



General Certificate of Secondary Education

Chemistry (Modular) 3423/H

Specification A

Mark Scheme

2005 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

GCSE CHEMISTRY (MODULAR) 3423/H
MARK SCHEME – HIGHER TIER (TERMINAL PAPER)
SUMMER 2005**3423/H Q1**

	answers	extra information	mark
(a)	lower temperature reactions/lower pressure reactions/cheaper/use less energy/lower activation energy	accept speed up reaction do not accept can be re-used	1
(b)	less will be needed (to sweeten food)	do not accept it is sweeter (stem)	1
(c) (i)	3		1
(c) (ii)	60	accept 12 + 3 + 12 + 32 + 1 for 1 mark	2
total			5

3423/H Q2

	answers	extra information	mark
(a)	Haber		1
(b)	Quality of written communication		
	one mark for correct use of two scientific terms	temperature or °C/pressure or atmosphere/catalyst/reversible or equilibrium	1
	temperature of 450°C ± 50°	accept high/moderate temperature accept temperature of 450 (with no units) accept 450°C (without temperature) do not accept very high temperature	1
	pressure of 200 atmospheres	accept high pressure/200 atmospheres/pressure of 200/pressure of 100+	1
	iron is a catalyst	accept iron speeds up the reaction	1
	reaction is reversible/equilibrium	accept the idea that not all the nitrogen & hydrogen react/does not go to completion	1
total			6

3423/H Q3

	answers	extra information	mark
(a)	2 electrons transfer	accept diagrammatic answers only if they represent a clear explanation of what happens	1
	from magnesium/to oxygen	ignore charges on ions any reference to covalent bonding or sharing electrons = 0	1
(b)	ionic	accept electrovalent	1
(c)	electrostatic/attraction between (oppositely charged) ions	do not accept magnetic forces	1
total			4

3423/H Q4

	answers	extra information	mark
(a)	not all elements had been discovered/to allow for discovery of new elements (OWTTE)		1
(b)	noble/inert gases/group 0	ignore group 8	1
(c)	71 – 75	allow 1 mark for:- $(28 + 118) \div 2$ or 60 – 70	2
(d)	germanium/Ge		1
total			5

3423/H Q5

	answers	extra information	mark
(a)	aluminium oxide	accept correct formula Al_2O_3	1
(b) (i)	anodising		1
(b) (ii)	the (aluminium) oxide coating is removed/dissolved	accept protective layer is removed/dissolved	1
(b) (iii)	positive/anode/+		1
(b) (iv)	oxygen	accept O_2 do not accept O	1
total			5

3423/H Q6

	answers	extra information	mark
(a)	a <u>mixture</u> of metals/a mixture of carbon and metals		1
(b)	the greater the amount of carbon the harder the steel	ignore brittle	1
(c)	chromium/nickel	accept chrome accept correct symbols	1
(d)	mass spectrometry/emission spectroscopy/absorption spectroscopy	accept flame photometer	1
total			4

3423/H Q7

	answers	extra information	mark
	Quality of written communication		
	one mark for correct linking of ideas		1
	any three from		3
	<ul style="list-style-type: none"> • difficult to lather/forms scum (with soap) • water flows over/dissolves substances from rocks • calcium/magnesium (compounds) • addition of sodium carbonate/ion exchange 	accept calcium carbonate accept boiling/distillation	
total			4

3423/H Q8

	answers	extra information	mark
(a)	shale	accept (the one with) fossils/at the bottom/deepest	1
(b)	formed by currents or waves	some reference to <u>movement</u> of water needed do not accept erosion/rivers	1
(c)	sedimentary		1
total			3

3423/H Q9

	answers	extra information	mark
(a)	aluminium is more reactive (than iron)/aluminium is higher in the reactivity series (than iron)/aluminium is higher than iron	accept converse	1
(b)	zinc is lower than calcium/is lower in the reactivity series/zinc is less reactive (than calcium)	accept converse	1
	cannot remove oxygen from calcium/cannot displace calcium	no reaction is not sufficient	1
(c)	They usually have high melting points.		1
	They react very vigorously with water.	×	
	They are often used as catalysts in chemical reactions.		
	Their compounds are often coloured.		
total			4

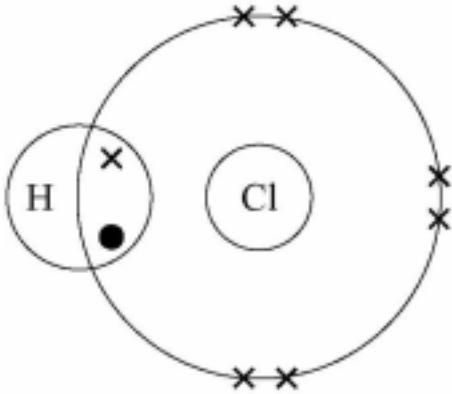
3423/H Q10

	answers	extra information	mark			
(a)	A – energy needed to break bonds/activation energy for forward reaction		1			
	B – energy change during the reaction	energy difference between reactants and products accept ΔH	1			
(b) (i)	2219	if incorrect allow 1 mark for contents of box:- <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>4 x N-H</td></tr> <tr><td>1 x N-N</td></tr> <tr><td>1 x O=O</td></tr> </table> or allow 1 mark for correct arithmetic $= 4 \times 390 = 1560$ $= 1 \times 163 = 163$ $= 1 \times 496 = 496$ accept 1049 for 1 mark	4 x N-H	1 x N-N	1 x O=O	2
4 x N-H						
1 x N-N						
1 x O=O						
(b) (ii)	2797	allow 1 mark for contents of box <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1 x N\equivN</td></tr> <tr><td>4 x H-O</td></tr> </table> or allow 1 mark for correct arithmetic $= 1 \times 945 = 945$ $= 4 \times 463 = 1852$ accept 1408 for 1 mark	1 x N \equiv N	4 x H-O	2	
1 x N \equiv N						
4 x H-O						
(b) (iii)	578 (kJ mol ⁻¹)	ignore any signs + or – transferred error rules apply	1			
(b) (iv)	exothermic	dependent on answers to parts (b) (i) and (ii). No marks if (i) or (ii) blank	1			
total			8			

3423/H Q11

	answers	extra information	mark
(a)	Use the same amount of iron in lots of small pieces.		2
	Use 75cm ³ of a more concentrated solution of sulphuric acid.	√	
	Add a catalyst		
	Use 75cm ³ of the original dilute sulphuric acid with the same amount of iron in small pieces.	√	
	Heat the 50cm ³ of dilute sulphuric acid before using it.		
(b) (i)	1.52	allow 1 mark for:- FeSO ₄ = 56 + 32 + 64 = 152	2
(b) (ii)	0.24 dm ³ H ₂	allow 1 mark for:- 56g Fe → 24 dm ³ H ₂	2
total			6

3423/H Q12

	answers	extra information	mark
(a) (i)	Na^+ and Cl^-	both required for mark	1
(a) (ii)	Na^+ and Cl^- H_2O	ignore H^+ and OH^-	1 1
(a) (iii)	ions can move in solution/cannot move in solid		1 1
(a) (iv)	graphite	accept carbon	1
(b)		correct number of electrons in outer shell (8) one shared pair ignore any inner shells	1 1
total			8

3423/H Q13

	answers	extra information	mark
(a)	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> √ <input type="checkbox"/> √	If both A and B correct	1
	<input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> X <input type="checkbox"/> √	If both C and D correct	1
(b)	substance being added is more reactive than/displaces substance in solution	accept e.g. chlorine more reactive than bromide	1
(c)	KBr + AgNO ₃	accept correct multiples	1
	KNO ₃ + AgBr	allow 1 mark for:- 4 correct formulae incorrectly balanced	1
(d)	photography/X-rays/detection of radiation	do not accept photochromic lenses	1
total			6

3423/H Q14

	answers	extra information	mark
(a)	for magnesium nitrate: (white) precipitate/solid	do not accept coloured precipitates	1
	for ammonium nitrate: ammonia produced	accept no precipitate/no visible reaction/strong smelling gas/gas that turns red litmus blue do not accept no reaction	1
(b)	(warm with) aluminium (powder) and sodium hydroxide	both required for 1 mark	1
	ammonium ions/ammonia produced	accept description of ammonia (this mark depends on correct test for first mark)	1
total			4

3423/H Q15

	answers	extra information	mark
(a)	anhydrous copper sulphate	accept CuSO_4	1
(b)	dehydrating	do not accept drying	1
(c)	(making) batteries/fertilisers/ detergents		1
total			3

3423/H Q16

	answers	extra information	mark
(a)	removal of oxygen/addition of electrons/Ti changes from Ti^{+4} to Ti	accept to prevent titanium reacting with oxygen	1
(b)	to prevent Na or Mg reacting with air/oxygen		1
(c)	strong/resists corrosion/low density	accept hypoallergenic accept flexible	1
total			3

3423/H Q17

	answers	extra information	mark
(a)	ethyl ethanoate		1
(b)	(-)-OH	do not accept OH-/COOH accept attempts at general formula containing correct OH group	1
(c)	0.08	accept any correct method of calculation allow 1 mark for:- moles of alkali used = $\frac{20 \times 0.1}{1000}$ or moles of acid used = $\frac{25 \times m}{1000}$ allow two marks for:- $20 \times 0.1 = 25m$	3
total			5

3423/H Q18

	answers	extra information	mark
(a)	C_nH_{2n+2}		1
(b)	C weakest forces between molecules	mark independently accept answers referring to branched chains not being able to get so close together as straight chains do not accept bonds	1 1
(c)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Propane (C₃H₈) $\begin{array}{ccccccc} & H & H & H & & & \\ & & & & & & \\ H & -C & -C & -C & -H & & \\ & & & & & & \\ & H & H & H & & & \end{array}$ </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Ethene (C₂H₄) $\begin{array}{ccc} H & & H \\ & \diagdown & / \\ & C = C & \\ & / & \diagdown \\ H & & H \end{array}$ </div> </div>	both boxes correct allow 1 mark for 1 correct box	2
(d)	$-(CH_2 - CH_2)_3-$ or $-(CH_2 - CH_2)_n-$ or $-CH_2 - CH_2 - CH_2 - CH_2 - CH_2 - CH_2 -$	any of these three or accept three or more CH ₂ with open ends accept a structure with single bond between carbon atoms C – C and open ends for 1 mark	2
total			7