitres) used (1) **ignore** it has (developed) a wider range **allow** more power stations (1)
b	**any two from** nitrates (1) lead (compounds) (1) pesticides (1) herbicides (1)	2	**allow** fertilisers / named fertiliser (1) **allow** chlorinated hydrocarbons / aluminium (compounds) (1) **ignore** chlorine / fluoride / dust / **allow** other more obscure pollutants e.g. hormones (1)
	Total	**4**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>a</td><td></td><td>
<table>
<tr><th rowspan="2">Indicator</th><th colspan="3">Colour in</th></tr>
<tr><th>Acid</th><th>Neutral</th><th>Alkali</th></tr>
<tr><td>litmus</td><td>red</td><td>purple</td><td>blue</td></tr>
<tr><td>phenolphthalein</td><td>colourless</td><td>colourless</td><td>pink</td></tr>
<tr><td>universal indicator</td><td>red, orange or yellow</td><td>green</td><td>blue or purple</td></tr>
</table>
phenolphthalein row correct (1)

universal indicator row correct (1)</td><td>2</td><td>allow purple / lilac / red (1)</td></tr>
<tr><td></td><td>b</td><td>i</td><td>burette (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>pipette filler (1) because the liquid is corrosive or harmful or an irritant (1)

or
(safety) goggles (1) because the liquid is corrosive or harmful or an irritant (1)</td><td>2</td><td>allow avoids getting liquid in mouth (1)

ignore idea that protects eyes from chemicals

allow wear gloves (1) because the liquid is corrosive or harmful or an irritant (1)
allow protective clothing (1) because the liquid is corrosive or harmful or an irritant (1)</td></tr>
</table>

		iii	idea of a colour change (1) **but** idea of a sudden colour change (2) **or** starts blue (1) then it changes to purple or red (1)	2	
			Total	**7**	

Question			**Answer**	**Marks**	**Guidance**
7	**a**		72 (1)	1	unit **not** needed
	b		C_4H_6 / H_6C_4 (1)	1	**not** if superscripts used for the numbers
	c		C_2H_2 **and** C_6H_6 (1)	1	**both** needed if no answer on answer line **allow** other ways of indicating the correct answer e.g. circling, ticking or underlining
	d		75% (1)	1	
			Total	**4**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>8 a</td><td>copper hydroxide → copper oxide + water (1)</td><td>1</td><td>allow steam for water

allow correct formulae and mix of formulae and names
the equation does not need to be balanced
$Cu(OH)_2$ → CuO + H_2O (1)

allow heat above arrow
not copper hydroxide + heat → copper oxide + water</td></tr>
<tr><td>b</td><td><table><tr><th>experiment number</th><th>Mass of water made in g</th></tr><tr><td>1</td><td>0.09</td></tr><tr><td>2</td><td>0.18</td></tr><tr><td>3</td><td>0.28</td></tr><tr><td>4</td><td>0.37</td></tr></table>mass of water calculated for missing values (1)

prediction supported because as more copper hydroxide is used the mass of water increases (1)
but
prediction supported illustrated by examples showing the direct proportionality e.g. mass of $Cu(OH)_2$ doubles in expt 1 and expt 2 and so does the mass of water (2)</td><td>3</td><td>allow ecf from incorrect calculation</td></tr>
<tr><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
</table>

9	**[Level 3]** **Deduces how changing temperature and pressure affects the percentage yield** **AND** **explains the connection between percentage yield and position of equilibrium** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **[Level 2]** **Deduces how changing temperature and changing the pressure affects the percentage yield** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **[Level 1]** **Deduces how changing temperature affects the percentage yield** **OR** **deduces how changing pressure affects the percentage yield** 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 at level 3 must include:** • As percentage yield increases position of equilibrium shifts to the right / high percentage yield has position of equilibrium is on the right / ora **Relevant points at all levels could include explanations** • as temperature increases percentage yield decreases / ora • as pressure increases percentage yield increases / ora **Use the L1, L2, L3 annotations in scoris. Do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
10 a	reading decreases (1)	2	**2nd mark is dependent on decreases**

	(because) a gas is made / carbon dioxide is made (1)		**not** the name of an incorrect gas
b	reaction is slower / reading on balance decreases more slowly (1) ethanoic acid is a weak acid / fewer collisions / fewer hydrogen ions (1)	2	**allow** idea that reaction takes longer (1) **allow** has not decreased as much (in the same time) (1) **ignore** a longer rate of reaction **allow** ethanoic acid is not as strong as hydrochloric acid (1)
	Total	**4**	

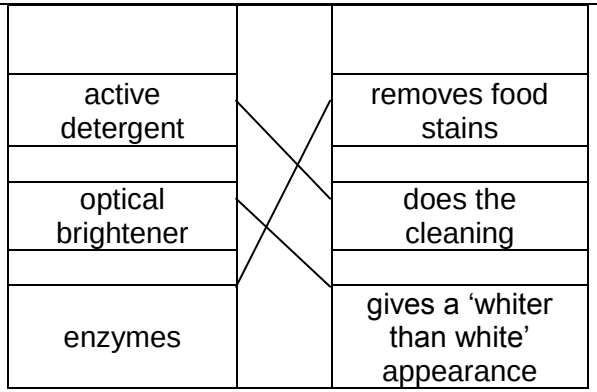
Question	Answer	Marks	Guidance
11 a	52 (%) (1)	1	
b i	carbon, hydrogen **and** fluorine (1)	1	**all three** required **allow** any order **ignore** symbols **not** fluoride
ii	8 (1)	1	
c	**any two from:** (increased risk of) sunburn (1) (accelerated) ageing of skin (1) (increased risk of) cataracts (1) (increased risk of) skin cancer (1)	2	**allow** sunstroke or damage to the skin (1) **allow** damage to eyes (1) **ignore** just 'cancer'
	Total	**5**	

Question			Answer	Marks	Guidance
12	**a**	**i**	5 (cm^3) (1)	1	**allow** any value between 5 and 6
		ii	44^oC (1)	2	**allow** 42-45 (^oC) (1)

			idea of highest point on the curve / where most carbon dioxide is made (1)		**second mark is dependent on the correct temperature** **allow** optimum temperature (1)
	b		$C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH$ formulae (1) balancing – dependent on correct formulae (1)	2	**allow** C_2H_6O as formula for ethanol **allow** any correct multiple e.g. $2C_6H_{12}O_6 \rightarrow 4CO_2 + 4C_2H_5OH$ **allow** = or ⇆ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors of case, subscript or superscript e.g. $C^6H^{12}O^6 \rightarrow 2Co_2 + 2C_2H_5OH$
			Total	**5**	

Question	Answer	Marks	Guidance
13	**Level 3** **Applies knowledge to correctly rank all of the samples in order of hardness** **AND** **identifies the type of hardness in two of the samples with a correct explanation for at least one of them.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Applies knowledge to correctly rank all of the samples in order of hardness** **AND** **identifies the type of hardness in one of the samples (no explanation needed).** **OR** **identifies the type of hardness in two of the samples (no explanation needed).** **OR** **Identifies the type of hardness in one of the samples with a correct explanation.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Applies knowledge to either correctly rank two of the samples in order of hardness** **OR** **identifies the type of hardness in one of the samples (no explanation needed).** 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:** Order of hardness • **B>A>C** Types of hardness and explanation • sample **A** contains permanent hardness • as not softened by boiling • sample **B** contains both temporary and permanent hardness • as some (but not all) of the hardness is removed by boiling • sample **C** contains only temporary hardness • as it completely softened by boiling **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		6	

Question	Answer	Marks	Guidance
14 a	water (1) oxygen (1)	2	**allow** H_2O (1) **allow** O / O_2 / air (1) **allow** moist air or damp air (2) **ignore** iron
b	**any two from:** oil or grease (1) paint (1) galvanising (1) idea of sacrificial protection (1) alloying (1) tin plating (1) **then any one from:** oil or grease or paint or tin plating – act as a barrier (so they stop water and oxygen reaching the iron) (1) galvanising – coated with zinc / so acts as a barrier / zinc corrodes first (1) sacrificial protection uses a more reactive metal / magnesium reacts instead of iron / zinc reacts instead of iron (1)	3	 **allow** coat with zinc (1) **allow** put in contact with magnesium or zinc (1) **allow** coat in another metal (1) **allow** mix with another metal (1) **allow** use stainless steel (1) **allow** plastic coating (1) **allow** paint provides a protective layer (1)
	Total	**5**	

Question	Answer	Marks	Guidance
15 a	Yes (no mark) solvent **A** will remove the blue paint and solvent **D** will remove the yellow paint (1) solvents **A** and **D** will not damage the clothes (1)	2	 **allow** solvent **A** removes blue paint and does not damage clothes (1) **allow** solvent **D** removes yellow paint and does not damage clothes (1)
b	 **all three** correct (2) **but** **one** or **two** correct (1)	2	
	Total	**4**	

Question			Answer	Marks	Guidance
16	a	i	electricity generation (1)	1	
		ii	**any three from:** decrease in total water usage (1) decrease in use for electricity generation (1) decrease in amount used for farming (1) other uses decreases (1)	3	**allow** (virtually) no change in use for farming (1)
		iii	$\frac{13000}{42000} \times 100$ (2) **but if incorrect then** percentage = $\frac{\text{volume for public water supply}}{\text{total volume}} \times 100$ (1)	2	**allow** $\frac{13000}{42000} = 0.3095$ (1) **allow** $\frac{13}{42}$ x 100 (1) 0.3095 x 100 (1) No mark for 30.95%
		iv	increase (1)	1	**allow** went to 37.14 (%)
	b		water meters increases (so less water used) (1) population increases (so more water used) (1) idea of a balance between more and less water being used (1)	3	
			Total	**10**	

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