AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.9.2.2

Human activities which contribute to an increase in greenhouse gases in the atmosphere

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**12**
Available paper years	**2007–2023**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 01 · Mark scheme January 2007 | CHY1H | Original Q2 | Legacy

Question 2

	answers	extra information	mark
(a)	oxygen **and** nitrogen		1
	20 – 21% **and** 78 – 80%	accept any two correct responses in the correct space for **one** mark	1
(b)(i)	acid rain	accept toxic gas or consequence of acid rain	1
(ii)	idea of the removal or use of sulfur dioxide gas (from the waste gases)	do **not** accept remove sulfur from coal	1
(iii)	oxygen	accept O_2	1
	water	accept H_2O accept hydrogen oxide / steam	1
(c)	any **two** from: • it's a 'greenhouse gas' or increase greenhouse effect • causes global warming or increase in the Earth's temperature • sea-levels rise or flooding • climate change • (polar) ice-caps melt • extension of deserts	accept action of a 'greenhouse gas' mention of ozone / acid rain / global dimming = max **1** mark	2
(d)	idea trap / store / lock the carbon dioxide		1
	in the oil reservoir **or** under the sea <u>bed</u>	do **not** accept 'into the oil' / 'under the sea'	1
total			10

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 02 · Mark scheme

June 2007 | CHY1B | Original Q9 | Legacy

Nine	**4**	**1**	**3**	**4**

Answer 03 · Mark scheme

January 2008 | CHY1H | Original Q6 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 04 · Mark scheme

March 2008 | CHY1BP | Original Q4 | Legacy

Four	**2**	**1**	**2**	**3**

Answer 05 · Mark scheme

June 2008 | CHY1AP | Original Q2 | Legacy

Two	**A** carbon monoxide **3** **B** carbon particles **4** **C** oxygen **1** **D** carbon dioxide **2**			
	A	**B**	**C**	**D**

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 06 · Mark scheme June 2009 | CHY1H | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	calcium oxide / quicklime	allow calcium monoxide do **not** accept calcium dioxide ignore chemical formulae	1
2(a)(ii)	any **three** from: • carbon dioxide / CO_2 • (carbon dioxide) reacts (with the calcium hydroxide / slaked lime / plaster) • limestone / calcium carbonate / $CaCO_3$ forms • water is lost / evaporates	it = plaster allow reaction 3 identified do **not** allow incorrect reaction ignore mixes, unless they state the correct product allow marble / chalk allow moisture ignore dries	3
2(b)(i)	as the amount / volume of sand decreases the strength of the mortar increases	accept as sand decreases the mortar is stronger / harder to crack allow as sand decreases the mortar increases allow converse ignore references to height of metal ball	1

Question 2 continues on the next page…

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

CHY1H

Question 2 continued

question	answers	extra information	mark
2(b)(ii)	any **two** from: • 400 / 5th result is anomalous • the interval between the others is similar or the interval is about 6/7 • he has only one set of results	accept two results (36 and 37 / 400 and 500 / 4th and 5th) are almost the same accept result at 400 should be 42 allow the other results fit a pattern / are on a straight line allow he has only done it once ignore reliable	2
Total			**7**

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 06 · Mark scheme June 2009 | CHY1H | Original Q2 | Legacy

CHY1H

Answer 07 · Mark scheme March 2010 | CHY1AP | Original Q9 | Legacy

Nine	**4**	**3**	**2**	**4**

Answer 08 · Mark scheme June 2010 | CHY1BP | Original Q5 | Legacy

Five	**4**	**1**	**3**	**2**

Answer 09 · Mark scheme June 2010 | CHY1BP | Original Q7 | Legacy

Seven	**2**	**2**	**2**	**3**

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 10 · Mark scheme

June 2011 | CHY1H | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	complete diagram with 2 carbon atoms and 5 hydrogen atoms each C–C and each C–H linked by a single line (bond)		1
5(b)(i)	the greater the number of (carbon) atoms (in an alkane molecule) the greater its boiling point **or** vice versa	allow as the (carbon) chain gets longer the boiling point increases ignore melting points do **not** accept reference to greater number of molecules	1
5(b)(ii)	any **two** from: • low boiling point / volatile • low viscosity • high flammability • small molecules • burn completely	they = hydrocarbons from the graph it = $C_{30}H_{62}$ accept they are gases or liquids accept easier to burn / ignite accept short chains ignore number of carbon atoms ignore speed of burning	2
5(c)(i)	16 (CO_2) + 18 (H_2O)		1
5(c)(ii)	(carbon dioxide in the Earth's early) atmosphere	accept from volcanoes (millions of years ago) **or** from dead plants / animals allow dead sea creatures ignore shells	1

Question 5 continues on the next page . . .

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

CHY1H

Question 5 continued . . .

question	answers	extra information	mark
5(c)(iii)	increase in burning / use of fossil fuels		1
	locked up carbon (carbon dioxide) is released	allow carbon / carbon dioxide from millions of years ago is released accept extra carbon dioxide is not 'absorbed' (by the carbon cycle)	1
Total			**8**

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 11 · Mark scheme

June 2019 | 8462/2H | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(Titan has) little / no oxygen	ignore references to respiration	1	AO3 4.9.1.3
	(so) photosynthesis has not occurred (on Titan)	allow (so) no plants / algae to produce oxygen (on Titan)	1	
	(therefore) little / no carbon dioxide present (on Titan) **or** (therefore) oxygen-using animals cannot have evolved (on Titan)		1	
08.2	(methane) allows short(er) wavelength radiation to pass through (from the sun)	allow (methane) allows uv / ultraviolet radiation to pass through (from the sun)	1	AO1 4.9.2.1
	(which is) re-emitted from the surface as long(er) wavelength radiation	allow (which is) re-emitted from the surface as ir / infra-red radiation	1	
	(which is) absorbed (by methane in the atmosphere)	allow (which is) trapped (by methane in the atmosphere) if no other mark is awarded, allow **1** mark for methane absorbs long(er) wavelength radiation **or** methane absorbs ir / infra-red radiation	1	
08.3	(add) bromine (water)	do **not** accept bromide	1	AO1 4.7.1.4 4.7.2.1 4.7.2.2
	(changes from) orange to colourless	dependent on correct test in MP1 allow (changes from) brown to colourless ignore clear	1	
Total			**8**	

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 12 · Mark scheme

June 2023 | 8462/2H | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	water vapour		1	AO1 4.9.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	(increased population so) more energy required (so) more (fossil) fuels burned **OR** (increased population so) more farmland required (1) (so) more deforestation (1)	allow (increased population so) more transport required allow a named fossil fuel	1 1	AO3 4.9.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	(increased population so) more food required (so) more methane-producing food production **OR** (increased population so) more waste produced (1) (which) produces more methane on decomposition (1)	 allow more use of beef cattle (in food production) allow more rice grown	1 1	AO3 4.9.2.2

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 12 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	any **two** from: • melting ice • rising sea levels • flooding • extremes of weather • loss of habitats	ignore global warming do **not** accept acid rain do **not** accept global dimming do **not** accept references to ozone	2	AO1 4.9.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	there may be other reasons for changes in the (mean) temperature (of the atmosphere at the Earth's surface)	allow difficult to model allow the earth goes through cycles of temperature change	1	AO3 4.9.2.2

Total Question 4	8

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Answer 12 · Examiner comments

June 2023 | 8462/2H | Original Q4

Question 4 (standard and standard / high demand)

04.1 Around three-quarters of students knew that water vapour is a greenhouse gas. Nitrogen was the most popular distractor.

04.2 Students who gained credit, usually did so by identifying that an increase in population creates an increased demand for energy. There were many references to the increase in the need for transportation in its various (specified) forms, which was creditworthy. However, students often did not gain the second mark as they failed to link the need for more energy to the outcome, that more (fossil) fuels are burned. Some students incorrectly stated that increased respiration by humans has caused the increase in the concentration of atmospheric carbon dioxide. Around 30% of students scored both marks.

04.3 Over half of the students scored both marks. Students who gained only one mark usually did so because they simply stated that more cattle farming causes an increase in methane concentration, but did not explain that this was a result of an increased demand for food.

04.4 This question was answered well, with more than 70% of students giving two effects. Students who did not gain credit often referred to climate change / the greenhouse effect / global warming, without describing the effect.

04.5 Many students gave answers that were too vague, such as there is insufficient data or evidence. The usual creditworthy answers were in terms of previous cooling / warming cycles in the Earth's past. Only around one-quarter of students gained a mark here.