

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

GCSE COMBINED SCIENCE: TRILOGY

H

Higher Tier

Chemistry Paper 2H

Specimen 2018 (set 2)

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:

- a ruler
- a calculator
- the periodic table (enclosed).

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

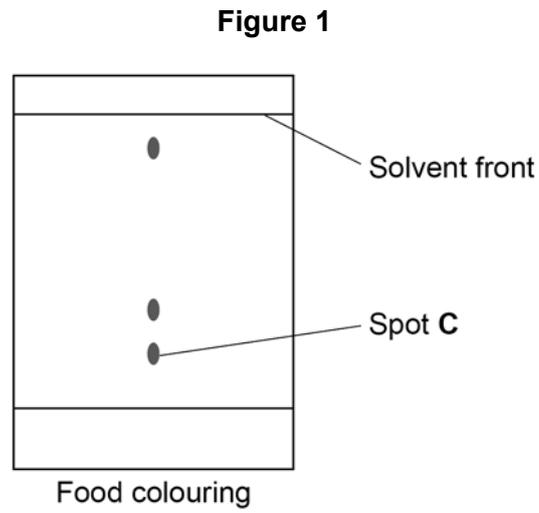
Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

0 1

Figure 1 shows a chromatogram for a food colouring.



0 1 . 1

How does the chromatogram show that the food colouring is a mixture?

[1 mark]

0 1 . 2 A student makes measurements for spot C.

Table 1 shows the student's results.

Table 1

	Distance in mm
Distance moved by spot C	7
Distance moved by solvent	39

Calculate the R_f value for spot C.

Give your answer to 2 significant figures.

Use the results in Table 1.

[3 marks]

R_f value = _____

Question 1 continues on the next page

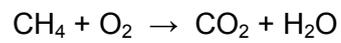
Turn over ►

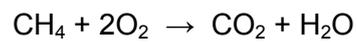
0 2 . 1 Methane is burned in a plentiful supply of oxygen.

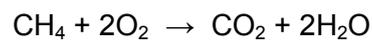
Which is the correct balanced chemical equation?

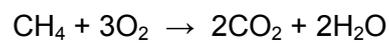
Tick **one** box.

[1 mark]









0 2 . 2 Burning fuels causes atmospheric pollution.

Write **one** effect for each pollutant in **Table 2**.

[3 marks]

Table 2

Pollutant	Effect
Carbon monoxide	
Sulfur dioxide	
Particulates	

Question 2 continues on the next page

Turn over ►

0 3

This question is about copper and its compounds.

0 3 . 1

Table 4 shows information about bioleaching and phytomining.

Bioleaching and phytomining are used to extract copper from low grade ores.

Table 4

	Bioleaching	Phytomining
Metal extracted from	Waste from quarrying	Contaminated ground
Speed of process	Very slow	Slow, made more efficient using quick-growing plants
Pollution	Produces a solution of toxic chemicals which may run off into rivers Takes a long time to stop the process if river pollution occurs	Involves combustion of plants but decontaminates polluted ground

Compare phytomining and bioleaching.

Use the information in **Table 4**.

[4 marks]

Question 3 continues on the next page

Turn over ►

0 3 . 2 Describe how copper sulfate solution is obtained from the plants used in phytomining. **[2 marks]**

0 3 . 3 Copper is displaced from a solution of copper sulfate using iron.
Write a balanced symbol equation for this reaction. **[2 marks]**

0 3 . 4 How does this displacement reaction take place? **[1 mark]**

Tick **one** box.

Electron sharing

Electron transfer

Proton transfer

0 3 . 5 Describe how copper conducts electricity.

[2 marks]

0 3 . 6 Suggest how anhydrous copper sulfate is used to test for water.

[2 marks]

13

Turn over for the next question

Turn over ►

0 4

This question is about catalysts.

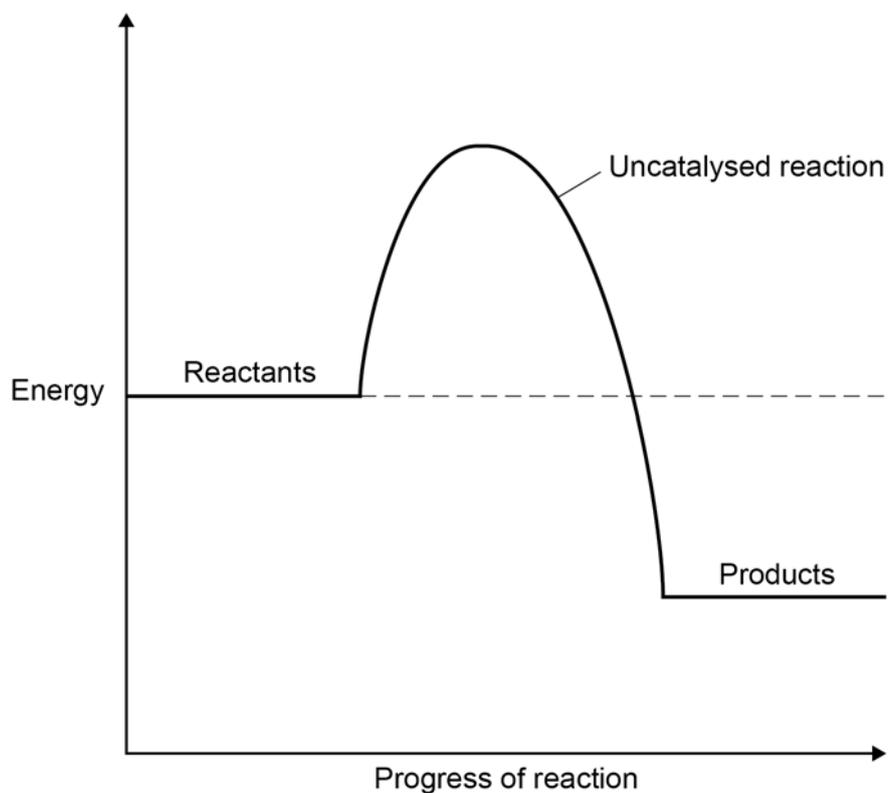
0 4 . 1

Why are catalysts used in reactions?

[1 mark]

Figure 2 shows the reaction profile for a reaction without a catalyst.

Figure 2



0 4 . 2

Label the activation energy (E_A) for the reaction on **Figure 2**.

[1 mark]

0 4 . 3

Label the energy change for the reaction on **Figure 2**.

[1 mark]

0 4 . 4

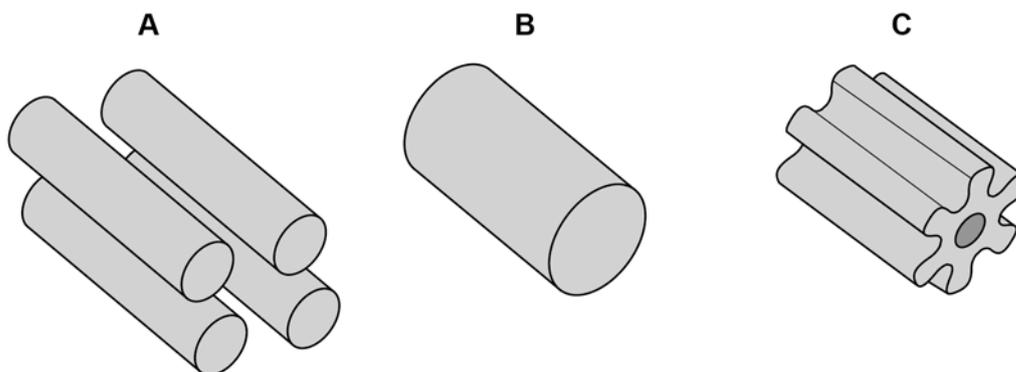
Draw the reaction profile for the reaction **with a catalyst** on **Figure 2**.

[2 marks]

0 4 . 5 **Figure 3** shows three different shapes of the same catalyst.

Each catalyst has the same volume.

Figure 3



Evaluate the effectiveness of the shapes of the catalyst in **Figure 3**.

[3 marks]

—
8

Turn over for the next question

Turn over ►

0 5

A student investigated the rate of the reaction between sodium thiosulfate solution and dilute hydrochloric acid.

Figure 4 shows the apparatus.

Figure 4

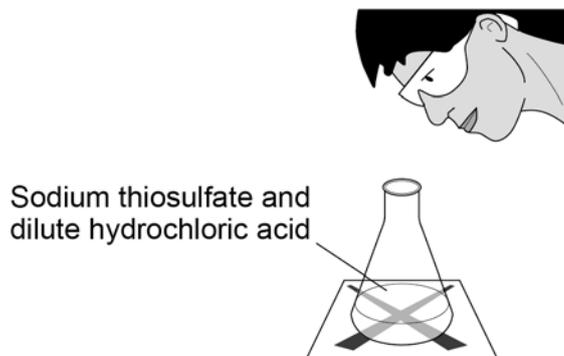


Table 5 shows the time taken for the student to no longer see the cross at different temperatures.

Table 5

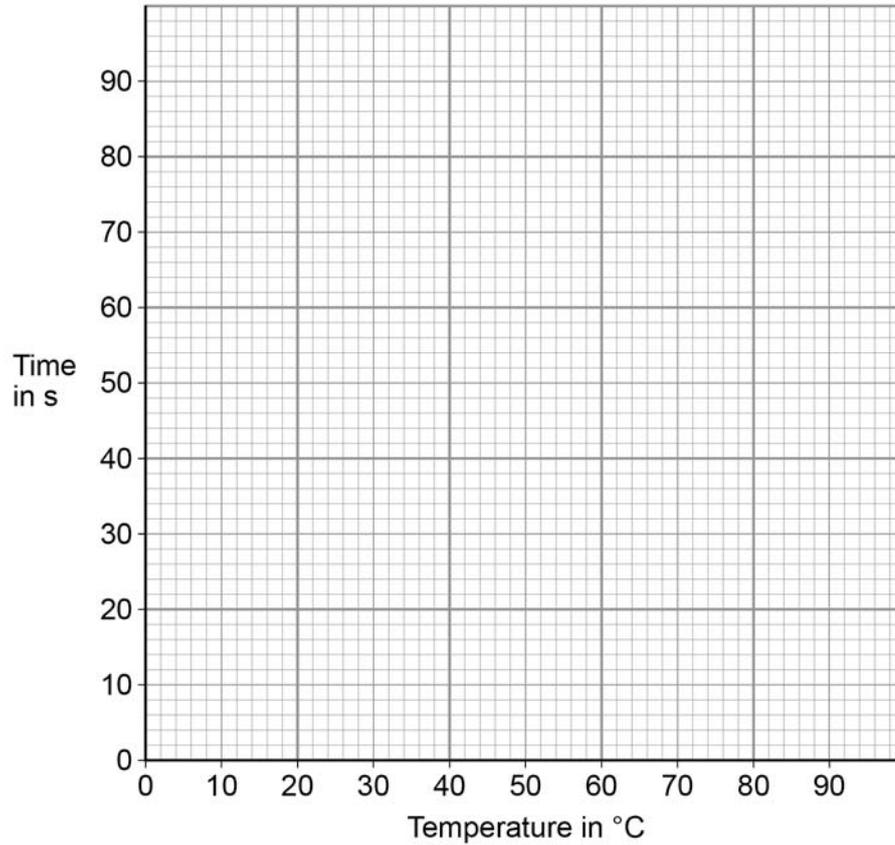
Temperature in °C	Time in seconds
25	89
32	62
44	33
55	17
64	8
75	5
85	4

0 5 . 1 Plot the data from **Table 5** on **Figure 5**.

Draw a line of best fit.

[3 marks]

Figure 5



0 5 . 2 Describe the trend in **Figure 5**.

Use values from **Figure 5**.

[3 marks]

Question 5 continues on the next page

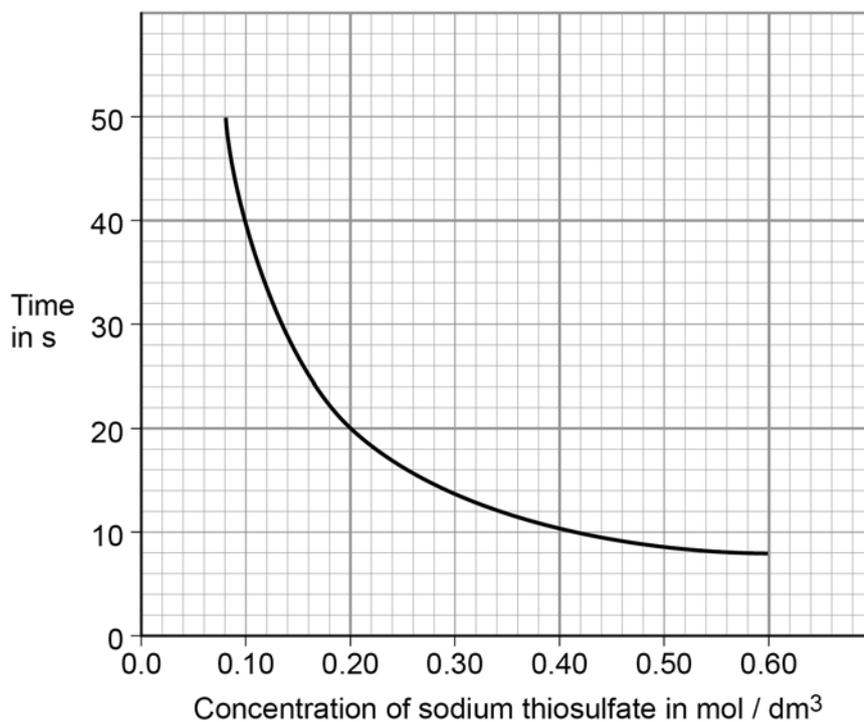
Turn over ►

0 5 . 3

The student also investigated the effect of concentration on the time taken for the reaction.

Figure 6 shows the student's results.

Figure 6



Draw a tangent to the curve at 0.20 mol/dm³

Calculate the gradient (slope) of the tangent at 0.20 mol/dm³

Give the unit.

[4 marks]

Gradient = _____ Unit _____

0 5 . 4

Explain why the rate decreases during a reaction between sodium thiosulfate and dilute hydrochloric acid.

Write about particles in your answer.

[2 marks]

12

Turn over for the next question

Turn over ►

0 6

This question is about crude oil.

0 6**1****Table 6** shows information about crude oil fractions.**Table 6**

Crude oil fraction	Number of carbon atoms	Approximate percentage (%) in crude oil	Approximate percentage (%) demand
Gas	1–4	3	4
Petrol	5–10	9	23
Naphtha	8–12	10	5
Kerosene	9–16	14	8
Diesel	15–25	16	22
Residue	20–30+	48	38

Explain the advantage of cracking hydrocarbons.

Give **one** example from **Table 6**.**[3 marks]**

0 6 . 2

Ethene is a product of cracking.

Relative formula mass (M_r) of ethene = 28Calculate the number of moles of ethene (C_2H_4) in 50.4 kg

Give your answer in standard form.

[3 marks]

Numbers of moles = _____

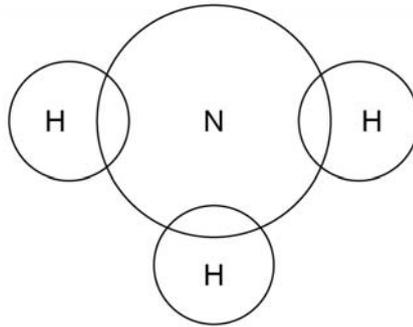
0 6 . 3 $C_{21}H_{44}$ can be cracked to produce ethene.Relative formula mass (M_r) of $C_{21}H_{44}$ = 296Calculate the mass of $C_{21}H_{44}$ needed to produce 50.4 kg of ethene.**[3 marks]**

Mass = _____ kg

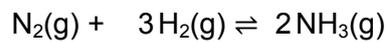
9**Turn over ►**

0 7This question is about ammonia (NH₃).**0 7 . 1**Complete **Figure 7** to show the bonding electrons in ammonia.**[2 marks]**

Show the outer electrons only.

Figure 7

Ammonia is produced from nitrogen and hydrogen.



The forward reaction is exothermic.

0 7 . 2

A low pressure is used.

Explain the effect on the yield of ammonia.

[2 marks]

0 7 . 3 A high temperature is used.

Explain the effect on the yield of ammonia.

[2 marks]

0 7 . 4 Ammonia is removed from the reaction mixture.

Explain the effect on the position of equilibrium.

[2 marks]

8

END OF QUESTIONS

Turn over ►

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright information

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2017 AQA and its licensors. All rights reserved.