

Chemistry B

General Certificate of Secondary Education

Unit **B641/01**: Modules C1, C2, C3 (Foundation Tier)

Mark Scheme for January 2012

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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.

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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 the doubt
	benefit of the doubt not given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

Subject-specific Marking Instructions

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

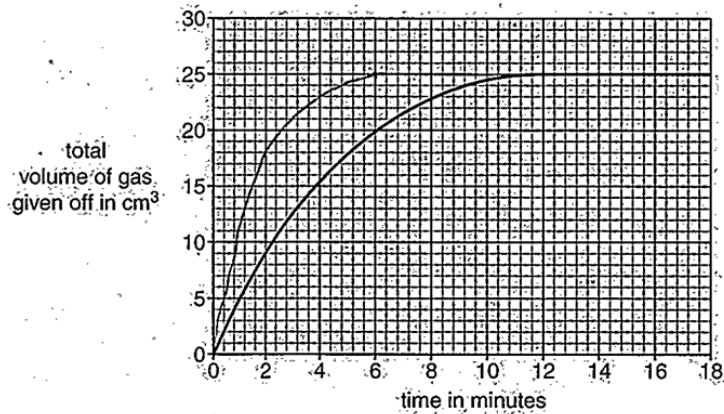
- / = alternative and acceptable answers for the same marking point
- (1) = separates marking points
- allow = answers that can be accepted
- not = answers which are not worthy of credit
- reject = answers which are not worthy of credit
- ignore = statements which are irrelevant
- () = words which are 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		Expected Answers	Marks	Additional Guidance
1	(a)	monomers (1)	1	allow alkenes
	(b)	(i) E (1)	1	
		(ii) E (1) insoluble (in oil) (1) melting point is above 100°C (1)	3	allow 1 mark for B with the reason that melting point is above 100°C no marks if A, C or D chosen allow it has the highest melting point allow melting point is 150°C ignore it has a high melting point allow won't melt carrying the oil ignore density / strength
	(c)	packaging / cups / cartons / toys / insulation / furniture / coving / tiles / swimming floats / bubble wrap (1)	1	allow under fish tanks allow protection of goods items etc. ignore bottles
	(d)	does not rot / does not decompose / does not decay (1)	1	allow does not disintegrate / cannot break down allow takes a long time to break down / disintegrate / decay ignore does not break down quickly / hard to break down / takes a long time to go away
		Total	7	

Question		Expected Answers	Marks	Additional Guidance
2	(a)	carbon – 7 hydrogen – 16 (1)	1	both required for 1 mark
	(b)	oxygen (1)	1	allow O ₂ or O
	(c)	(i)	1	allow H ₂ O
		(ii)	2	allow it goes white ignore it bubbles allow due to presence of CO ₂
			Total	5

Question		Expected Answers	Marks	Additional Guidance												
3	(a)	one or two correct (1) but all three correct (2)	2	<table border="1"> <tr> <td>toxic</td> <td></td> <td>✓</td> </tr> <tr> <td>does not react</td> <td>✓</td> <td></td> </tr> <tr> <td>irritates</td> <td></td> <td>✓</td> </tr> <tr> <td>soluble</td> <td></td> <td>(✓)</td> </tr> </table>	toxic		✓	does not react	✓		irritates		✓	soluble		(✓)
	toxic			✓												
does not react	✓															
irritates		✓														
soluble		(✓)														
	(b)	idea of safety to humans (1)	1	allow to know if it has any side effects / so it does not harm the person wearing it / does not irritate the skin												
Total			3													

Question		Expected Answers	Marks	Additional Guidance
4	(a)	(i) idea of colour change (1)	1	allow albumen goes coloured / changes to a white colour ignore egg goes hard
		(ii) B (1)	1	allow a new substance is made allow correct answer underlined, ringed or ticked but answer line takes precedence
	(b)	(i) carbon dioxide (1)	1	allow CO ₂ allow water vapour / steam ignore just water
		(ii) to make it rise (1)	1	
	(c)	to stop food reacting with oxygen (1)	1	allow stop food reacting with air ignore to preserve food / prevent food going off / food lasts longer ignore to stop oxygen getting in
Total			5	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	zinc chloride / hydrogen (1)	1	allow correct formulae ZnCl ₂ / H ₂ / H
	(b)	(i) 6 (minutes)	1	
		(ii) no more (dilute) hydrochloric acid / no zinc left (1)	1	allow reactants run out ignore no gas produced / graph is flat ignore the zinc is not reacting any more
	(c)	gradient steeper than original line (1) line ends at 25 cm ³ (1)	2	mark independently if line does not clearly start at origin, lose first marking point the line must not go above 25 cm ³ ±½ square 
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	<p>one line correct (1)</p> <p>but</p> <p>all three lines correct (2)</p>	2	<p>solvent — helps to stick paint</p> <p>binding material — gives the paint its colour</p> <p>pigment — thins the paint</p>
	(b)	solvent evaporates (1)	1	<p>allow water evaporates / liquid evaporates</p> <p>allow (paint) dries by evaporation</p> <p>allow (binder) reacts with oxygen or air</p> <p>ignore oil evaporates</p>
	(c)	colloid (1)	1	allow correct answer ticked, circled or underlined in list but answer line takes precedence
	(d)	natural (1)	1	allow correct answer ticked, circled or underlined in list but answer line takes precedence
Total			5	

Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	their electrical conductivity (1)	1	allow both conduct electricity
		(ii)	<p>any one from: aluminium is weaker (than iron) / iron is stronger (than aluminium)</p> <p>aluminium does not rust / corrode and Iron rusts</p> <p>aluminium is less dense (than iron) / iron is more dense (than aluminium)</p>	1	<p>answer must come from table</p> <p>allow aluminium does not rust / corrode</p>
	(b)		<p>any two from: saves natural resources (1)</p> <p>saves energy (1)</p> <p>reduces disposal problems (1)</p>	2	<p>allow less metal ores are mined allow avoids environmental damage due to mining or quarrying allow otherwise we will run out of natural resources / we are not wasting materials</p> <p>allow reduction in toxic material being dumped allow reduces need for landfill sites / saves land / reduces the amount of rubbish (that goes into landfill sites) / reduces waste / to make more space ignore references to harming or killing wildlife</p> <p>ignore can be used to make other objects / cars</p> <p>ignore it will help the environment / cause pollution</p>
			Total	4	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	78 (%) (1)	1	
	(b)	idea that photosynthesis takes in or lowers carbon dioxide and gives out or increases oxygen (1) idea that respiration takes in or lowers oxygen and gives out or increases carbon dioxide (1)	2	allow word or unbalanced symbol equation for photosynthesis water + carbon dioxide → glucose + oxygen $\text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ not references to plants breathing allow word or unbalanced symbol equation for respiration glucose + oxygen → water + carbon dioxide $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO}_2$ allow photosynthesis gives out oxygen / takes in carbon dioxide and respiration gives out carbon dioxide / takes in oxygen scores 1
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	5 / five (1)	1	
	(b)	$\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (1)	1	allow any order of products allow any correct multiples allow = instead of → not and / & instead of + allow heat above arrow but not '+ heat' or '+ energy' in equation
	(c)	concrete is poured into a metal support (1) aw / steel rods are put inside concrete / AW (1)	1	allow steel, iron instead of metal allow frame, mesh, or cage instead of support allow with metal (bars)
		Total	3	

Question			Expected Answers	Marks	Additional Guidance				
10	(a)	(i)	(element B) has one electron in the outer shell (1)	1					
		(ii)	(element E) has three (electron) shells (1)	1	allow has 3 rings / 3 outer shells				
		(iii)	D (1)	1					
	(b)		fluorine (1)	1	allow F				
	(c)		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">relative charge</td> <td style="padding: 5px;">relative mass</td> </tr> <tr> <td style="padding: 5px;">0 / no charge / neutral</td> <td style="padding: 5px;">1 / one</td> </tr> </table> (1)	relative charge	relative mass	0 / no charge / neutral	1 / one	1	both required for 1 mark allow +1 but not -1 for relative mass
relative charge	relative mass								
0 / no charge / neutral	1 / one								
			Total	5					

Question		Expected Answers	Marks	Additional Guidance
11	(a)	X – potassium Y – lithium Z – sodium	2	one or two correct (1) but all three correct (2)
	(b)	(sodium) reacts with air / reacts with oxygen (1) reacts with water (1)	2	allow is a reactive metal / is very reactive score 1 if no other mark is given allow so it will not react with water / air allow because it oxidises / because it tarnishes allow stops contact with water and or air scores 1 allow reacts with moist air for two marks ignore (sodium) does not react with oil
	(c)	potassium chloride (1)	1	not potassium chlorine allow KCl
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
12	(a)	any correct transition metal (1)	1	allow correct symbol instead of name
	(b)	breakdown of a compound / breakdown of a substance / breakdown of a chemical (1) when it is heated / AW / (1) OR compound makes two (or more) other compounds (1) when heated / AW (1)	2	allow break up allow breakdown of a molecule allow substance makes two (or more) substances allow chemical makes two (or more) chemicals allow a molecule makes two (or more) molecules (1)
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
13	(a)	magnesium + oxygen \rightarrow magnesium oxide (1)	1	allow reactants and products in either order allow correct formulae or mix of formulae and words $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$ symbol equation does not need to be balanced ignore incorrect balancing allow = instead of \rightarrow not and / & instead of +
	(b)	ions (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	(c)	magnesium oxide has a very high melting point (1) (tick in 3 rd answer box)	1	more than 1 box ticked (0)
		Total	3	

Question		Expected Answers	Marks	Additional Guidance	
14	(a)	lead (1)	1		
	(b)	(tungsten has a) melting point above 2000°C (1)	1	allow tungsten has highest melting point allow it has a melting point of 3407°C allow reference to sufficiently low electrical conductivity to give high resistance ignore it has a very high melting point ignore references to other properties	
	(c)	(i)	(gold and/or tungsten are) too expensive (1)	1	
		(ii)	any one from: lead – high density or cheap (1) iron – high density or cheap (1) copper – high density or does not corrode (1)	1	not aluminium ignore other properties ignore just dense
			Total	4	

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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