

Chemistry B

Advanced GCE A2 H435

Advanced Subsidiary GCE AS H035

Mark Schemes for the Units

June 2009

HX35/MS/R/09

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, GCSEs, OCR Nationals, 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 syllabuses 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 2009

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

CONTENTS

Advanced GCE Chemistry (H435)

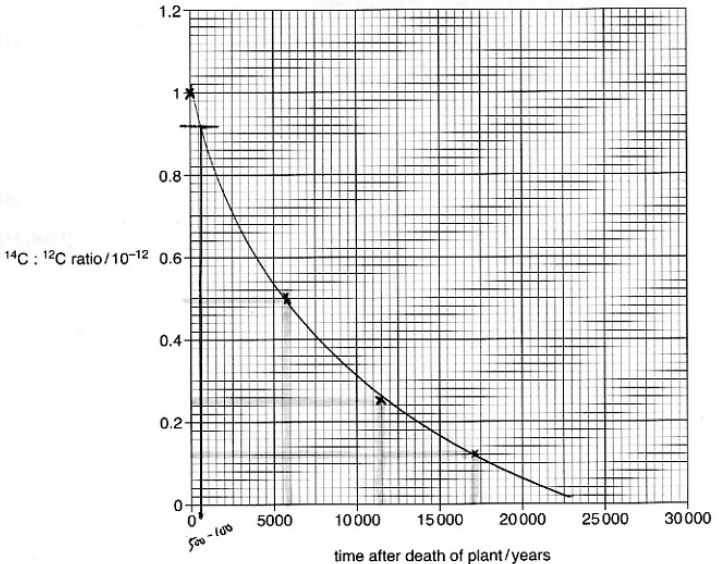
Advanced Subsidiary GCE Chemistry (H035)

MARK SCHEME FOR THE UNITS

Unit/Content	Page
F331 Chemistry for Life	1
F332 Chemistry of Natural Resources	8
Grade Thresholds	21

F331 Chemistry for Life

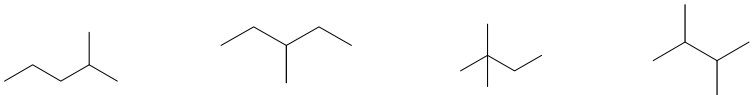
Question			Expected Answers	Marks	Additional Guidance															
1	(a)	(i)	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">protons</td> <td style="text-align: center;">neutrons</td> <td style="text-align: center;">electrons</td> </tr> <tr> <td>^{14}C</td> <td style="text-align: center;">6</td> <td style="text-align: center;">8</td> <td style="text-align: center;">6</td> </tr> <tr> <td>^{12}C</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> </tr> </table> <p>one mark for each row</p>		protons	neutrons	electrons	^{14}C	6	8	6	^{12}C	6	6	6	2	do not allow ecf for electrons based on proton number			
	protons	neutrons	electrons																	
^{14}C	6	8	6																	
^{12}C	6	6	6																	
		(ii)	$^{14}_6\text{C} \longrightarrow ^{14}_7\text{N} + ^0_{-1}\text{e}$ <p>correct β particle (either symbol)(1) ; rest correct (1) ;</p>	2	must be <u>beta</u> decay to score allow – β on LHS numbers on wrong side scores maximum 1															
		(iii)	time taken for half(radioactive) isotope to decay / count rate to fall by half / mass / amount to decrease by half(1) ;	1	do not allow atom instead of isotope allow 'substance' (to decay by half etc)															
	(b)	(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of half lives</th> <th>Time after death of organism/years</th> <th>$^{14}\text{C}: ^{12}\text{C}$ ratio/10^{-12}</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1.000</td> </tr> <tr> <td>1</td> <td>5730</td> <td>0.500</td> </tr> <tr> <td>2</td> <td>11460</td> <td>0.25(0)</td> </tr> <tr> <td>3</td> <td>17190</td> <td>0.125</td> </tr> </tbody> </table>	Number of half lives	Time after death of organism/years	$^{14}\text{C}: ^{12}\text{C}$ ratio/ 10^{-12}	0	0	1.000	1	5730	0.500	2	11460	0.25(0)	3	17190	0.125	1	all correct as in table to left for mark
Number of half lives	Time after death of organism/years	$^{14}\text{C}: ^{12}\text{C}$ ratio/ 10^{-12}																		
0	0	1.000																		
1	5730	0.500																		
2	11460	0.25(0)																		
3	17190	0.125																		

Question	Expected Answers	Marks	Additional Guidance
(ii)	<p>correct plotting(1) ; smooth curve(1) ;</p> <p>(ii) Use the figures in the completed table to plot a decay curve for ^{14}C on the axes below.</p>  <p style="text-align: right;">[2]</p>	2	<p>plotting within the square curve does not need to go through all points but must be 'sensible' not point to point straight lines line must not become horizontal / rise after the final point ecf on candidate values in table</p>
(iii)	between 500 and 1000 yrs(1) ;	1	check against graph if outside range (for ecf)
(c)	<p>very short not around in sufficient levels long enough to detect(AW) / burst of harmful radiation (1) ;</p> <p>very long possible harm to patient/too little radiation to detect(1) ;</p>	2	<p>do not allow isotope finished / stopped; must be about diagnosis / detection / tracing allow 'not around long enough to be useful as a tracer' / decays too fast / quickly for use(AW)</p>
(d) (i)	(nuclear) fusion (1) ;	1	allow spelling errors

Question		Expected Answers	Marks	Additional Guidance
	(ii)	${}^1_1H + {}^2_1H \rightarrow {}^3_2He$ RHS(1) ; LHS(1) ;	2	con one mark for numbers on right ignore gamma radiation
Total			14	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	for elements yet to be discovered(1) ;	1	allow AW allow "to line up elements with similar properties"
		(ii)	new elements(1) ; showed properties fitting in with group(1) ;	2	Showed properties / characteristics / chemistry predicted / fitted – for second mark allow specific reference to a "new" element
		(iii)	noble(inert) gases / group 0 / group 8 / VIII (1) ;	1	wrongly named group cons correct group number
	(b)	(i)	Atomic / proton number(1) ;	1	
		(ii)	properties of some of the elements did not match up in Newlands(1) ;	1	allow "he didn't leave gaps"
	(c)	(i)	goes up(rises) then goes down(falls) (1) ;	1	allow high to higher then drops / falls
		(ii)	bonding: <i>(one mark available)</i> metallic on left of period changing to covalent going right(1) ; may be combined with later marks structure: <i>(three marks available)</i> (giant) metallic at start(1) ; giant / large molecular / covalent or network / lattice in middle(1) ; (simple) molecular on right(1) ;	4	allow description using quoted elements eg Li, Be, (B) metallic. etc allow 'carbon / C' for middle marking point
	(d)		group 2 and period 4 (both needed)	1	
			Total	12	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	fuel igniting too early / before or without spark/on compression(1) ; can damage engine / loss of power / efficiency(1) ;	2	do not allow <u>tendency</u> to auto ignite do not allow causes knocking
	(b) (i)	any value between 0.218 and 0.300 inclusive(1) ;	1	
	(ii)	bond enthalpies decrease down group(1) ; longer bonds weaker(1) ; ORA	2	allow from left to right longer bonds give smaller bond enthalpies scores 2
	(c) (i)	tetrahedral(1) ; 109°(1) ;	2	allow tetrahedron between 104 and 110°
	(ii)	<u>four</u> sets / pairs of electrons / areas of negative charge / electron density(AW)(1) ; <u>repel</u> (1) ; as far as possible/minimise electronic energy(1) ; (need not refer to electrons)	3	note do not need around central atom (in stem) do not allow four sets / four pairs on own without qualification repel must refer to <u>electrons</u> not bonds or atoms etc do not allow repel as <u>much</u> as possible
	(d) (i)	QWC – heterogeneous (1) ; spelling of word must be correct adsorption of reactants(1) ; bonds (in reactants) weaken and break(1) ; new bonds (in products) form(1) ; products diffuse off / desorbed / released from catalyst(1) ;	5	do not allow absorption but allow anything else which suggests “on the surface” bonds <u>between</u> reactants break cons 3 rd mark do not allow forms an intermediate do not allow <u>petrol</u> as a named reactant
	(ii)	poison blocks / coats / reduces surface of catalyst (AW) (1) ; reactants / other molecules cannot bond to surface(1) ;	2	allow poison binds irreversibly for 1st mark
Total			17	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	aliphatic(1) ; unsaturated(1) ;	2	
		(ii)	(cyclo)alkene / C=C / carbon-carbon double bond(1) ;	1	
		(iii)	process (+17,578 -23,524)(1) ; answer with sign ecf (1) ; -5946 scores 2	2	+5946 scores 1 5946 without a sign scores zero
		(iv)	bond enthalpies are for the gaseous state / not in standard state (1) ; bond enthalpy values are averages(1) ;	2	no other reference to standard states / conditions
		(v)	M _r limonene = 136(1) ; moles of limonene = 1/136 (= 0.007352)(1) ; 3 sf(1) ; (0.00735)/7.35 x 10 ⁻³ scores all three	3	allow any 3sf if a calculation present. Answer must be consistent with calculation
	(b)	(i)	ethanol(1) ; alkene(1) ; ether / alkoxyalkane(1) ;	3	not ethan-1-ol
		(ii)	correct skeletal formula for branched six carbon alkane	1	
		(iii)	correct name from above (ecf on incorrect skeletal / structural formula)	1	2-methylpentane 3-methylpentane 2,2-dimethylbutane 2,3-dimethylbutane allow methyl-2-pentane etc ignore dashes, commas etc

Question		Expected Answers	Marks	Additional Guidance
	(c) (i)	more molecules in products(1) ; more disorder/ways of arranging them(1) ;	2	allow 'increase in number of moles' allow exothermic reaction giving more kinetic energy for 1 st mark not more ways of arranging <u>atoms</u>
		Total	17	

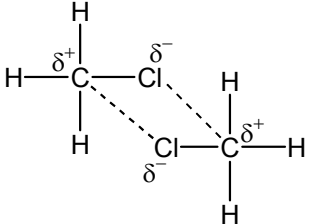
F332 Chemistry of Natural Resources

Question		Expected Answers	Marks	Additional Guidance
1	(a)	chlorine is volatile / a gas (1) ; toxic / poisonous / causes respiratory diseases / choking gas (1) ;	2	do not allow harmful / irritant / dangerous instead of toxic.
	(b) (i)	(moles NaCl =) 100000 / 58.5 (= 1709) (1) ; moles Cl ₂ = ½ moles NaCl (1) ; volume Cl ₂ = moles Cl ₂ x 24 (= 20513dm ³) (1) ;	3	indication of halving mols of NaCl or doubling 58.5 = 117 allow any number of significant figures including 1sf. allow a volume of 20508dm ³ , which is obtained if the rounded up value for the moles of NaCl is used.
	(ii)	100% atom economy (1) ;	1	ignore high atom economy allow all products are useful allow no waste products ignore references to side reactions
	(c) (i)	<i>Diaphragm cell: advantage</i> no environmental concerns / uses less electricity / uses less energy (1) ; <i>disadvantage</i> uses lots of steam / chlorine / Cl ₂ / product must be purified(1) ;	2	
	(ii)	the required transportation links are already there / skilled workforce lives locally / near to necessary raw materials / links to electricity / shared facilities / shared resources / easier to obtain planning permission / existing infrastructure / risks concentrated in one area(1) ;	1	

Question		Expected Answers	Marks	Additional Guidance
	(iii)	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ or balanced with $\frac{1}{2}$ (2) ;	2	$\text{Cl}^- \rightarrow \text{Cl}_2$ (1) ; adding electrons and balancing (1) ; ignore state symbols allow $2\text{Cl}^- - 2\text{e}^- \rightarrow \text{Cl}_2$ 2 nd mark depends on 1st
	(iv)	$1\text{s}^2 2\text{s}^2 2\text{p}^6 3\text{s}^2 3\text{p}^5$ (1) ;	1	allow upper or lower case letters but numbers must be superscripts allow $[\text{Ne}] 3\text{s}^2 3\text{p}^5$
(d)	(i)	$\text{Cl}_2 = 0$ (1); $\text{Cl}^- = -1$ (1) ;	2	do not allow 1-
	(ii)	reduction (1) ; gain of electrons / oxidation state has decreased (1) ;	2	allow oxidation state becomes more negative ignore redox mark independently
	(iii)	chlorine is a more powerful / stronger / better oxidising agent / more oxidising (than bromine). ORA(1) ;	1	do not allow chlorine is more reactive than bromine. allow chlorine has a higher oxidising ability.
	(iv)	making medicines / making flame retardants (1) ;	1	allow water purification, making agricultural chemicals (like bromomethane), making dyes / photography / making solvents. allow testing for unsaturation or a stated laboratory use

Question	Expected Answers	Marks	Additional Guidance
(e)	<p>must have:</p> <p>1. <u>instantaneous (dipole) – induced dipole</u> bonds (underlined part must be correctly spelt) (1) ;</p> <p><i>plus four out of:</i></p> <p>2. electron movements in the molecules create an uneven distribution of charge (1) ;</p> <p>3. a dipole is induced in a neighbouring molecule leading to attraction (1) ;</p> <p>4. intermolecular bonds are stronger in bromine/Br₂ ORA(1) ;</p> <p>5. bromine has more electrons (ORA) (1) ;</p> <p>6. more energy / higher temperature is needed to break intermolecular bonds in bromine ORA (1) ;</p>	5	<p>allow references to intermolecular forces, rather than intermolecular bonds.</p> <p>1. allow anywhere in answer allow <u>van der Waals</u> correctly spelt, ignoring capitals</p> <p>4. do not allow more / higher intermolecular bonds</p> <p>5. do not allow references to electron density.</p> <p>6. a clear statement referring to breaking the covalent bond in bromine cons this point.</p>
	Total	23	

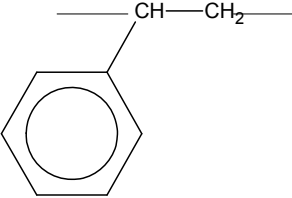
Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	white (1) ;	1	do not allow off white/cream/grey white ignore cloudy ignore changes of colour on standing
		(ii)	$\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$ equation (1) ; state symbols (1) ;	2	completely correct equation (i.e. without spectator ions) scores the first mark. allow answer with multiples mark state symbols separately – must have the idea of (aq) + (aq) → (s)
		(iii)	Ag_2SO_4 (1) ;	1	ignore brackets around SO_4
	(b)	(i)	<u>equilibrium</u> (position) moves to left / towards reactants(1) ; HCO_3^- (concentration) increases(1) ;	2	equilibrium moves to make more HCO_3^- gains both marks
		(ii)	rate of forward reaction = rate of back reaction / reactants and products are formed at the same rate (1) ; <u>concentrations</u> of reactants and products remain constant / closed system (1) ;	2	do not allow concentrations of reactants and products are the same / equal
	(c)	(i)	intermolecular bonds in chloromethane are weaker ORA (1) ;	1	answer must be a comparison. do not allow less/fewer for weaker ignore references to specific types of intermolecular bond

Question	Expected Answers	Marks	Additional Guidance
	<p>(ii) at least one intermolecular bond shown from Cl of one molecule to C of another (1) ;</p> <p>C and Cl of each molecule shown with δ^+ / δ^- charge (1) ;</p> 	2	<p>intermolecular bond can be shown in other forms, but not as a solid line.</p> <p>there must be 2 δ^+ on 2 carbons and 2 δ^- on 2 chlorines</p> <p>ignore any δ^+ / δ^- on hydrogen.</p>
	(iii) permanent dipole–(permanent) dipole (1) ;	1	do not allow pd-pd
	(iv) 346 x 1000 (=346000) (1) ; answer / $6.02 \times 10^{23} = 5.748 \times 10^{-19} \text{ J}$ (1) ;	2	allow 2 or more sig figs
	(v) answer to (c) (iv) / 6.63×10^{-34} (1) ; evaluation of number divided by h (= $8.67 \times 10^{14} \text{ Hz}$) (1) ; 3 sf (1) ;	3	award sf mark for an answer that is the correct 3sf value of a shown calculation.
(d)	(i) $\text{C}_4\text{H}_9\text{OH} + \text{HCl} \rightarrow \text{C}_4\text{H}_9\text{Cl} + \text{H}_2\text{O}$ (1) ;	1	allow answers with other structural forms for butan-1-ol and 1-chlorobutane. ignore state symbols
	(ii) nucleophilic (1) ; substitution (1) ;	2	allow answers indicated in other ways, such as circling. each additional underline cons a mark
	(iii) (shaking with) (sodium / potassium) hydrogencarbonate (solution) (1) ;	1	allow sodium / potassium hydrogen carbonate allow sodium / potassium carbonate

Question	Expected Answers	Marks	Additional Guidance
	(iv) (anhydrous) sodium sulfate (1) ; or other salt with an anhydrous form	1	allow <u>conc.</u> H ₂ SO ₄ / silica gel allow correct formula allow sulphate
	(v) M _r butan-1-ol = 74, chlorobutane = 92.5 (1) ; Moles butan-1-ol = 10/74 (=0.135) (1) ; moles chlorobutane = 2/92.5 (=0.022) (1) ; % = 0.022 x 100/0.135 = 16% (1) ; or M _r butan-1-ol = 74, chlorobutane = 92.5 (1) ; Moles butan-1-ol = 10/74 (= 0.135) (1) ; 0.135 x 92.5 (= 12.4875) (1) ; % = 2/12.4875 x 100 = 16% (1) ;	4	apply ecf for moles of butan-1-ol / 1-chlorobutane from an incorrect M _r value. allow a final answer of between 15.7 to 16.3%, which is obtained if numbers have been rounded at an earlier stage. allow 2 or more sf give 1 mark for 2/10x100 = 20%
	Total	26	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	refining oil / generating electricity / processes in a petrochemical plant / producing steel / heating limestone / fermentation (1) ;	1	allow burning a fossil fuel provided it is the context of another industrial activity eg in a factory allow making cement ignore deforestation
		(ii)	<p>any one pair from:</p> <p>NO/ NO₂ / NO_x / SO₂ / SO₃ / SO_x (1) ; causes acid rain / causes breathing problems (1) ;</p> <p>or</p> <p>unburnt hydrocarbons / Carbon monoxide / NO_x (1) ; causes smog (1) ;</p> <p>or</p> <p>CO₂ / NO_x / C_xH_y (1) ; causes greenhouse effect / global warming (1) ;</p> <p>or</p> <p>NO_x / SO_x / CO / aromatics (1) ; causes toxic effects on humans (1) ;</p>	2	<p>A correct pollutant gas scores the first mark. The second mark depends on the first.</p> <p>do not allow harmful instead of toxic</p>

Question		Expected Answers	Marks	Additional Guidance
	(ii)	any two from: <u>burn</u> less fossil fuel (1) ; named alternative power source (1) ; less deforestation / plant more trees (AW) / more photosynthesis (1) ; reacting the CO ₂ with lime/other suitable named solid (1) ; disposing of it in an old mine / well / other suitable disposal site (1) ;	2	do not allow just fewer cars
		Total	12	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	addition (1) ;	1	do not allow additional ignore electrophilic and radical. do not allow nucleophilic.
	(b)	 (1) ;	1	ignore brackets and n ignore ambiguous attachments and small errors in benzene structure. do not allow more than one simplest repeat unit allow more displayed versions
	(c)	(i)	2	Any combination of these colours but no others do not allow "clear" instead of "colourless". answers like 'it turns colourless' gain 1 mark.
		(ii)	1	allow carbonium ion. allow minor spelling error do not allow bromonium ion
		(iii)	3	allow marks from suitable diagrams allow 'attract' for 'attack' provided it leads to a reaction.
	(d)	(i)	1	ignore state symbols
		(ii)	2	ignore lone in lone pair

Question	Expected Answers	Marks	Additional Guidance
	<p>(iii) water / steam (1) ; phosphoric acid catalyst (1) ; high temperature and pressure/300C and 60atm (1) ;</p>	3	<p>allow sulfuric acid instead of phosphoric acid ignore concentrations ignore inert catalyst supports such as alumina allow temps 200-400C and pressure above 1atm do not give a mark for high temperature and pressure without water/steam</p>
(e)	<p>(i) C to which the OH is joined is itself joined to two other Cs / one H on C to which OH is bonded/ 2 alkyl groups on C(1) ;</p>	1	<p>can refer to R groups. allow "it" for OH ignore OH in middle of chain</p>
	<p>(ii) <i>any four from:</i> the oxidation produces a ketone/ propanone (1) ; absorption within 1705 to 1725 (cm⁻¹) (1) ; shows presence of C=O bond (1) ; there is no peak/trough between 3200 to 3640 (cm⁻¹) (1) ; indicating there is no O-H bond (1) ;</p>	4	<p>allow 'around/approximately 1700'. accept one number from 1705 and 1725 accept one number between 3200 and 3640 allow 2 marks for correctly indicating the peak at 1720 due to C=O on the IR spectrum allow 2 marks for indicating that there is no peak at 3200 due to O-H on the IR spectrum ignore references to other peaks/troughs</p>
	Total	19	

Question	Expected Answers	Marks	Additional Guidance
5 (a)	<p><i>meaning:</i> splitting / breaking down a chemical / molecule / bond(1) ; using <u>energy</u> absorbed from UV / visible / light(1) ;</p> <p><i>example:</i> splitting of a water molecule by UV (radiation) (1) ;</p>	3	<p>The example quoted must be the one taken from the article (break-up of water by UV radiation). It can be represented by an equation.</p> <p>the second mark can be scored in either part by mention of $h\nu$ e.g. on the equation arrow</p>
(b)	<ol style="list-style-type: none"> 1. formation of oxygen atoms from dissociation of water by UV or dissociation of O_2 by UV / $O_2 \rightarrow 2O$(1) ; 2. oxygen atoms/radicals join to make O_2 / $O+O \rightarrow O_2$ / O_2 formed by photosynthesis (1) ; 3. O_2 plus O gives O_3 / $O_2+O \rightarrow O_3$(1) ; 4. ozone is decomposed / $2O_3 \rightarrow 3O_2$ / $O_3 \rightarrow O_2+O$(1) ; 5. absorbs UV from sunlight (1) ; <p>QWC mark for connection of ideas: <i>idea of O atoms formed and then being used in another reaction</i></p>	<p>5</p> <p>1</p>	<p>allow $H_2O \rightarrow H_2 + O$ / $H_2O \rightarrow 2H + O$ UV or $h\nu$ not needed. allow 'photodissociation' instead of 'by UV'.</p> <p>for full marks at least one of marking points 2, 3 and 4 must be given as an equation.</p> <p>allow frequency values in the range 1×10^{15} to 1×10^{17} Hz instead of UV.</p> <p>mark independently</p>
(c)	<p>converting both values to the same units (2 ppm = 0.0002% / 20.948% = 209480 ppm) (1) ;</p> <p>dividing oxygen value by methane value (20.948/0.0002 or 209480/2 = 104740) (1) ;</p>	2	<p>allow 3 sf or more</p> <p>mark independently</p>

Question	Expected Answers	Marks	Additional Guidance
(d)	FeS ₂ is oxidised (1) ; O ₂ and Fe ₂ O ₃ /FeO/Fe ₃ O ₄ in an equation (1) ; completely correct equation (1) ; $4\text{FeS}_2 + 11\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3 + 8\text{SO}_2$ $3\text{FeS}_2 + 8\text{O}_2 \rightarrow \text{Fe}_3\text{O}_4 + 6\text{SO}_2$ $\text{FeS}_2 + 2.5\text{O}_2 \rightarrow \text{FeO} + 2\text{SO}_2$	3	
(e)	the temperature in the troposphere decreases as you move away from the Earth's surface (1) ; because hot gases near the Earth's surface rise & cool / higher concentrations of greenhouse gases / named gas lower down absorb more IR from Earth / the atmosphere is heated by the Earth low down(1) ; within the stratosphere the temperature of the atmosphere rises as you move away from the Earth (1) ; due to exothermic reactions (1) ;	4	mark independently candidates can give figures for altitudes instead of troposphere / stratosphere
(f)	the concentration of gases is higher in the troposphere / troposphere is more dense / pressure is higher ORA (1) ; so there are more collisions per second / more frequent collisions (in the troposphere) (1) ;	2	do not allow 'more collisions' or 'more chance of collisions'
	Total	20	

Grade Thresholds

Advanced GCE Chemistry B (Salters) (H035 H435)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
F331	Raw	60	47	42	37	32	27	0
	UMS	90	72	63	54	45	36	0
F332	Raw	100	69	60	51	43	35	0
	UMS	150	120	105	90	75	60	0
F333	Raw	60	51	46	41	37	33	0
	UMS	60	48	42	36	30	24	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
H035	300	240	210	180	150	120	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
H035	17.8	35.1	53.4	68.9	82.8	100.0	8931

8931 candidates aggregated this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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

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

© OCR 2009

