

Chemistry A

General Certificate of Secondary Education

Unit **A321/02**: Modules C1, C2, C3 (Higher Tier)

Mark Scheme for June 2011

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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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Question			Answer	Mark	Guidance
1	a	i	$(451+447+453+449) / 4$ (1) = 450 (1)	2	allow 1800 / 4 for first mark give both marks for answer 450 without working allow one mark for answer 430 with or without working
		ii	The mean sulfur dioxide ... <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	1	
		iii	The range of measurements taken at A <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	1	
	b	i	Amy (1)	1	if two or more names given no mark
		ii	Andrew (1)	1	if two or more names given no mark
		iii	Clarissa (1)	1	if two or more names given no mark

Question		Answer	Mark	Guidance
1	c	<p>any two from:</p> <p>people to use less electricity;</p> <p>remove/reduce sulfur dioxide from the flue/chimney gases;</p> <p>use natural gas/oil/methane/hydrocarbon fuel/low sulfur fuel / remove sulfur from fuel;</p>	2	<p>allow switch off appliances when not in use etc</p> <p>ignore references to using nuclear power/hydro-electric/wind/solar/renewable</p> <p>ignore moving power station to another/less windy place</p> <p>ignore produce less electricity from this power station unless related to reduced demand from customers</p> <p>ignore burn less fuel</p> <p>ignore using another fuel than coal unless fuel is named or described</p> <p>ignore use a filter unless qualified eg to remove sulfur dioxide</p> <p>ignore catalytic converters/changing sulfur dioxide into a less harmful gas</p>
Total			[9]	
2	a	<p>any three from:</p> <p>people will share cars / cars will have more than one person in them;</p> <p>people will use public transport/use cycles/walk;</p> <p>fewer cars (in the town/on the road);</p> <p>less fuel is burned;</p> <p>less exhaust gas/nitrogen dioxide produced;</p>	3	<p>ignore use other means of transport unless qualified eg cycles</p> <p>allow petrol/diesel/LPG for fuel</p> <p>ignore less pollution/emissions/fumes unless qualified</p> <p>ignore reference to other pollutants eg carbon dioxide</p>
	b	<p>air/atmosphere nitrogen monoxide / NO (1)</p> <p>oxygen / O₂ nitrogen dioxide / NO₂ (1)</p>	2	<p>one mark for each correct sentence</p> <p>do not allow nitrogen oxide(s) in either sentence</p> <p>allow nitrogen(II) oxide for nitrogen monoxide</p> <p>allow nitrogen(IV) oxide for nitrogen dioxide</p>
Total			[5]	

Question		Answer	Mark	Guidance																				
3	a	<table border="1"> <thead> <tr> <th rowspan="2">factor</th> <th colspan="2">Type of shirt</th> </tr> <tr> <th>cotton shirt</th> <th>polyester shirt</th> </tr> </thead> <tbody> <tr> <td>energy</td> <td>✓</td> <td></td> </tr> <tr> <td>crude oil</td> <td>✓</td> <td></td> </tr> <tr> <td>fertilisers</td> <td></td> <td>✓</td> </tr> <tr> <td>carbon dioxide</td> <td></td> <td>✓</td> </tr> <tr> <td>water</td> <td></td> <td>✓</td> </tr> </tbody> </table>	factor	Type of shirt		cotton shirt	polyester shirt	energy	✓		crude oil	✓		fertilisers		✓	carbon dioxide		✓	water		✓	2	<p>all five rows correct = 2 marks four rows correct = 1 mark three or fewer rows correct = 0 marks</p> <p>if there are two ticks in one row, that row does not count</p>
factor	Type of shirt																							
	cotton shirt	polyester shirt																						
energy	✓																							
crude oil	✓																							
fertilisers		✓																						
carbon dioxide		✓																						
water		✓																						
	b	<p>any three from:</p> <p>forces between chains (that are not cross linked) are weak; cross linking forms bonds between chains; cross linked bonds/forces between chains are strong(er); more force/energy needed to separate chains;</p>	3	<p>do not credit answers that refer to forces in chains or chains being stronger ignore idea of chains/molecules being closer together allow use of polymer molecules instead of chains in all answers do not accept polymer or fibre in place of molecule or chain ignore references to sliding or overlapping ignore harder to break apart</p>																				

Question		Answer	Mark	Guidance
3	c	Making cling film from poly(ethene) ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Cling film is used once then thrown ... <input checked="" type="checkbox"/> (1)	2	
Total			[7]	

Question		Answer	Mark	Guidance
4	a	<input type="checkbox"/> Poly(propene) rope is expensive ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> Natural materials are available locally. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	
	b	<p>LEVEL OF RESPONSE MARK SCHEME</p> <p>Level 1 What affects sustainability (1 Mark) idea of hemp being renewable or poly(propene) not being renewable / idea that poly(propene) will cause more pollution when disposed / idea that poly(propene) will last longer in use</p> <p>Level 2 How does it affect sustainability (2 Marks) plus reasons for hemp being renewable eg more can be grown or poly(ethene) not being renewable eg made from crude oil / reasons for poly(propene) causing more disposal problems – will not rot in landfill/toxic fumes if burned / hemp will last a shorter time because it will rot</p> <p>Level 3 What else affects sustainability (3 Marks) plus one additional piece of information needed eg use of fertilisers/water/pesticides / pollution caused during manufacture / energy input during manufacture / whether material can be recycled</p> <p>Level 4 Additional detail (4 Marks) plus two additional pieces of information given or one additional piece of information explained</p>	4	<p>apply level of response marking – judge the worth of the whole answer based on the Levels. You need to mark holistically using the Levels as a guide.</p> <p>apply reverse arguments throughout</p> <p>if Level 1 and/or Level 2 ideas are not given, max 2 marks can be given for additional pieces of information needed as described in Level 3 and Level 4</p> <p>the answer must relate to sustainability of the material used for the rope</p> <p>there are no marks if the answer simply compares the properties of the two rope materials from the table</p> <p>ignore references to cost</p>

Question			Answer	Mark	Guidance
4	c		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> add plasticizer to the polymer <input checked="" type="checkbox"/> (1)	1	
			Total	[7]	

Question		Answer	Mark	Guidance
5	a	<input type="checkbox"/> <input type="checkbox"/> nitrogen and oxygen react to form ... <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> nitrogen dioxide dissolves in rainwater <input checked="" type="checkbox"/> (1)	2	
	b	phosphorus (1) potassium (1)	2	if three circled, max 1 if more than three circled, no marks
	c	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> They spread animal manure on the soil. <input checked="" type="checkbox"/> (1) They use annual crop rotation. <input checked="" type="checkbox"/> (1) <input type="checkbox"/>	2	
Total			[6]	

Question		Answer	Mark	Guidance																								
6	a	<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">element present</th> </tr> <tr> <th>carbon</th> <th>hydrogen</th> <th>nitrogen</th> <th>oxygen</th> </tr> </thead> <tbody> <tr> <td>hydrocbrn</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>sugar</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>protein</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>		element present				carbon	hydrogen	nitrogen	oxygen	hydrocbrn	✓	✓			sugar	✓	✓		✓	protein	✓	✓	✓	✓	3	one mark for each correct row
				element present																								
			carbon	hydrogen	nitrogen	oxygen																						
		hydrocbrn	✓	✓																								
sugar	✓	✓		✓																								
protein	✓	✓	✓	✓																								
b	i	liver (1)	1																									
	ii	urea (1)	1	not urine																								
	iii	kidney (1)	1	allow kidneys do not allow bladder																								
	c	<p>any two from:</p> <p>gives information about sugar content so consumer can avoid getting obese/diabetes;</p> <p>gives information about fat content so consumer can avoid getting obese/heart disease;</p> <p>gives information about salt content so consumer can avoid getting high blood pressure/strokes;</p> <p>gives information about additives/e-numbers/preservatives/colouring etc so consumer can avoid specific harmful effect eg hyperactivity/allergy;</p> <p>gives information about nuts/soya/dairy products/gluten etc so consumer can avoid foods that they are allergic to;</p>	2	<p>allow other relevant ideas, eg looking for omega-3 fatty acids/vitamins because these promote good health</p> <p>allow named chemical in place of type of chemical eg glucose for sugar</p> <p>do not give two marks for two chemicals from the same marking point</p> <p>allow chemicals put into food = additives</p> <p>allow sugar because diabetics need to control sugar input for first marking point</p> <p>do not give marks for chemicals that would not normally be listed on food labels</p> <p>there are no marks for naming chemicals without effects or with incorrect effects</p> <p>effects on health must be specific, so no mark if eg could damage us / could cause harm unless qualified</p>																								
Total			[8]																									

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