

Chemistry B

General Certificate of Secondary Education

Unit **B642/01**: Modules C4, C5, C6 (Foundation Tier)

Mark Scheme for June 2012

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Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Annotations

Annotation	Meaning
	Correct response
	Incorrect response
	Benefit of doubt
	Benefit of the doubt not given
	error carried forward
	Omission Mark
	Ignore
	reject
	contradiction

Subject-specific Marking Instructions

/	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
<u> </u>	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	error carried forward
AW	alternate wording
ora	or reverse argument

Question		Answers	Marks	Guidance
1	(a)	plants grow bigger / increase crop yield / plants grow faster / replace essential elements (1)	1	<p>allow replace nitrogen / replace potassium / replace phosphorus / replace nutrients / replace minerals</p> <p>allow fertilisers contain nutrients</p> <p>allow to make more money</p> <p>ignore to make plants grow / to help plants grow / to produce better crops</p> <p>ignore makes plants healthier</p> <p>not kills weeds / pests</p>
	(b)	nitrogen (1)	1	<p>allow N for nitrogen</p> <p>allow N₂</p>
	(c) (i)	measuring cylinder (1)	1	ignore measuring beaker / measuring tube
	(ii)	it decreases / AW (1)	1	<p>allow it moves from high to low number</p> <p>allow it moves from a number greater than 7 to a quoted number that is less e.g. from 11 to 8 or from 12 to 4</p> <p>ignore references to colour changes</p>
	(d) (i)	3 / three (1)	1	
	(ii)	174 (1)	1	
Total			6	

Question		Answers	Marks	Guidance
2	(a)	(the reaction is) reversible (1)	1	allow reaction goes both ways allow idea that products (also) react to make reactants allow (forms an) equilibrium ignore vice versa
	(b)	air (1)	1	allow correct answer ticked, circled or underlined in list if answer line blank
	(c)	recycled (1)	1	allow (unreacted nitrogen and hydrogen) gases are reacted again allow a description of recycling e.g. gas goes back round to be put through again allow the gas is re-used in the reactor
	(d)	(i) decreases / goes down / gets lower / AW (1)	1	allow ora if lower temperature clearly stated
		(ii) pressure 500 (atmospheres), temperature 350 (°C) (1)	1	allow correct answers indicated in table if answer lines are blank
		Total	5	

Question		Answers	Marks	Guidance
3	(a)	lakes / rivers / streams / aquifers / boreholes / wells (1)	1	allow rain (water) allow sea (water) allow springs ignore water butt
	(b)	kills microbes / kills bacteria / kills microorganisms (1)	1	ignore kills germs ignore get rid of microbes / get rid of bacteria / get rid of microorganisms water is not harmful to drink or people do not get ill is not sufficient
	(c)	bromide (1) sulfate (1)	2	allow Br- not bromine ignore halide allow SO ₄ ²⁻
		Total	4	

Question			Answers	Marks	Guidance
4	(a)	(i)	detergent (1)	1	
		(ii)	rinse agent (1)	1	
	(b)		<p>any two from:</p> <p>dyes not damaged or made paler (1) more delicate clothes can be washed / less shrinkage / so clothes do not lose their shape (1) saves energy / saves electricity / saves fuel in the home (1) less greenhouse gases / reduces the carbon footprint (1) enzymes in washing powder not denatured (1)</p>	2	<p>allow colours won't run ignore doesn't ruin or damage the clothes unless qualified</p> <p>ignore better for the environment unless qualified ignore less pollution allow enzymes work better at low temperatures ignore takes less time</p>
	(c)		a solvent other than water (is used to clean clothes) (1)	1	<p>allow water not used allow uses an organic solvent but uses a solvent on its own is not sufficient</p>
			Total	5	

Question		Answers	Marks	Guidance
5	(a)	raw material A is sulfur (1) raw material B is air (1)	2	allow other sources of sulfur dioxide e.g. calcium sulfate ignore oxygen
	(b)	$2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$ correct formulae (1) correct balancing (1)	2	allow any correct multiple including fractions allow = or \rightarrow instead of \rightleftharpoons not and or & instead of + balanced equation mark dependent on correct formulae but allow one mark for balanced equation with some minor errors in subscript and case eg $2\text{SO}_2 + \text{o}_2 \rightarrow 2\text{So}_3$
		Total	4	

Question			Answers	Marks	Guidance
6	(a)	(i)	600 (seconds) (1)	1	
		(ii)	0 - 200 seconds (1)	1	allow correct answer ticked, circled or underlined in list if answer line blank
		(iii)	reactant(s) used up / no more marble chips / no more hydrochloric acid (1)	1	allow nothing left to react ignore calcium carbonate has dissolved
	(b)		<p>any three from:</p> <p>(ethanoic acid) is a weaker acid / doesn't ionise as much (1)</p> <p>fewer particles / less crowded particles (1)</p> <p>appreciation that the particles are hydrogen ions (1)</p> <p>fewer collisions (1)</p>	3	<p>assume answer refers to ethanoic acid unless hydrochloric acid is specified</p> <p>allow hydrochloric acid is a stronger acid</p> <p>allow two marks for there is lower concentration of hydrogen ions</p> <p>allow two marks for fewer collisions involving hydrogen ions</p> <p>no need for reference to collision frequency or successful collisions to be awarded a mark</p>
			Total	6	

Question			Answers	Marks	Guidance
7	(a)	(i)	increases (in mass) / AW (1)	1	allow more copper is made
		(ii)	gets smaller / dissolves / mass decreases / AW (1)	1	allow loses copper ignore erodes away
	(b)		cathode: potassium (1) anode: iodine (1)	2	allow K allow I ₂ / I not iodide
			Total	4	

Question			Answers	Marks	Guidance
8	(a)		0.45 (g) (1)	1	unit not needed
	(b)		1.60 (g) (1)	1	unit not needed allow 1.6 (g)
	(c)		6.4 (g) (1)	1	unit not needed
			Total	3	

Question			Answers	Marks	Guidance
9	(a)		vitamin B1 (1)	1	allow vitamins allow correct answer ticked, circled or underlined in table if answer line blank
	(b)	(i)	prevents digestive problems / easier to digest / AW (1)	1	allow other sensible answers e.g. safer for baby / prevents harm to baby / does not give baby an upset stomach ignore milk is too thick for the baby to drink
		(ii)	mol/dm ³ (1)	1	allow correct answer ticked, circled or underlined in list if answer line blank
			Total	3	

Question		Answers	Marks	Guidance
10	(a)	water / H ₂ O and air / oxygen / O ₂ (1)	1	both required for 1 mark allow moisture ignore O
	(b) (i)	idea of stops oxygen reaching surface / idea of stops water reaching the surface (1)	1	allow acts as a barrier to air / acts as a barrier to oxygen / acts as a barrier to water / idea of stopping oxygen reacting with iron / idea of stopping water reacting with iron acts as a barrier or protects the iron is not sufficient
	(ii)	any two from: cover with oil / grease (1) galvanising / coating with zinc / coating with chromium (1) sacrificial protection / attach magnesium to iron (1) alloying / make stainless steel (1) tinning (1)	2	allow cover with varnish allow coating the iron in plastic allow chrome plating ignore keep it away from water or oxygen / keep it dry
		Total	4	

Question		Answers	Marks	Guidance
11	(a)	electrical (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(b)	water is the (only) waste product (which is not a pollutant) / does not give off greenhouse gases (1)	1	allow does not give off carbon dioxide allow does not produce carbon emissions / AW ignore does not produce harmful gases
	(c)	any two from: produces energy efficiently / direct energy transfer (1) light (weight) / idea that it's lighter so spacecraft can carry a bigger payload (1) they can be used continuously / do not need to be recharged (1) idea that fuel cell uses hydrogen and/or oxygen which spacecraft has to carry anyway (1) water produced is drunk by astronauts (1)	2	allow fewer energy transfers (1) ignore reference to cost / density fuel cell is efficient is not sufficient allow not heavy ignore takes up less space allow fuel cells will not run out ignore renewable energy source ignore readily available unless qualified for a spacecraft water is the only waste product is insufficient but allow if linked to a use within the spacecraft ignore reference to pollution
		Total	4	

Question		Answers	Marks	Guidance
12	(a)	(alcoholic) drinks / solvent / fuel (1)	1	allow named alcoholic drink allow methylated spirits / meths ignore used to make alcohol allow used to make esters allow mouthwash / (making) perfume / disinfectants / sterile wipes ignore cleaner / vinegar
	(b)	any three from: 25 – 50°C (1) absence of oxygen (1) presence of water (1) enzymes (found in yeast) (1)	3	allow any temperature within this range allow room temperature ignore warm allow absence of air allow damp / moist allow higher level answers that explain choice of condition <ul style="list-style-type: none"> • above 50°C enzyme denatured (2) • below 25°C yeast inactive (1) • lack of oxygen to stop formation of ethanoic acid (2)
		Total	4	

Question			Answers	Marks	Guidance
13	(a)	(i)	C (1)	1	allow A <u>after boiling</u>
		(ii)	A (1)	1	
	(b)		strong acid would react with the metal of the heater element or washing machine / strong acid will corrode the metal (1)	1	allow ora allow reacts with heater / reacts with metal / reacts with washing machine ignore strong acid will damage the heater element / metal / washing machine ignore strong acid with dissolve the heater element / metal / washing machine ignore strong acid will erode the heater element / metal / washing machine
	(c)	(i)	calcium carbonate (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
		(ii)	6 / six (1)	1	
Total				5	

Question			Answers	Marks	Guidance
14	(a)		at anode: chlorine / Cl ₂ (1) at cathode: hydrogen / H ₂ (1)	2	ignore Cl ignore H allow 1 mark for hydrogen at anode and chlorine at cathode
	(b)		test: moist litmus paper result of test: bleaches	1	test and result required for mark but allow if written on one line allow damp litmus paper allow moist (Universal) indicator paper / damp (Universal) indicator paper allow removes colour / turns white
Total				3	

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

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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