AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.2.3

Test for carbon dioxide

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**24**
Available paper years	**2007–2024**

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.

4.8.2.3 Test for carbon dioxide

Answer 01 · Mark scheme

June 2007 | CHY1A | Original Q8 | Legacy

Eight	**1**	**2**	**2**	**3**

Answer 02 · Mark scheme

November 2007 | CHY1A | Original Q2 | Legacy

Two	**A**	calcium carbonate	**1**
	B	calcium hydroxide	**4**
	C	calcium oxide	**2**
	D	carbon dioxide	**3**

4.8.2.3 Test for carbon dioxide

Question 2

question	answers	extra information	mark
(a)(i)	get wrong coloured flame/result owtte **or** to get the correct result	allow contaminated	1
(a)(ii)	high melting point unreactive		1 1
(a)(iii)	yellow-orange		1
(b)(i)	bubbles / fizz / effervescence	ignore any named gas	1
(b)(ii)	milky		1
(b)(c)	fast(er) small(er) amount		1 1
total			8

4.8.2.3 Test for carbon dioxide

Answer 03 · Mark scheme January 2008 | CHY3F | Original Q2 | Legacy

CHY3F

Answer 04 · Mark scheme June 2008 | CHY3F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)(i)	(hydrochloric) acid carbon dioxide limewater		1 1 1
3(a)(ii)	sodium hydroxide ammonia litmus		1 1 1
3(b)	no distinctive colour (flame) owtte	allow: not a metal (ion) accept flame tests only identify single elements	1
Total			**7**

4.8.2.3 Test for carbon dioxide

Answer 04 · Mark scheme June 2008 | CHY3F | Original Q3 | Legacy

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

Answer 05 · Mark scheme November 2008 | CHY1AP | Original Q7 | Legacy

Seven	**1**	**2**	*	**4**

Answer 06 · Mark scheme June 2009 | CHY1AP | Original Q1 | Legacy

One	**A**	calcium carbonate	**2**
	B	carbon dioxide	**1**
	C	calcium oxide	**4**
	D	calcium hydroxide	**3**

Answer 07 · Mark scheme November 2010 | CHY1AP | Original Q6 | Legacy

Six	**2**	**3**	**2**	**3**

4.8.2.3 Test for carbon dioxide

Answer 08 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	stop them reacting	owtte	1
2(b)(i)	fizzing / bubbles / effervescence	owtte	1
2(b)(ii)	(g)		1
2(b)(iii)	limewater		1
2(c)	yellow		1
2(d)(i)	barium chloride		1
2(d)(ii)	white		1
2(d)(iii)	eg don't see what is being bought **or** a comment about quality / purity eg may be impure / contaminated	ignore references to cost	1
Total			**8**

4.8.2.3 Test for carbon dioxide

Answer 08 · Mark scheme

January 2011 | CHY3F | Original Q2 | Legacy

CHY3F

4.8.2.3 Test for carbon dioxide

Answer 09 · Mark scheme

June 2011 | CHY2F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	because they are gases	ignore vapours / evaporate / (g) allow it is a gas	1
7(b)(i)	80 / 79.5	correct answer with or without working = **2** marks ignore units if no answer **or** incorrect answer then evidence of 64 / 63.5 + 16 gains **1** mark	2
7(b)(ii)	80 / 79.87 / 79.9 / 79.375 / 79.38 / 79.4	correct answer with or without working = **2** marks if no answer **or** incorrect answer then evidence of $\frac{64}{80}$ **or** $\frac{63.5}{79.5}$ (x100) gains **1** mark accept (ecf) $\frac{64 or 63.5}{answer(b)(i)}(\times 100)$ for **2** marks if correctly calculated if incorrectly calculated evidence of $\frac{64 or 63.5}{answer(b)(i)}(\times 100)$ gains **1** mark	2
7(b)(iii)	3.2	correct answer with or without working = **1** mark allow (ecf) 4 x ((b)(ii)/100) for **1** mark if correctly calculated	1

Question 7 continues on the next page

4.8.2.3 Test for carbon dioxide

Question 7 continued

question	answers	extra information	mark
7(c)(i)	3.3	accept 3.33…….. or $3\frac{1}{3}$ or $3.3^{\cdot}$ or 3.3^{r}	1
7(c)(ii)	measure to more decimal places **or** use a more sensitive balance / apparatus	allow use smaller scale (division) **or** use a smaller unit ignore accurate / repeat	1
7(c)(iii)	any **two** from: • different balances used **or** faulty balance • reading / using the balance incorrectly **or** recording error • spilling copper oxide / copper • copper oxide impure • not all of the copper oxide was reduced / converted to copper **or** not enough / different amounts of methane used • heated for different times • heated at different temperatures • some of the copper made is oxidised / forms copper oxide • some of the copper oxide / copper blown out / escapes (from tube) • some water still in the test tube	ignore systematic / human / apparatus / zero / measurement / random / weighing / reading errors unless qualified ignore dirty apparatus accept incorrect weighing of copper / copper oxide allow some copper left in tube allow impure copper (produced) accept not all copper oxide (fully) reacted accept Bunsen burner / flame at different temperatures ignore some copper oxide / copper lost	2
Total			**10**

The AQA UMS Conversion Calculator is available on the Results statistics page of the AQA Website

4.8.2.3 Test for carbon dioxide

Answer 10 · Mark scheme

January 2012 | CH1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	fermentation		1
4(a)(ii)	cloudy there is carbon dioxide / CO_2	accept milky / white accept calcium carbonate forms allow a (white) solid / precipitate forms	1 1
4(b)(i)	 (the amount of ethanol used) increases (from 1970) to 1989 then it decreases from 1989 (to 2000)	if no year(s) or incorrect year(s) indicated then max **1** correct year(s) only needs to be indicated once to gain full marks accept values in range 1987-1992	 1 1
4(b)(ii)	any **one** from: • Brazil had more oilfields • cost of crude oil had decreased • cost of ethanol / sugar (cane) had increased • demand for ethanol / sugar (cane) had increased • availability of ethanol / sugar (cane) had decreased • climate change affects growing sugar (cane)	 accept availability of land to grow sugar (cane) had decreased	1
Total			**6**

4.8.2.3 Test for carbon dioxide

Answer 10 · Mark scheme

January 2012 | CH1FP | Original Q4 | Legacy

CH1FP

4.8.2.3 Test for carbon dioxide

Answer 11 · Mark scheme

June 2012 | CH1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	react	allow neutralise allow bubbles / fizzes accept produces gas / CO_2 ignore rises	1
4(a)(ii)	stop reacting / producing the (hydrochloric) acid / (calcium) carbonate is used up **OR** have been used up (1) the graph line becomes horizontal / levels out (1) **OR** stays the same / no change (1) no further reaction (1)	stops on its own is insufficient allow stop working / bubbling / fizzing accept because the (calcium) carbonate has neutralised the (hydrochloric) acid ignore reference to graph line	1 1
4(a)(iii)	bubble the gas through limewater / calcium hydroxide solution (the solution) goes cloudy	allow (add) limewater test must be correct to gain result mark allow milky	1 1
4(b)	advantage > Quarrying limestone provides building materials, employment and new road links disadvantage > Quarrying limestone releases dust, and lorries release carbon dioxide from burning diesel fuel		1 1
Total			**7**

4.8.2.3 Test for carbon dioxide

Answer 11 · Mark scheme

June 2012 | CH1FP | Original Q4 | Legacy

CH1FP

4.8.2.3 Test for carbon dioxide

Answer 12 · Mark scheme

June 2012 | CH1FP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	Olive oil does not dissolve in vinegar		1
5(a)(ii)	(the mustard is) an emulsifier	accept an emulsion has formed	1
5(b)(i)	double		1
5(b)(ii)	add bromine water – turns colourless		1
5(c)(i)	because the (olive) trees/plants/crops/leaves/fruit absorb/use carbon dioxide	allow carbon for carbon dioxide allow carbon dioxide is used in photosynthesis	1
5(c)(ii)	any **one** from: • olive oil is a food • olives are slow-growing • olives require a lot of land • not enough olive trees / oil • olive oil dense / viscous / high boiling point	ignore habitats ignore gives off carbon dioxide	1
Total			**6**

4.8.2.3 Test for carbon dioxide

Answer 12 · Mark scheme

June 2012 | CH1FP | Original Q5 | Legacy

CH1FP

4.8.2.3 Test for carbon dioxide

Answer 13 · Mark scheme

question	answers	extra information	mark
6(a)	time from when the heating is started until		1
	the limewater turns cloudy / milky		1
6(b)(i)	the temperature was not high enough	accept the copper carbonate had not started to decompose / react accept it takes time to heat up the copper carbonate	1
	the bubbles of gas were air	accept no carbon dioxide produced	1
6(b)(ii)	the copper carbonate was decomposing / reacting	accept the temperature was high enough to cause decomposition / a reaction	1
	so carbon dioxide was produced	allow correct word / symbol equation	1
6(b)(iii)	copper oxide was produced	allow correct word / symbol equation	1
	because the copper carbonate had completely decomposed / reacted	ignore all of the carbon dioxide had been given off	1
Total			**8**

4.8.2.3 Test for carbon dioxide

Answer 13 · Mark scheme

January 2013 | CH1FP | Original Q6 | Legacy

CH1FP

4.8.2.3 Test for carbon dioxide

Answer 14 · Mark scheme

June 2013 | CH1FP | Original Q3 | Legacy

Question 3

question	answers	extra information	Mark
3(a)(i)	magnesium oxide		1
3(a)(ii)	decomposition		1
3(b)(i)	bar chart		1
3(b)(ii)	more		1
3(b)(iii)	limewater turns cloudy / milky	 accept forms a white precipitate	1 1
Total			6

4.8.2.3 Test for carbon dioxide

Answer 15 · Mark scheme June 2013 | CH3FP | Original Q2 | Legacy

Question 2

question	Answers	extra information	Mark
2(a)(i)	yellow		1
2(a)(ii)	lilac		1
2(b)	(bubble through) limewater cloudy	 allow white / milky	1 1
2(c)(i)	silver nitrate solution		1
2(c)(ii)	white		1
Total			**6**

4.8.2.3 Test for carbon dioxide

Answer 16 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
3(a)(i)	any **one** from: • destruction of habitats • fewer plants/trees to absorb carbon dioxide • dust / noise / air / visual *(pollution)* • more traffic	*allow breathing problems*	1	3 / 1.2	E
3(a)(ii)	any **one** from: • provides employment • local business make more profit • new transport links	ignore future use of quarry	1	3 / 1.2	E
3(a)(iii)	(rain water is) acidic		1	1 / 1.2.1f	E
3(b)(i)	1.2(g)		1	2 / 1.2.1b	E
3(b)(ii)	1.4(g)	allow ecf from (b)(i)	1	2 / 1.2.1b	E view with (b)(i)
3(b)(iii)	any **one** from: • temperature of the flame varied • different purity of the limestone • incorrect measurement of mass • heated for different times	allow flame was too hot or not hot enough	1	3 / 1.2.1b	E
3(c)(i)	decomposition		1	1 / 1.2.1b	G
3(c)(ii)	2.2(g)		1	2 / 1.1.3c	E

4.8.2.3 Test for carbon dioxide

Answer 16 · Mark scheme

3(c)(iii)	limewater turns cloudy	test must be correct to gain second mark allow turns milky or white (precipitate)	1 1	1 / 1.2.1e	E
Total			**10**		

4.8.2.3 Test for carbon dioxide

Answer 16 · Mark scheme

June 2014 | CH1FP | Original Q3 | Legacy



4.8.2.3 Test for carbon dioxide

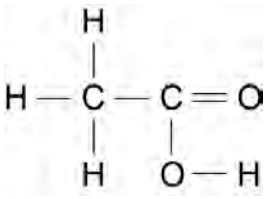
Answer 17 · Mark scheme June 2016 | CH1FP | Original Q4 | Legacy

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	fermentation		1	AO1 1.5.3b
4(a)(ii)	hydration		1	AO1 1.5.3a
4(a)(iii)	resources of crude oil are non-renewable producing ethanol from plants uses less energy		1 1	AO3 1.4.3e; 1.5.3b
4(b)(i)	turns cloudy / milky / white because carbon dioxide is produced	ignore bubbles allow CO_2 produced	1 1	AO1 1.2.1e
4(b)(ii)	filter paper		1	AO3 1.5.3b; 4.3
4(c)(i)	vegetable oils cook foods at higher temperatures than boiling water		1	AO1 1.6.1c
4(c)(ii)	(flask **A**) vegetable oil and water <u>do not mix</u> or are immiscible **or** vegetable oil <u>does not dissolve</u> in water (flask **B**) vegetable oil, water and an emulsifier form an emulsion **or** a suspension or a stable mixture	 allow correct description using hydrophilic and/or hydrophobic	1 1	AO2+AO3 1.6.2a
Total			**10**	

4.8.2.3 Test for carbon dioxide

Answer 18 · Mark scheme June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
5(a)(i)	fizz / effervescence / bubbles	allow calcium carbonate decreases in size or dissolves	1	AO2/AO3 3.4.1d, 3.6.2b
	because carbon dioxide produced / released	allow because gas produced / released	1	
	limewater turns cloudy / milky / white		1	
	because (a precipitate of or solid) calcium carbonate forms	allow because of carbon dioxide if not already credited	1	
5(a)(ii)		allow –OH do not allow lower case 'h'	1	AO1 3.6.2a
5(a)(iii)	acid	must be in this order ignore any name of an acid	1	AO1 3.6.2b
	ester(s)		1	
5(b)	white (precipitate) no change no change no change	all four correct 2 marks any two correct 1 mark	2	AO2 3.4.1e,f
5(c)(i)	lilac red	must be in this order allow purple	1 1	AO1 3.4.1a
5(c)(ii)	colours are masked / changed by each flame colour		1	AO3 3.4.1a
Total			12	

4.8.2.3 Test for carbon dioxide

Answer 18 · Mark scheme

June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
6			6	2AO1 / 3AO2 / 1AO3 3.4.1g

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	There is a simple description of using some of the apparatus.	There is a description of an experimental method including addition of acid to alkali which may include an indicator or colour change and may include a measurement of volume.	There is a description of titrations that would allow a comparison to be made between the two solutions of hydrochloric acid.

examples of chemistry points made in the response could include:

- acid in burette **or** flask
- alkali/sodium hydroxide **or** acid in burette or flask
- volume of acid **or** alkali measured using the pipette
- indicator in flask
- white tile under the flask
- slow addition
- swirling/mixing
- colour change of indicator
- burette volume measured

Total		6

4.8.2.3 Test for carbon dioxide

Answer 19 · Mark scheme

June 2019 | 8462/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	a glowing splint		1	AO1 4.8.2.2
07.2	student **A** should measure the mass of manganese dioxide.		1	AO3 4.6.1.1 4.6.1.2
07.3	calculate a mean but do not include any anomalous results.		1	AO3 4.6.1.1 4.6.1.2
07.4		an answer of 0.173 (cm^3/s) scores **4** marks		AO2 4.6.1.1
	(volume of oxygen formed =) (58 - 20 =) 38 (cm^3)	allow values between 36 (cm^3) and 40 (cm^3) inclusive	1	
	(time taken = 250 – 30 =) 220 (s)		1	
	$\frac{38}{220}$ **or** 0.1727 (cm^3/s)	allow a correct calculation using an incorrectly determined value for volume and / or time	1	
	= 0.173 (cm^3/s)	allow a correctly calculated answer given to 3 significant figures from an incorrect attempt at the rate equation	1	
07.5	line starts at the origin **and** steeper than existing line final volume same as existing line	 allow a tolerance of ± ½ a small square	1 1	AO2 4.6.1.1
07.6	fine manganese dioxide powder has a larger surface area		1	AO3 4.6.1.2 4.6.1.3
Total			**10**	

4.8.2.3 Test for carbon dioxide

Answer 20 · Mark scheme

June 2019 | 8462/2F | Original Q9

Question 9

Question	Answers	Mark	AO/ Spec. Ref
09.1	**Level 3**: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.8.2.3 4.8.3.1 4.8.3.3
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content lithium: • crush tablets or dissolve tablet (in water or acid) • clean wire • place on wire • place in (roaring / blue / non-luminous) flame • observe flame colour • crimson flame carbonate: • add hydrochloric acid • effervescence / fizzing • bubble gas through limewater • limewater becomes cloudy		
09.2	formulation(s)	1	AO1 4.8.1.2

4.8.2.3 Test for carbon dioxide

Answer 20 · Mark scheme

June 2019 | 8462/2F | Original Q9

09.3		an answer of 58.3333333 (%) correctly rounded to at least 2 significant figures scores **3** marks		AO2 4.8.1.2
	1.20 g = 1200 mg **or** 700 mg = 0.700 g		1	
	$\frac{700}{1200} \times 100$ **or** $\frac{0.700}{1.20} \times 100$	allow correct use of incorrectly or not converted values from step 1	1	
	= 58.3 (%)	allow 58.3333333 (%) correctly rounded to at least 2 significant figures	1	
Total			**10**	

4.8.2.3 Test for carbon dioxide

Answer 21 · Mark scheme

November 2020 | 8462/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	measuring cylinder	allow pipette / burette	1	AO3 4.6.1.1
03.2	limewater turns milky		1	AO1 4.8.2.3
03.3	all six points plotted correctly line of best fit	allow a tolerance of ± ½ a small square allow **1** mark for four or five points plotted correctly	2 1	AO2 4.6.1.1
03.4	(volume =) 48 (cm^3) (rate=) $\frac{48}{60}$ = 0.8 (cm^3/s)	 allow correct use of an incorrectly determined value for volume	1 1 1	AO2 4.6.1.1
03.5	(between 0 and 20 seconds) (volume of gas) increases (between 80 and 100 seconds) no change (in volume of gas)	 allow reaction stops	1 1	AO2 4.6.1.1

Question 3 (continued)

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	systematic error		1	AO3 4.6.1.1
03.7	(area of one face = 2 x 2 =) 4 (mm^2) (total surface area =) 4 x 6 = 24 (mm^2)	 allow correct use of an incorrectly calculated area of one face 	1 1 1	AO2 4.6.1.2
03.8	faster		1	AO1 4.6.1.3
Total			**15**	

4.8.2.3 Test for carbon dioxide

Answer 22 · Mark scheme

November 2021 | 8462/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	flame emission spectroscopy flame test		1 1	AO1 4.8.3.1 4.8.3.7 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	white		1	AO2 4.8.3.2 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	barium chloride (solution)		1	AO1 4.8.3.5 RPA7

Question 6 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(conversion) (800 cm^3 = $\frac{800}{1000}$ =) 0.8 (dm^3) (mass =) 0.8 × 258 (g) = 206.4 (g) = 206 (g) **alternative approach:** (conversion) (258 g/dm^3 = $\frac{258}{1000}$ =) 0.258 (g/cm^3) (1) (mass =) 0.258 × 800 (g) (1) = 206.4 (g) (1) = 206 (g) (1)	 allow correct use of incorrect / no volume conversion allow an answer correctly calculated to 3 significant figures from an incorrect calculation which uses the values in the question allow correct use of incorrect / no concentration conversion allow an answer correctly calculated to 3 significant figures from an incorrect calculation which uses the values in the question	 1 1 1 1	AO2 4.3.2.5
Total			**8**	

4.8.2.3 Test for carbon dioxide

Answer 23 · Mark scheme

June 2023 | 8462/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	(mass =) $\frac{39.8}{29.6}$ (× 1) = 1.34 (g)	 allow 1.34459459 (g) correctly rounded to at least 2 significant figures	1 1	AO2 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	all six points plotted correctly	allow a tolerance of ± ½ a small square allow **1** mark for four or five points plotted correctly	2	AO2 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	40.6 (kJ)	allow a value in the range 40.4 – 40.8 (kJ) allow a value consistent with the plotted points	1	AO2 4.7.2.3

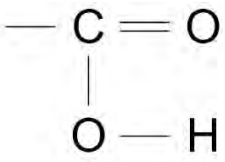
Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	calcium hydroxide		1	AO1 4.8.2.3

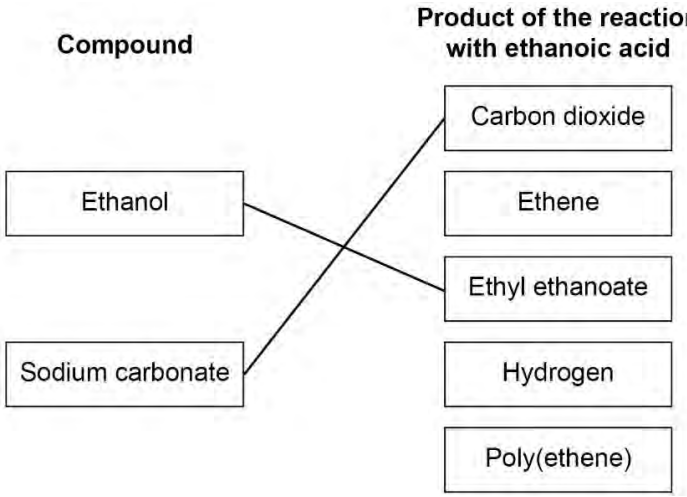
Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	(limewater turns) milky / cloudy	allow white precipitate (formed) allow calcium carbonate is produced	1	AO1 4.8.2.3

4.8.2.3 Test for carbon dioxide

Answer 23 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	an oxidising agent		1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.7			1	AO1 4.7.2.4

Question	Answers	Mark	AO / Spec. Ref.
09.8	 do **not** accept more than **one** line from a box on the left	1 1	AO1 4.7.2.4

Total Question 9	11

4.8.2.3 Test for carbon dioxide

Answer 24 · Mark scheme

June 2024 | 8462/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	alloy		1	AO1
	reinforcement		1	AO2 4.10.3.2 4.10.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	burning (of methane) releases carbon dioxide	allow burning methane ignore methane is a greenhouse gas	1	AO2 4.9.2.2 4.9.3.1
	decomposition (of limestone) releases carbon dioxide	allow decomposition of limestone	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	hydrochloric acid		1	AO1 4.8.3.3
	limewater		1	RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4		allow converse for plain concrete		AO3 4.10.3.3
	(pre-stressed concrete) can bear the weight of (heavy) traffic	allow (pre-stressed concrete) bridge is less likely to collapse	1	
	(because pre-stressed concrete is) stronger	do **not** accept (because pre-stressed concrete is) more dense	1	

4.8.2.3 Test for carbon dioxide

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	any **two** from: (plain concrete slabs) • are cheaper • will be lighter (to transport / lay) • do not need to carry vehicles	allow converse for pre-stressed concrete	2	AO3 4.10.3.3

Total Question 7	**10**

4.8.2.3 Test for carbon dioxide

Answer 23 · Examiner comments

June 2023 | 8462/2F | Original Q9

Question 9 (Standard demand)

09.1 The calculation discriminated well. More than 25% of students successfully completed the calculation, usually showing full details of their working. Students need to be sufficiently familiar with their calculator to understand when it is appropriate to include a recurring dot over one or more digits, and also when it is not. Weaker responses included rounding errors.

09.2 Around half of students obtained both marks for correctly plotting all the points. Over 20% of students incorrectly plotted at least two of the points, with the most frequently seen error being to incorrectly identify the number of carbon atoms present, for example, plotting ethanol as having one carbon atom. If a line of best fit was drawn, this was ignored, as this was not required and is inappropriate in the context of a discrete variable on the x-axis.

09.3 Over 40% of students gained this mark. Any line of best fit drawn was ignored. The answer, within the tolerances stated in the mark scheme, was estimated from the plotted points alone and was as stated in the mark scheme unless misplotted points (usually for hexanol and/or heptanol) suggested otherwise.

09.4 Over 30% of students gained this mark, but the other three distractors were all popular.

09.5 Over 40% of students gained this mark. A small number asserted that the limewater became colourless or clear.

09.6 Less than one third of students gained this mark. ‘Water’ was not a popular distractor, but ‘a halogen’ and ‘an alkali metal’ were both frequently selected.

09.7 The carboxylic acid functional group was not well known.
Less than 2% of students were able to successfully complete the displayed structural formula for this functional group. Many students completed a square of points around the 4 atoms provided.

09.8 Over 20% of students gained both marks and a further 40% gained 1 mark. A number of students drew multiple lines from the boxes on the left.

4.8.2.3 Test for carbon dioxide

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Question 7 (low and standard demand)

07.1 Approximately two out of five students gained both marks with a one in two gaining one mark. It is important that students read the question carefully as there was a significant number of students who ticked one box instead of two.

07.2 This question asked for two ways in which a greenhouse gas is released in the process described. Less than 25% of students gained both marks with just over 35% more gaining one mark. Incorrect or insufficient responses included 'heating the limestone' and general references to the equation, or that methane might escape during its combustion.

07.3 The carbonate test is poorly understood with less than 15% of students correctly identifying the substance added to the limestone and the test for carbon dioxide. Two in five students gained one mark. The most frequent incorrect response was to mistakenly identify the test as universal indicator.

07.4 Less than 35% of students gained one mark in this question, with less than 15% gaining two marks. Responses which did not gain credit included those referring to carrying heavy weights in general rather than the weight being from lorries or vehicles, responses in terms of the incorrect property from the table or failing to make a valid comparison.

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07.5 This question proved to be easier than that for the concrete bridge with over 50% of students gaining one mark and over 35% gaining both marks. Responses which did not gain credit again included those that failed to make a valid comparison or those that simply quoted data from the table.