

Chemistry B

General Certificate of Secondary Education

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

- 1 The **Abbreviations, annotations and conventions** used in the detailed Mark Scheme are:

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
not	= answers which are not worthy of credit
reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant
allow	= answers that can be accepted
()	= words which are not essential to gain credit
<u> </u>	= underlined words must be present in answer to score a mark
ecf	= error carried forward
AW	= alternative wording
ora	= or reverse argument

Question		Expected Answers	Marks	Additional Guidance
1	a	sodium nitrate (1)	1	allow NaNO ₃
	b	any two from: food colouring (1) flavour enhancer (1) emulsifier (1)	2	allow stabiliser (1) / acid regulator (1) / sweetener (1) allow flavouring or enhancer (1) / colouring (1)
	c	oxygen (1)	1	allow O / O ₂
Total			4	

Question		Expected Answers	Marks	Additional Guidance
2	a	any one from takes a long time to form (1) are used up faster than they are formed (1) cannot be made again (1)	1	allow takes (many) years to form or thousands or millions of years to form ignore takes hundreds of years to form allow once it's gone, its gone / can't be replaced ignore cannot be used again
	b	has the lowest boiling point (1)	1	allow has a low boiling point allow boiling point is small or low
	c	propane (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	d i	paraffin (1)	1	allow correct answer indicated in table if answer line is blank
	d ii	cracking needs a catalyst and high temperature (1) cracking converts large molecules into small molecules (1)	2	two ticks only in correct boxes 2 marks two ticks only but only 1 correct answer 1 mark if three ticks with two correct allow 1 mark
Total			6	

Question		Expected Answers	Marks	Additional Guidance
3	a	carbon and hydrogen (1)	1	ignore C and H i.e. must be names of the elements
	b	C (1)	1	
	c	C ₄ H ₁₀ (1)	1	allow H ₁₀ C ₄ not C ₄ H ₁₀ / C ⁴ H ¹⁰
	d	polyethene (1)	1	allow polythene allow poly(ethene) allow correct formula allow polyethylene
		Total	4	

Question		Expected Answers	Marks	Additional Guidance
4	a	<p>advantage no carbon dioxide (which is a greenhouse gas) / no carbon monoxide (which is a poisonous gas) (1)</p> <p>disadvantage hydrogen is not widely available / hydrogen is (a gas) which is difficult to store (1)</p>	2	<p>USE TICKS ON THIS QUESTION allow hydrogen (only) produces water allow hydrogen produces no poisonous gases ignore hydrogen produces no harmful or dangerous gases ignore hydrogen is more environmentally friendly / eco-friendly ignore hydrogen will not pollute air</p> <p>ignore references to cost ignore hydrogen is explosive / flammable allow hydrogen is more difficult to transport</p>
	b	octane + oxygen → carbon dioxide + water (1)	1	<p>allow air for oxygen not and or & for + allow = instead of → allow correct formulae or mix of words and correct formulae allow $C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$ i.e. symbol equation does not have to be balanced not '+ energy or + heat' on either side of equation ignore 'heat' written above the arrow</p>
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
5	a	waterproof (1)	1	allow keep rain off / keep water out / water resistant
	b	any two from: causes litter (1) disposal problems (1) fill up landfill sites (1) stay around for a very long time (1)	2	USE TICKS ON THIS QUESTION allow do not break down / does not biodegrade allow gives off poisonous gases when burnt allow harms animals by choking ignore references to recycling
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
6	a	least hard limestone marble hardest granite (1)	1	all three in correct order required for mark
	b	any two from: brick (1) glass (1) concrete (1) cement (1) wood (1) plastic (1) MDF (1) clay (1) slate (1) metal (1)	2	allow straw / reeds (1) allow a named wood e.g. oak (1) allow a named plastic e.g. poly vinyl chloride allow water / stones / sand / mud allow a named metal used in construction e.g. aluminium
	c	cools slowly / aw (1)	1	allow takes a long time to cool allow it is an intrusive rock
		Total	4	

Question		Expected Answers	Marks	Additional Guidance	
7	a	<p>advantage: aluminium will have a longer lifetime / aluminium corrodes less (than steel) / aw (1)</p> <p>disadvantage: aluminium is (more) expensive (than steel) / aluminium is not (as) strong / aw (1)</p>	2	<p>allow (steel rusts but) aluminium does not corrode allow aluminium does not rust allow higher level answers e.g. aluminium forms a protective coat / protective layer / layer of aluminium oxide / protective film (1) ignore better fuel economy / car will go faster</p> <p>allow ora e.g. steel is strong(er) allow aluminium dents easily</p>	
	b	i	19.2 (g) (1)	1	<p>ignore incorrect units allow 0.0192 kg</p>
		ii	air (1)	1	allow atmosphere
		Total		4	

Question		Expected Answers	Marks	Additional Guidance															
8	a	a mixture containing a metal (1)	1	allow contains two metals / mixture containing a metal and a non-metal allow a metal made from other metals (limit of acceptability) not metals joined / combined / bonded not metal mixed with a compound															
	b	solder has a low(er) melting point (than lead or tin) (1)	1	ignore references to hardness ignore solder melts quicker or solder melts easily															
	c	<table border="0"> <tr> <td>amalgam</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>brass</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>copper</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>iron</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>steel</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> <p>one or two correct (1) but all correct (2)</p>	amalgam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	brass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	copper	<input type="checkbox"/>	<input checked="" type="checkbox"/>	iron	<input type="checkbox"/>	<input checked="" type="checkbox"/>	steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	any material in both columns is wrong
amalgam	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
brass	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
copper	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
iron	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
		Total	4																

Question		Expected Answers	Marks	Additional Guidance
9	a	CaCO ₃ / HCl (1)	1	allow 2HCl/ allow CaCO ₃ + 2HCl/
	b	i	1	allow correct answer indicated on graph if answer line is blank
		ii	1	allow correct answer ticked, circled or underlined in list if answer line is blank
	c	acid runs out / aw (1)	1	ignore no more gas or bubbles produced allow 'not enough acid available'
	d	any two from: increase temperature / hotter (acid) / heating / aw (1) use more concentrated acid / aw (1) use a catalyst (1) stir / shake (1)	2	USE TICKS ON THIS QUESTION allow heat allow use stronger acid / use less water / use a more pure acid ignore use more acid allow explanations of methods given, e.g. increase temperature (1) because particles have more energy (1) and more collisions (1) increase concentration (1) because particles are more crowded (1) and more collisions (1) / add a catalyst (1) which will speed up the reaction whilst remaining unchanged itself (1)
		Total	6	

Question			Expected Answers	Marks	Additional Guidance
10			pigment solvent binding medium	2	
			one or two correct scores (1) all three correct scores (2)		
Total				2	

Question			Expected Answers	Marks	Additional Guidance
11	a		potassium (1)	1	allow K
	b		iron (1)	1	allow Fe
	c		bromine (1)	1	allow Br / Br ₂
	d		sulfur / aluminium (1)	1	allow S / Al
Total				4	

Question			Expected Answers	Marks	Additional Guidance
12	a	i	electron (1)	1	
		ii	11 / eleven (1)	1	
	b		5 / five (1)	1	
Total				3	

Question		Expected Answers	Marks	Additional Guidance
13	a	orange (1)	1	allow red or brown or red/brown or yellow or any combination of these colours e.g. orange/brown or orange-brown allow foxy red
	b	chlorine + sodium iodide → iodine + sodium chloride (1)	1	not and or & for + allow = instead of → allow correct formulae or mix of words and correct formulae allow $Cl_2 + NaI \rightarrow I_2 + NaCl$ i.e. symbol equation does not need to be balanced allow chlorine + sodium iodide solution → iodine + sodium chloride
	c	chlorine bromine iodine (1)	1	allow symbols in correct order Cl, Br, I allow formulae in correct order Cl_2, Br_2, I_2
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
14	a	goes milky / cloudy (1)	1	allow white precipitate / suspension / goes white ignore changes colour
	b	breaking down a substance into two different substances (1)	1	
	c	i	1	unit not needed
		ii	1	allow Cu
		iii	2	USE TICKS ON THIS QUESTION allow lightweight ignore aluminium is light allow is flexible / ductile / low corrosion or does not rust (1) ignore any comment on relative strength or malleability
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
15	a	H ⁺ (1)	1	allow hydrogen ion not hydrogen
	b	oxygen (1)	1	allow O ₂
	c	lighted spill / splint / taper / light the gas (1) squeaky pop / it pops / explodes (1)	2	ignore glowing splint allow (squeaky) pop test for one mark max result mark is dependent on the correct test except for 'use a glowing splint and gives a pop' scores 1
		Total	4	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Facsimile: 01223 552553