AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.6.2.1

Reversible reactions

Past-paper questions

Tier	**Foundation**
Question groups	**5**
Available paper years	**2018–2024**

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.

5.6.2.1 Reversible reactions

Question 01

June 2018 | 8464/C/2F | Original Q4

0 4 . 1 What percentage of the Earth's atmosphere is nitrogen?

[1 mark]

Tick **one** box.

5% ☐ 20% ☐ 50% ☐ 80% ☐

0 4 . 2 During the first billion years of the Earth's existence the amount of nitrogen in the atmosphere increased.

Give **one** source of this nitrogen.

[1 mark]

_____

0 4 . 3 Nitrogen is used to make ammonia.

The word equation for the reaction is:

nitrogen + hydrogen _____ ammonia

Write the correct symbol in the equation to show that it is a reversible reaction.

[1 mark]

0 4 . 4 A reversible reaction can reach equilibrium.

Complete the sentence.

[1 mark]

Equilibrium is reached when the forward reaction and the reverse reaction happen at the same _____ .

0 4 . 5 Fertilisers are formulations containing nitrogen.

What is a formulation?

[1 mark]

_____

_____

5.6.2.1 Reversible reactions

Question 01 · continued

0 4 . 6 **Table 4** shows percentages of chemical elements in a fertiliser.

Table 4

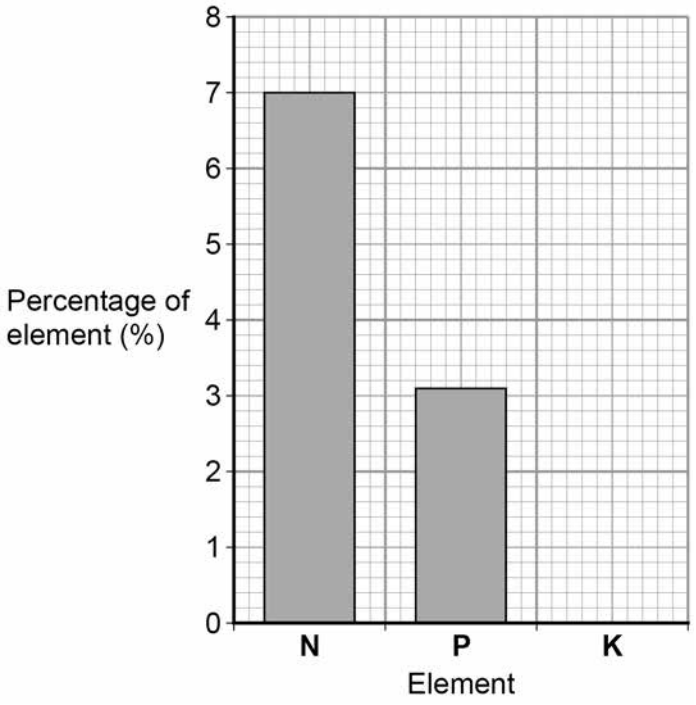
Element	Percentage (%)
Nitrogen (N)	7.0
Phosphorus (P)	3.1
Potassium (K)	5.8

Draw the bar for potassium on **Figure 8**

Use the information in **Table 4**

[1 mark]

Figure 8



5.6.2.1 Reversible reactions

Question 01 · continued

0 4 . 7 A fertiliser contains 0.225 g of iron per 3.0 g of fertiliser.

Which calculation gives the percentage of iron in the fertiliser?

[1 mark]

Tick **one** box.

$\frac{0.225}{3.0 \times 100}$ ☐

$\frac{3.0 \times 100}{0.225}$ ☐

$\frac{0.225 \times 3.0}{100}$ ☐

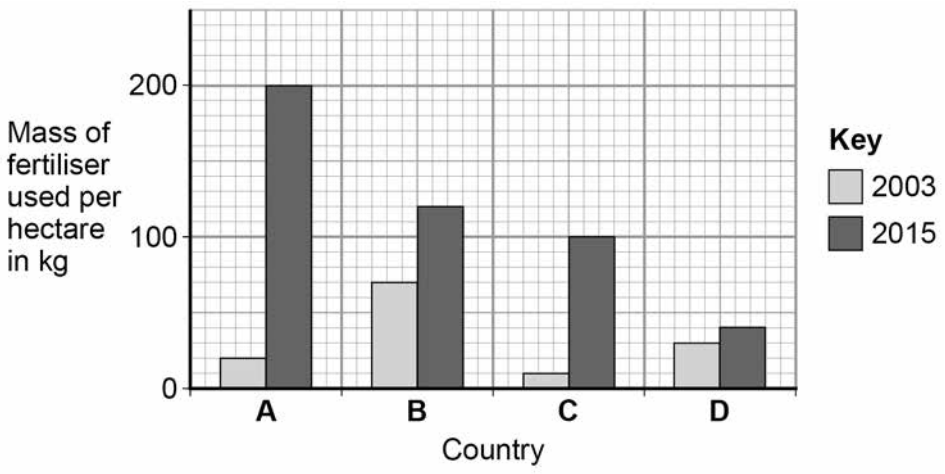
$\frac{0.225 \times 100}{3.0}$ ☐

5.6.2.1 Reversible reactions

Question 01 · continued

0 4 . 8 **Figure 9** shows the use of fertiliser in four different countries, **A**, **B**, **C** and **D**, in 2003 and 2015

Figure 9



A student said:

'**much** more fertiliser was used in 2015 than in 2003'

Is the student correct?

Use data from **Figure 9** to justify your answer.

[3 marks]

10

5.6.2.1 Reversible reactions

Question 02

June 2019 | 8464/C/2F | Original Q1

0 1 . 1 This question is about gases.

Draw **one** line from each substance to the description of the substance.

[3 marks]

Substance	Description of substance
	Compound
Air	Element
Carbon dioxide	Hydrocarbon
Oxygen	Metal
	Mixture

5.6.2.1 Reversible reactions

Question 02 · continued

0 1 . 2 What is used to test for each of the gases?

Draw **one** line from each gas to the test for the gas.

[2 marks]

Gas	Test
Carbon dioxide	A glowing splint
	A lighted splint
Oxygen	Limewater
	Litmus paper

0 1 . 3 Give **two** reasons why the percentage of carbon dioxide in the air has decreased in the last 2.7 billion years.

[2 marks]

Tick (✓) **two** boxes.

- Combustion ☐
- Dissolved in oceans ☐
- Intense volcanic activity ☐
- Photosynthesis ☐
- Respiration ☐

5.6.2.1 Reversible reactions

Question 02 · continued

Oxygen reacts with sulfur dioxide.

The reaction is reversible.

0 1 . 4 What is the symbol for a reversible reaction?

[1 mark]

_____

0 1 . 5 Complete the sentence.

[1 mark]

In a reversible reaction the forward reaction is exothermic, so the

reverse reaction is _____ .

0 1 . 6 A reversible reaction happens in apparatus which stops the escape of reactants and products.

Complete the sentence.

[1 mark]

Equilibrium is reached when the forward and reverse reactions happen at

exactly the same _____ .

10

5.6.2.1 Reversible reactions

Question 03

November 2021 | 8464/C/2F | Original Q1

0 1 Fresh water contains low levels of dissolved salts.

Water reacts with anhydrous copper sulfate in a reversible reaction.

The word equation for the reaction is:

water + anhydrous copper sulfate ⇌ hydrated copper sulfate

0 1 . 1 How does the equation show that the reaction is reversible?

[1 mark]

_____

_____

0 1 . 2 Complete the sentences.

Choose answers from the box.

[2 marks]

blue	**green**	**orange**	**white**	**yellow**

The colour of anhydrous copper sulfate is _____ .

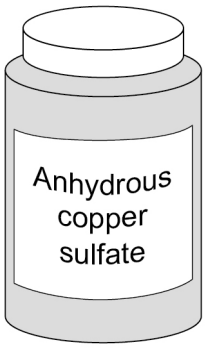
The colour of hydrated copper sulfate is _____ .

5.6.2.1 Reversible reactions

Question 03 · continued

0 1 . 3 **Figure 1** shows anhydrous copper sulfate in a sealed container.

Figure 1



Suggest **one** reason why anhydrous copper sulfate is kept in a sealed container.

[1 mark]

Question 1 continues on the next page

5.6.2.1 Reversible reactions

Question 03 · continued

Sodium chloride dissolves in water to form sodium chloride solution.

0 1 . 4 Draw **one** line from each substance to the description of the substance.

[2 marks]

Substance	Description of substance
Sodium chloride solution	Compound
Water	Element
	Hydrocarbon
	Mixture

0 1 . 5 Name the process used to obtain solid sodium chloride from sodium chloride solution.

[1 mark]

_____

5.6.2.1 Reversible reactions

Question 03 · continued

0 1 . 6 Two processes used to obtain potable water from fresh water are:

- filtering
- sterilising.

Give **one** reason why each process is used.

[2 marks]

Filtering _____

_____

Sterilising _____

_____

0 1 . 7 Which type of water is the easiest to obtain potable water from?

[1 mark]

Tick (✓) **one** box.

Ground water ☐

Salt water ☐

Waste water ☐

0 1 . 8 Which of the following is the first stage of waste water treatment?

[1 mark]

Tick (✓) **one** box.

Aerobic biological treatment of effluent ☐

Anaerobic digestion of sewage sludge ☐

Screening and removal of grit ☐

11

5.6.2.1 Reversible reactions

Question 04

June 2022 | 8464/C/2F | Original Q3

0 3 This question is about ammonia and its compounds.

A student heated a sample of ammonium chloride.

The equation for the reaction is:

$$\underset{\text{ammonium chloride}}{NH_4Cl} \rightleftharpoons \underset{\text{ammonia}}{NH_3} + HCl$$

0 3 . 1 One product is ammonia.

What is the name of the product with the formula HCl?

[1 mark]

_____

0 3 . 2 Ammonia is a gas.

What is the state symbol for ammonia?

[1 mark]

Tick (✓) **one** box.

(aq) ☐ (g) ☐ (l) ☐ (s) ☐

0 3 . 3 How does the equation show that the reaction is reversible?

[1 mark]

_____

_____

0 3 . 4 Complete the sentence.

[1 mark]

The forward reaction is endothermic,

so the reverse reaction is _____ .

5.6.2.1 Reversible reactions

Question 04 · continued

0 3 . 5 Complete the sentence.

Choose the answer from the box.

[1 mark]

concentration	**rate**	**temperature**

Equilibrium is reached when the forward and reverse reactions happen at exactly the same _____ .

Question 3 continues on the next page

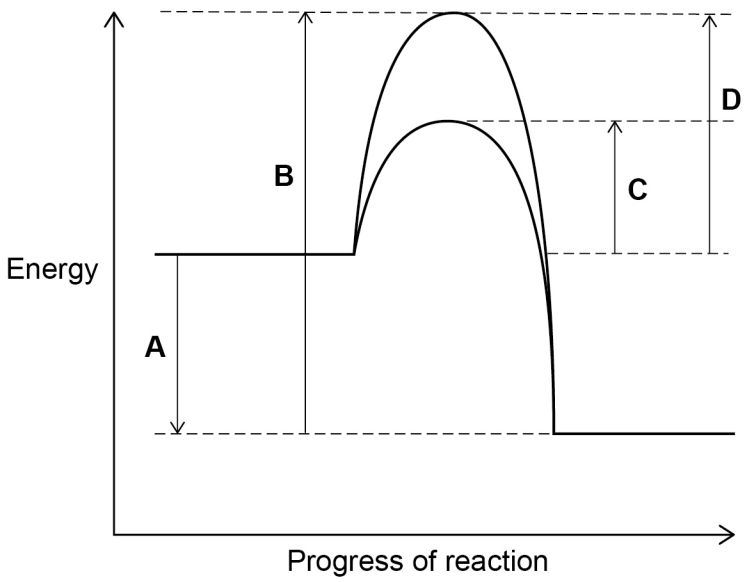
5.6.2.1 Reversible reactions

Question 04 · continued

The industrial process to produce ammonia uses a catalyst.

0 3 . 6 **Figure 5** shows the reaction profile for the reaction with and without a catalyst.

Figure 5



Which letter represents the activation energy for the reaction with a catalyst?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

5.6.2.1 Reversible reactions

Question 04 · continued

0 3 . 7 Give **one** reason why using a catalyst reduces costs.

Do **not** answer in terms of activation energy.

[1 mark]

0 3 . 8 Ammonia is in a mixture that is used as a household cleaner.

What is a mixture that has been designed as a useful product called?

[1 mark]

8

Turn over for the next question

5.6.2.1 Reversible reactions

Question 05

0 2 Different tests can be used to identify chemicals.

0 2 . 1 A student measured the melting points of four substances.

Table 1 shows the results.

Table 1

Substance	Melting point in °C
A	52 to 54
B	61
C	–2 to 0
D	80 to 82

Which substance was pure?

Give **one** reason for your answer.

[2 marks]

Substance _____

Reason _____

_____

Question 2 continues on the next page

5.6.2.1 Reversible reactions

Question 05 · continued

Anhydrous copper sulfate can be used to test for water.

The word equation for the reaction is:

anhydrous copper sulfate + water ⇌ hydrated copper sulfate

0 2 . 2 Complete the sentence.

Choose answers from the box.

[2 marks]

blue	**green**	**red**	**white**	**yellow**

When water is added to anhydrous copper sulfate, the colour changes

from _____ to _____.

0 2 . 3 The reaction between anhydrous copper sulfate and water is reversible.

How does the word equation show that the reaction is reversible?

[1 mark]

_____

5.6.2.1 Reversible reactions

Question 05 · continued

0 2 . 4 The formula of anhydrous copper sulfate is $CuSO_4$

What is the total number of atoms in the formula $CuSO_4$?

[1 mark]

Tick (✓) **one** box.

3 ☐ 4 ☐ 6 ☐ 7 ☐

0 2 . 5 Chlorine is a gas.

Describe the test for chlorine.

Give the result.

[2 marks]

Test _____

_____

Result _____

_____

8