



GCSE

## Chemistry B

General Certificate of Secondary Education **B641/02**

Unit 1: Modules C1, C2, C3

## Mark Scheme for June 2010

---

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2010

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](mailto:publications@ocr.org.uk)

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
1	(a)		emulsifier (1)	1	
	(b)		no because there is no E-number between 200 and 299 / AW (1)	1	no mark for just saying no <b>allow</b> E-numbers on label are not preservatives <b>allow</b> there are no E-numbers in the preservative range <b>allow</b> yes because salt or sugar are preservatives
	(c)		$2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$  correct reactants and products (1) correct balancing (1)	2	<b>allow</b> any correct multiple, including fractions <b>allow</b> = instead of arrow <b>not</b> + heat <b>allow</b> heat written on arrow <b>not</b> and / & for + <b>allow</b> 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark dependent on correct formulae
	(d)		name of chemical used: limewater / calcium hydroxide (solution) (1)  result: (limewater) turns milky / turns cloudy / forms white solid / forms white precipitate (1)	2	result mark is dependent on correct reagent but test with limewater (calcium carbonate) can score 2 <sup>nd</sup> mark  <b>allow</b> turns foggy or misty  <b>allow</b> bicarbonate indicator (1) changes from red to yellow (1)
			<b>Total</b>	<b>6</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
2	(a)		nylon is not breathable / Gore-Tex is breathable (1)	1	assume answer refers to nylon if not stated <b>allow</b> nylon does not let water vapour through <b>ignore</b> nylon does not allow sweat or water or air to escape <b>ignore</b> references to hard wearing and waterproof
	(b)	(i)	holes too small to allow (liquid) water to pass through (1)  holes big enough to allow (water) vapour / water molecules / evaporated sweat to pass through (1)	2	<b>allow</b> rain for water <b>ignore</b> references to air <b>not</b> water molecules / particles  <b>not</b> just sweat <b>allow</b> particles for molecules <b>allow</b> holes are small enough to let (water) vapour out but not water in scores (2) <b>allow</b> does not let water in but lets (water) vapour out scores (1)
		(ii)	PTFE layer is fragile / weak / not strong / nylon strengthens / toughens (PTFE layer) (1)	1	assume 'it' refers to PTFE unless qualified <b>ignore</b> hard-wearing / durable / waterproof <b>ignore</b> nylon is strong
			<b>Total</b>	<b>4</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
3	(a)		C <sub>2</sub> H <sub>6</sub> (1)	1	<b>not</b> C <sub>2</sub> H <sub>6</sub> / C <sup>2</sup> H <sup>6</sup> <b>allow</b> H <sub>6</sub> C <sub>2</sub>
	(b)		(ethane contains) single (covalent) bonds <b>only</b> / AW (1)	1	<b>allow</b> general formula for alkanes e.g. C <sub>n</sub> H <sub>2n+2</sub> scores (1) <b>ignore</b> it is saturated <b>ignore</b> references to double bonds <b>allow</b> has a single bond between carbon atoms (1)
	(c)		(ethene) decolourises bromine water / changes bromine water from red / orange / brown / yellow to colourless (1)	1	<b>ignore</b> red / orange / brown / yellow to clear <b>allow</b> (turns) colourless <b>ignore</b> just changes colour <b>ignore</b> goes clear <b>not</b> it discolours
	(d)		<b>any three from:</b> idea of (long chain molecules are) changed into smaller molecules (1) idea of (random) breaking of carbon-carbon or <b>intramolecular</b> bonds (1)  saturated / alkane is made (1)  unsaturated / alkene is made (1)     idea of more useful substances are made (1)	3	<b>allow</b> (larger) molecules or hydrocarbons broken down or split up  <b>ignore</b> references to <b>intermolecular</b> bonds  <b>allow</b> named alkanes  <b>allow</b> named alkenes except ethene (given in (b)) <b>allow</b> idea that alkenes can be used to make polymers or plastics / ethene made can be used to make ethanediol or ethanol (1)  <b>ignore</b> petrol is made but allow <b>more</b> petrol is made (1) <b>allow</b> higher level answers in terms of the idea that cracking enables (an oil refinery) to match supply with demand (1)
			<b>Total</b>	<b>6</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
4	(a)		can same height above burner / same volume, mass or amount of fuel / same volume, mass or amount of water / use same burner each time / same temperature increase / same can / same size flame or wick / same time of burning fuel / same starting temperature of water (1)	1	<b>allow</b> measure mass of fuel before or after <b>allow</b> weight for mass
	(b)		10,080(J) scores (2) <b>BUT</b> energy released = $100 \times 4.2 \times 24$ (1)	2	<b>look for correct answer first</b> , 10,080(J) on own scores (2) despite any other working out <b>allow</b> 10.08kJ (2) unit not needed – <b>ignore</b> incorrect units, unless a con, e.g. 10,080kJ <b>allow</b> 1 mark for ecf if incorrect temperature change used
	(c)		greater population / energy requirements increasing / AW (1)	1	<b>allow</b> more transport / more cars / use more electrical appliances / more aeroplanes / more industrialisation / more people are using it  <b>must</b> be an implication of <b>more</b> use of a fossil fuel <b>ignore</b> more demand unless qualified with a use e.g. more technology
			<b>Total</b>	<b>4</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	any time less than 55 seconds (1)	1	unit not needed
		(ii)	more collisions (1)	1	<b>allow</b> collisions more often / greater collision frequency / collisions more likely / more collisions per second / more chance of collisions (1) <b>not</b> faster collisions just successful collisions scores (0)
	(b)		particles are moving faster / particles have more (kinetic) energy (1) more collisions (1)	2	<b>allow</b> more collisions per second or collide more often or increased collision frequency or more chance of collisions (1) <b>allow</b> more successful or energetic collisions (2) <b>ignore</b> references to particles vibrate more <b>ignore</b> references to particles move around more
	(c)		decreases / slower / lower rate of reaction (1)  smaller surface area / fewer collisions (per second) (1)	2	<b>ignore</b> references to time e.g. 'takes longer' or 'the time taken will increase' both marks could be scored in the explanation section <b>allow</b> less chance of a collision <b>allow</b> reverse argument for powder
	(d)		$\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$  correct formulae of reactants and products (1) correct balancing (1)	2	<b>allow</b> any correct multiple <b>allow</b> = for arrow <b>not</b> and or & for + <b>allow</b> 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark is dependent on correct formulae
			<b>Total</b>	<b>8</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
6	(a)		any value between 77 and 80 (1)	1	
	(b)	(i)	make (very) little carbon monoxide / make (very) little oxides of nitrogen (compared to the other two types of car) / AW (1)	1	<b>allow</b> makes less carbon monoxide / makes less oxides of nitrogen (1) <b>ignore</b> references to harmful / polluting gases  incorrect references to carbon dioxide scores (0) e.g. makes least amount of carbon monoxide, oxides of nitrogen and carbon dioxide scores (0)
		(ii)	reacts carbon monoxide with oxides of nitrogen to make carbon dioxide and nitrogen (1)	1	<b>allow</b> converts carbon monoxide into carbon dioxide (1) <b>allow</b> converts oxides of nitrogen into nitrogen (1) answer must be specific as to which gas is being converted into carbon dioxide or nitrogen to score the mark
			<b>Total</b>	<b>3</b>	



B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
7	(a)		cannot reach inner layers of the Earth because it is too hot / can't drill or dig deep enough / AW (1)	1	<b>allow</b> problems of studying in adverse or difficult conditions / can't drill or dig through the crust <b>ignore</b> references to cost or time
	(b)		crust and top part of the mantle / (tectonic) plates / oceanic plates / continental plates (1)	1	
	(c)		shape of coastlines fit together (1) same type of fossils found in both continents (1)	2	if <b>one</b> wrong tick maximum mark of 1 if <b>two</b> wrong ticks scores 0
	(d)		fast cooling small crystals / slow cooling large crystals (1)	1	
	(e)		sand (1)	1	<b>allow</b> silicon dioxide or sandstone
			<b>Total</b>	<b>6</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
8	(a)		iron + water + oxygen --> hydrated iron(III) oxide (1)	1	<b>allow</b> hydrated iron oxide <b>not</b> hydrated iron(II) oxide <b>allow</b> = for arrow <b>not</b> and or & for +
	(b)		aluminium is less dense / car (body) will weigh less (1)  improved fuel consumption / AW (1)	2	assume unqualified comments refer to aluminium <b>ignore</b> aluminium is lighter or lightweight <b>allow</b> ora if specified  <b>allow</b> car is cheaper to run / better fuel economy <b>ignore</b> references to efficiency <b>ignore</b> car goes faster <b>ignore</b> references to pollution or the environment
			<b>Total</b>	<b>3</b>	

Question			Expected Answers	Marks	Additional Guidance
9	(a)		argon (1)	1	<b>allow</b> Ar
	(b)		aluminium / potassium / sodium (1)	1	<b>allow</b> Al / K / Na
	(c)		aluminium (1)	1	<b>allow</b> Al
			<b>Total</b>	<b>3</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
10	(a)		colour of bromine – red / brown / red-brown (1)  state of iodine - solid (1)	2	<b>allow</b> any combination of red, brown and orange e.g. orange-red <b>allow</b> rusty red <b>not</b> combinations where one of the colours is incorrect e.g. black-brown or yellow-brown <b>ignore</b> references to pale or dark
	(b)		melting point of fluorine:-190 to -250 (1) boiling point of astatine: 310 to 400 (1)	2	<b>allow</b> answers given as a range if it falls within the stated values
	(c)		one sodium ion drawn with a full outer shell or an empty one and a charge of +1 (1) one chloride ion drawn with 8 electrons in outer shell and a charge of -1 (1)	2	alternatively mark as below to give the candidate the best mark (do not mix & match the 2 mark schemes) <b>allow</b> correct electronic structure of sodium ion and chloride ion (1) <b>allow</b> correct charges on the ions - this is independent of the electronic structure drawn (1) <b>allow</b> +1 /-1 / 1+ /1- <b>ignore</b> inner shells <b>allow</b> correct electronic structure written rather than drawn, i.e. Na <sup>+</sup> 2.8 and Cl <sup>-</sup> 2.8.8. <b>not</b> if a covalent structure drawn scores (0) if structures drawn are not labelled, answer scores (0)
			<b>Total</b>	<b>6</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
11	(a)		(oxygen has electrons in) two (occupied) shells or orbits (1)	1	<b>allow</b> oxygen is in the second row of the periodic table <b>allow</b> has two outer shells or orbits <b>allow</b> has two rings or layers or levels or circles
	(b)	(i)	positive (1)	1	<b>allow</b> + / +ve <b>allow</b> correct answer ticked, circled or underlined in list if answer line is blank
		(ii)	same number of electrons and protons / AW (1)	1	<b>ignore</b> references to neutrons / charges
			<b>Total</b>	<b>3</b>	

B641/02

Mark Scheme

June 2010

Question			Expected Answers	Marks	Additional Guidance
12	(a)		hydrogen + oxygen $\rightarrow$ water (1)	1	<b>allow</b> hydrogen oxide instead of water <b>allow</b> = instead of $\rightarrow$ <b>allow</b> $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ <b>allow</b> mix of formulae and names <b>not</b> and / &
	(b)		covalent (1)	1	
	(c)	(i)	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$  correct reactants and products (1) correct balancing (1)	2	<b>allow</b> = instead of $\rightarrow$ <b>allow</b> any correct multiple, including fractions <b>not</b> and / & for+ <b>allow</b> 1 mark for correctly balanced equation with minor errors of case or subscripts balancing mark is dependent on the correct formulae <b>allow</b> $\text{H}^+ + \text{e}^- \rightarrow \text{H}_2$ (1)
		(ii)	loss of electrons / AW (1)	1	
			<b>Total</b>	<b>5</b>	

Question			Expected Answers	Marks	Additional Guidance
13	(a)		<b>any two from</b> copper carbonate / it changes colour (1)  limewater goes milky / cloudy (1) bubbles (1) movement of copper carbonate powder (1)	2	<b>allow</b> two marks for changes colour from green to black (2) <b>but</b> changes from incorrect colour to black e.g. changes colour from blue to black scores (1)  <b>ignore</b> gas / carbon dioxide given off
	(b)		precipitation (1)	1	<b>allow</b> correct answer ticked, circled or underlined in list if answer line is blank
			<b>Total</b>	<b>3</b>	

**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](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
**is a Company Limited by Guarantee**  
**Registered in England**  
**Registered Office; 1 Hills Road, Cambridge, CB1 2EU**  
**Registered Company Number: 3484466**  
**OCR is an exempt Charity**



**OCR (Oxford Cambridge and RSA Examinations)**  
**Head office**  
**Telephone: 01223 552552**  
**Facsimile: 01223 552553**