

**Chemistry B**

General Certificate of Secondary Education

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

**Mark Scheme for June 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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## Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt <b>not</b> given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

## Subject-specific Marking Instructions

Annotation	Meaning
/	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		Answers	Marks	Guidance
1	(a)	<b>any 2 from:</b> oil slicks (1) damage to wildlife / sea life (1)  damage to beaches (1)	2	<b>allow</b> hard to remove or consequence of the oil slick <b>allow</b> kills sea birds / fish / animals <b>allow</b> harmful to sea birds / fish / animals <b>allow</b> damage to habitats / ecosystems <b>ignore</b> references to pollution
	(b)	(i) diesel (1)	1	<b>allow</b> correct answer ticked, circled or underlined in list if answer line is blank
		(ii) lowest boiling point (1)	1	<b>allow</b> low or lower boiling point <b>allow</b> smaller the molecule the lower the boiling point
<b>Total</b>			<b>4</b>	

Question		Answers	Marks	Guidance
2	(a)	(i) a cup for hot drinks (1)	1	<b>allow</b> correct answer ticked, circled or underlined in list if answer line is blank
		(ii) will not decay / decompose (by bacterial action) (1)	1	<b>ignore</b> it does not degrade
		(iii) <b>any one from:</b> wastes a valuable resource (1) produces toxic or poisonous gases or fumes (1) produces a greenhouse gas (1)	1	<b>ignore</b> a dangerous or harmful gas <b>allow</b> kills <b>allow</b> produces carbon monoxide, sulfur dioxide <b>allow</b> produces carbon, soot <b>allow</b> named greenhouse gas e.g. carbon dioxide <b>allow</b> contributes to global warming <b>ignore</b> references to pollution <b>ignore</b> smoke
	(b)	poly(chloroethene) (1) propene (1)	2	chloroethene is intended to be in brackets and should not be ignored <b>allow</b> polychloroethene
	(c)	tick next to a reaction in which small molecules are joined together (1) (4 <sup>th</sup> tick box)	1	<b>allow</b> other ways of indicating the answer, eg answer circled or underlined.
<b>Total</b>			<b>6</b>	

Question		Answers	Marks	Guidance
3	(a)	change in colour (1) change in mass (1)	2	<b>allow</b> green before and black afterwards <b>allow</b> 10.80g before and 10.20g afterwards <b>allow</b> decrease in mass
	(b)	(i) 9.5 (1)		1
		(ii) copper sulfate (1)	1	<b>allow</b> Cu SO <sub>4</sub>
	(c)	(i) spirit burner	1	
		(ii) same apparatus / equipment / spirit burner / copper can / calorimeter / thermometer spirit burner same distance from can (1)	1	<b>allow</b> same starting temperature <b>allow</b> same temperature rise <b>allow</b> heat for same time  <b>ignore</b> same mass of water each time <b>ignore</b> same mass of fuel
<b>Total</b>			<b>6</b>	

Question		Answers	Marks	Guidance
4	(a)	contains hydrogen and carbon atoms <b>only</b> (1)	1	<b>allow</b> contains <b>only</b> carbon and hydrogen <b>not</b> is a mixture of carbon and hydrogen only <b>not</b> contains only carbon and hydrogen molecules
	(b)	double (covalent) bond (between carbon atoms) (1)		1
	(c)	12 (1)	1	
	(d)	C <sub>4</sub> H <sub>10</sub> (1)	1	<b>allow</b> H <sub>10</sub> C <sub>4</sub> <b>not</b> C <sub>4</sub> H <sub>10</sub>
<b>Total</b>			<b>4</b>	

Question		Answers	Marks	Guidance
5	(a)	steel (1)	1	
	(b)	marble / limestone (1)	1	
	(c)	glass / concrete (1)	1	
	(d)	granite (1)	1	
		<b>Total</b>	<b>4</b>	

Question		Answers	Marks	Guidance
6	(a)	toxic / poisonous (1)	1	<b>allow</b> kills <b>allow</b> higher level answers involving formation of carboxyhaemoglobin <b>ignore</b> dangerous / harmful
	(b)	acid rain / photochemical smog (1)	1	<b>allow</b> named effect of acid rain / smog eg plants dying <b>allow</b> makes ozone at low level / destroys the ozone layer / destroys ozone at high level <b>allow</b> causes asthma  <b>ignore</b> greenhouse effect / global warming
	(c)	$N_2 + O_2 \rightarrow 2NO$ Correct formula (1) Balancing (1)	2	<b>allow</b> = instead of $\rightarrow$ <b>not</b> and or & in equation  <b>allow</b> any correct multiple including fractions balancing mark is dependent on the correct formulae  <b>allow</b> one mark for correct balanced equation with minor errors in case or subscript e.g. $N_2 + O_2 \rightarrow 2NO$ or $N_2 + O_2 \rightarrow 2No$ <b>if</b> + heat / energy max one mark for correct formula but heat / energy can be above $\rightarrow$ or =
	(d) (i)	nitrogen (1)	1	<b>ignore</b> N or $N_2$
	(ii)	particles have little energy / particles are moving slowly (1)  not many collisions (per second) (1)	2	<b>no need for a comparison</b> <b>allow</b> particles are moving slower / particles have less energy <b>allow</b> collisions are not successful / collisions are not energetic  <b>allow</b> fewer collisions <b>allow</b> particles are far apart / concentration is very small
<b>Total</b>			<b>7</b>	

Question		Answers	Marks	Guidance
7	(a)	<b>any two from:</b> (percentage of) glass decreases (1) (percentage of) metals decreases (1) (percentage of) plastic increases (1) (percentage of) other increases (1)	2	<b>allow</b> (percentage of) paper does not change (1) <b>allow</b> (percentage of) textiles does not change (1) <b>allow</b> (percentage of) organic waste does not change (1)
	(b) (i)	cars / cutlery (1)	1	<b>allow</b> any suitable use of steel other than as a building material
	(ii)	mixture of elements one of which is a metal	1	<b>allow</b> mixture of metals <b>allow</b> contains two (or more) metals  <b>not</b> metals or elements bonded together <b>not</b> a compound of two metals
	(iii)	brass / bronze / amalgam / solder / nichrome / nitinol (1)	1	<b>allow</b> other correct alloys
	(c)	<b>any two from:</b> saves natural resources (1) cheaper than extracting metal (1) saves energy (1) reduces disposal problems / reduces litter / reduces use of land-fill sites (1)	2	
	(d) (i)	aluminium – none <b>and</b> iron – rusts (1)	1	<b>allow</b> aluminium corrodes slowly and iron rusts (easily) <b>allow</b> aluminium – No / Low <b>and</b> Iron – Yes / High <b>not</b> corrosive
	(ii)	iron is attracted to a magnet (aluminium is not) (1)	1	<b>allow</b> higher level answers in terms of the use of an electromagnet
<b>Total</b>			<b>9</b>	



Question		Answers	Marks	Guidance										
8	(a)	magnesium + oxygen → magnesium oxide (1)	1	<p><b>allow</b> formulae instead of words  <b>allow</b> symbol equation even if not balanced            eg <math>\text{Mg} + \text{O}_2 \rightarrow \text{MgO}</math> (but case and subscript must be correct)  <b>allow</b> = for →  <b>not</b> and or &amp; for +  <b>not</b> + heat but heat can be above → or =</p>										
	(b)	magnesium oxide has a high melting point (1)  solid magnesium oxide does not conduct electricity (1)	2	<p>If more than two properties marked with a tick mark the incorrect ones first.</p> <ul style="list-style-type: none"> <li>• If one incorrect maximum one mark</li> <li>• If two or more incorrect award 0 marks</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 2px;">Magnesium oxide is a gas at room temperature.</td> <td style="width: 50px; text-align: center;"> </td> </tr> <tr> <td style="padding: 2px;">Magnesium oxide has a high melting point.</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="padding: 2px;">Magnesium oxide is a liquid at room temperature.</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="padding: 2px;">Solid magnesium oxide does not conduct electricity.</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="padding: 2px;">Melted magnesium oxide does not conduct electricity.</td> <td style="text-align: center;"> </td> </tr> </tbody> </table>	Magnesium oxide is a gas at room temperature.		Magnesium oxide has a high melting point.	✓	Magnesium oxide is a liquid at room temperature.		Solid magnesium oxide does not conduct electricity.	✓	Melted magnesium oxide does not conduct electricity.	
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	(c) (i)	magnesium atom has two more electrons / magnesium ion has two less electrons (1)	1	<p><b>allow</b> difference of two electrons  <b>allow</b> magnesium atom has more electrons  <b>allow</b> magnesium ion has less electrons</p>										
	(ii)	24 (1)	1											
<b>Total</b>			<b>5</b>											

Question		Answers	Marks	Guidance
9	(a)	17 (1)	1	
	(b)	7 (1)	1	allow VII / halogens / seven
	(c)	7 (1)	1	
	(d)	4 (1)	1	
	(e)	green (gas) (1)	1	not an incorrect state e.g. green liquid
<b>Total</b>			<b>5</b>	

Question		Answers	Marks	Guidance
10	(a)	iron(II) sulfate (1)	1	
	(b)	lime water has gone milky (1)	1	allow it in reference to lime water
	(c)	(i) 3 (1)	1	
		(ii) green precipitate (1)	1	allow green solid / green grey solid
	(d)	yellow (1)	1	
<b>Total</b>			<b>5</b>	

Question		Answers	Marks	Guidance
11	(a)	hydrogen – test with a burning splint / light with a flame (1) and get a squeaky pop (1)  oxygen – test with a glowing splint (1) relights (1)	4	Mark test and result independently but must correspond to the correct gas to be awarded a mark <b>allow</b> two marks for burns with a squeaky pop <b>allow</b> one mark for a squeaky pop test  <b>allow</b> burning splint for test and burns brighter for result
	(b)	H <sub>2</sub> O (1)	1	
		<b>Total</b>	<b>5</b>	

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