AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.8.2.1

Test for hydrogen

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2020–2023**

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.

5.8.2.1 Test for hydrogen

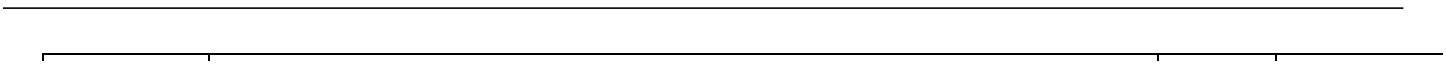
Answer 01 · Mark scheme November 2020 | 8464/C/2H | Original Q1

01.1	$C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$	allow multiples	1	AO2 5.1.1.1 5.7.1.3
01.2	(bubble gas through) lime water turns milky / cloudy / white **or** white precipitate forms	MP2 is dependent upon correct response in MP1 allow (bubble gas through) calcium hydroxide (solution)	 1 1	AO1.2 5.8.2.3
01.3	C_3H_6		1	AO2 5.1.1.1 5.7.1.4
01.4	burning / lit splint burns with a (squeaky) pop sound	MP2 is dependent upon correct response in MP1 allow flame do **not** accept glowing splint allow pops	 1 1	AO1 5.8.2.1
01.5	bromine (water) (colour change) orange (to) colourless	do **not** accept bromide allow 1 mark for colourless (to) orange ignore clear	1 1 1	AO1 5.7.1.4
Total			**9**	

5.8.2.1 Test for hydrogen

Answer 01 · Mark scheme

November 2020 | 8464/C/2H | Original Q1



5.8.2.1 Test for hydrogen

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	(test) glowing splint	MP2 is dependent upon MP1 being awarded do **not** accept burning / lit splint	1	AO2 AO1
	(result) relights	allow glows more brightly	1	5.8.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	smaller volume of gas produced (per unit time) (so) error in reading is a larger percentage of the total volume		1 1	AO3 5.6.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	any **one** from: • measuring vessel (for hydrogen peroxide or gas) wrongly calibrated • balance wrongly calibrated • timer slow / fast		1	AO3 5.6.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	all points plotted correctly line of best fit	allow a tolerance of ± ½ a small square allow at least 4 points plotted correctly for **1** mark	2 1	AO2 AO3 5.6.1.4

5.8.2.1 Test for hydrogen

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	manganese dioxide (because manganese dioxide) has the steepest gradient	allow ecf from question **06.4** allow (because manganese dioxide) produces the most gas per unit time	1 1	AO3 5.6.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	same number of particles per unit volume (so) same frequency of collisions (with catalyst)	allow same concentration (of hydrogen peroxide solution)	1 1	AO3 5.6.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	tangent drawn at 20 s value for *x* step **and** *y* step from tangent (rate =) $\frac{\text{value for } y \text{ step}}{\text{value for } x \text{ step}}$ correctly calculated to 3 significant figures	 allow evidence of use of two points on tangent either on the graph or in the text allow correct use of incorrectly determined value(s) for *x* step and/or *y* step from a drawn tangent allow a correctly calculated answer to 3 significant figures from an incorrect calculation which uses values determined from the graph	1 1 1 1 1	AO2 5.6.1.1

Total Question 6	17

5.8.2.1 Test for hydrogen

Answer 02 · Examiner comments

Question 6

06.1 Fewer than half of the students were able to identify oxygen from the equation then recall the test for oxygen gas and its result. Frequently, a description of a glowing splint was inadequate, such as a blown out splint or just a splint.

06.2 Practical errors are not well known by students and fewer than one in ten gained any marks on this question, usually for the idea that a smaller volume of hydrogen peroxide would lead to a smaller volume of gas. Students did not then make the link to a greater percentage reading error.

06.3 Understanding what a systematic error is was not well known by students with fewer than one in twenty five gaining this mark. There is significant confusion with a zero error, which could be systematic, but there was little realisation that the error has to be the same for every reading taken.

06.4 Three quarters of students were able to correctly plot the points on the graph. However, with the anomaly (which was not flagged in the question) and the curve, only about a quarter actually scored all three marks. It did appear that many thought the line had to be straight because the two already on the graph were. However, there was no realisation that these would also slow as the maximum volume of oxygen had been produced.

06.5 Nearly half of students correctly identified manganese oxide (not magnesium oxide) as the catalyst that gave the fastest rate of reaction with the reason. Since the question asked for the fastest rate, the superlative was required in the answer, which many students missed, so a quarter gained one mark, most frequently for this.

5.8.2.1 Test for hydrogen

Answer 02 · Examiner comments June 2023 | 8464/C/2H | Original Q6

06.6 Most students did not answer the question, preferring to talk about what the reaction was dependent on. Some talked about concentration, temperature, or surface area affecting rate without linking it to this specific question so failed to gain any credit.

06.7 Nearly a quarter of students gained full marks on this question. It appeared that if a student knew to draw a tangent, they could often work it through to an answer. The most common way of not gaining marks when a tangent was drawn was for misreading the scales, or not giving an answer to three significant figures. If a tangent was not drawn, then the mark was limited to a maximum of one for a correct calculation of an expression given to three significant figures.

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Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.