AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.8.2.3

Test for carbon dioxide

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2020–2023**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

5.8.2.3 Test for carbon dioxide

Question 01

November 2020 | 8464/C/1H | Original Q3

0 3 Some students investigated the thermal decomposition of metal carbonates.

The word equation for the reaction is:

metal carbonate → metal oxide + carbon dioxide

The students made the following hypothesis:

'When heated the same mass of any metal carbonate produces the same mass of carbon dioxide.'

The students heated a test tube containing copper carbonate.

Table 1 shows their results.

Table 1

Time the test tube containing copper carbonate was heated in mins	0	2	4	6
Mass of test tube and contents in g	17.7	17.1	17.0	17.0

5.8.2.3 Test for carbon dioxide

Question 01 · continued

Plan a method the students could use to test their hypothesis.

You should show how the students use their results to test the hypothesis.

You do **not** need to write about safety precautions.

[6 marks]

6

5.8.2.3 Test for carbon dioxide

Question 02

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

0 1 This question is about the Earth's resources.

When most fuels burn carbon dioxide is produced.

Propane (C_3H_8) is a fuel.

0 1 . 1 Balance the equation for the combustion of propane.

[1 mark]

$$C_3H_8 + ____ O_2 \rightarrow 3\,CO_2 + 4\,H_2O$$

0 1 . 2 Describe the test for carbon dioxide.

Give the result of the test.

[2 marks]

Test _____

Result _____

_____

0 1 . 3 Propane can be cracked to produce propene and hydrogen.

Complete the symbol equation for the reaction.

[1 mark]

$$\underset{\text{propane}}{C_3H_8} \rightarrow \underset{\text{propene}}{_____} + \underset{\text{hydrogen}}{H_2}$$

5.8.2.3 Test for carbon dioxide

Question 02 · continued

0 1 . 4 Describe the test for hydrogen.

Give the result of the test.

[2 marks]

Test _____

Result _____

_____

0 1 . 5 Propene is an alkene.

Describe the test for alkenes.

Give the colour change in the test.

[3 marks]

Test _____

Colour change _____ to _____

9

5.8.2.3 Test for carbon dioxide

Question 03

November 2021 | 8464/C/2H | Original Q6

0 6 Ammonia is produced when a mixture of nitrogen and hydrogen reacts.

The equation for the reaction is:

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

0 6 . 1 Nitrogen is obtained from the air.

The mixture of nitrogen and hydrogen must **not** contain carbon dioxide and oxygen.

Explain how a sample can be tested to show that carbon dioxide is **not** present in the mixture.

[2 marks]

0 6 . 2 A catalyst is used in the reaction.

Explain how a catalyst increases the rate of a reaction.

[2 marks]

Question 6 continues on the next page

5.8.2.3 Test for carbon dioxide

Question 03 · continued

The equation for the reaction to produce ammonia is repeated here.

$$N_2\,(g) + 3\,H_2\,(g) \rightleftharpoons 2\,NH_3\,(g)$$

0 6 . 3 The reaction reaches equilibrium.

Explain how an equilibrium is reached.

[2 marks]

0 6 . 4 Suggest how the catalyst affects the equilibrium position.

Give **one** reason for your answer.

[2 marks]

0 6 . 5 What is the effect of increasing the pressure on the reaction to produce ammonia?

[1 mark]

Tick (✓) **one** box.

The yield of ammonia decreases. ☐

The yield of ammonia stays the same. ☐

The yield of ammonia increases. ☐

5.8.2.3 Test for carbon dioxide

Question 03 · continued

0 6 . 6 The forward reaction is exothermic.

Explain the effect of increasing the temperature on the yield of ammonia gas produced at equilibrium.

[2 marks]

11

5.8.2.3 Test for carbon dioxide

Question 04

June 2023 | 8464/C/1H | Original Q1

0 1 This question is about carbon dioxide.

Carbon dioxide is soluble in water and forms an acidic solution.

0 1 . 1 Which ion makes the solution acidic?

[1 mark]

_____

0 1 . 2 Name an indicator that could be used to test if the solution is acidic.

Give the result of the test.

[2 marks]

Indicator _____

Result _____

_____

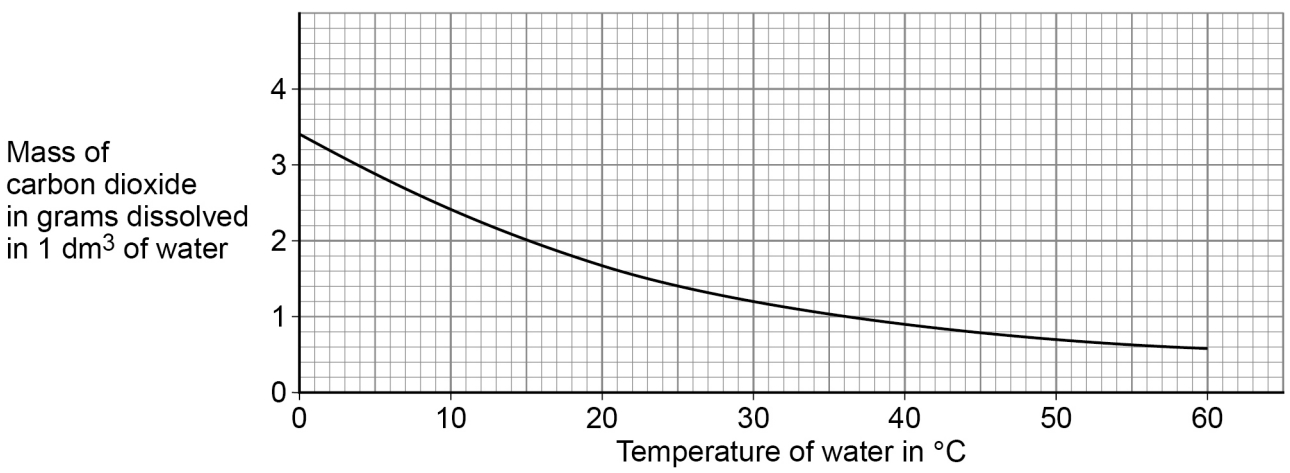
Question 1 continues on the next page

5.8.2.3 Test for carbon dioxide

Question 04 · continued

Figure 1 shows the mass of carbon dioxide that will dissolve in 1 dm^3 of water at different temperatures.

Figure 1



0 1 . 3 How does the solubility of carbon dioxide change as the temperature of the water increases?

[1 mark]

Tick (✓) **one** box.

- The solubility decreases ☐
- The solubility does not change ☐
- The solubility increases ☐

5.8.2.3 Test for carbon dioxide

Question 04 · continued

0 1 . 4 Carbon dioxide dissolves in water to form an acidic solution.

How does the pH of the solution change as the temperature of the water increases?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

pH of the solution decreases ☐

pH of the solution does not change ☐

pH of the solution increases ☐

Calcium carbonate reacts with hydrochloric acid to produce carbon dioxide.

The equation for the reaction is:

$$CaCO_3(s) + 2\,HCl(aq) \longrightarrow CaCl_2(aq) + CO_2(g) + H_2O(\mathbf{x})$$

0 1 . 5 What is the state symbol (**x**) in the equation?

[1 mark]

Tick (✓) **one** box.

(aq) ☐ (g) ☐ (l) ☐ (s) ☐

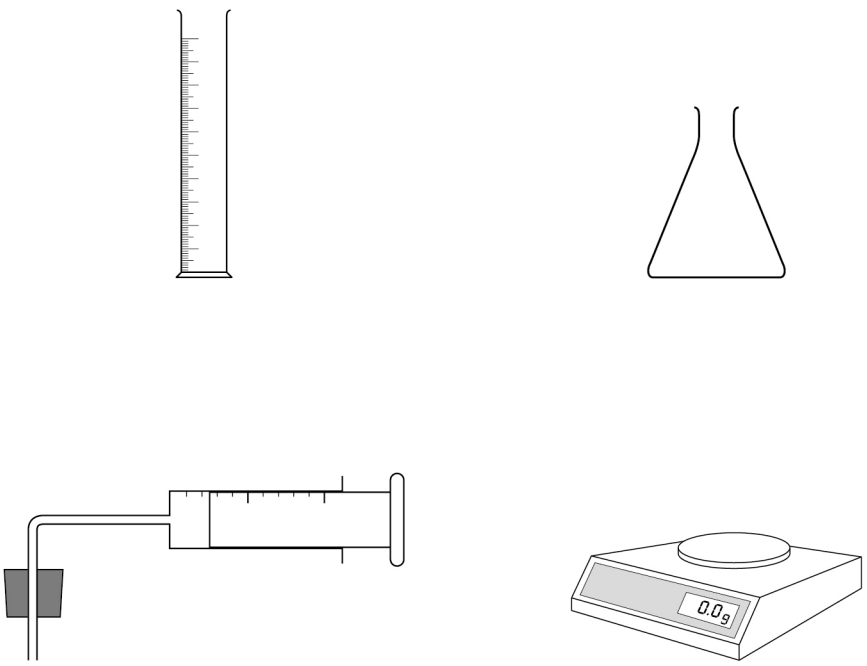
Question 1 continues on the next page

5.8.2.3 Test for carbon dioxide

Question 04 · continued

0 1 . 6 **Figure 2** shows equipment a student used for an investigation.

Figure 2



Gas syringe

5.8.2.3 Test for carbon dioxide

Question 04 · continued

The student investigated the volume of carbon dioxide produced when different masses of calcium carbonate react with hydrochloric acid.

Describe a method the student could use.

[6 marks]

12