

Name:

Date:

C5 - Test 3
ENERGY CHANGES
Intermediate

GCSE

CHEMISTRY

AQA - Combined Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

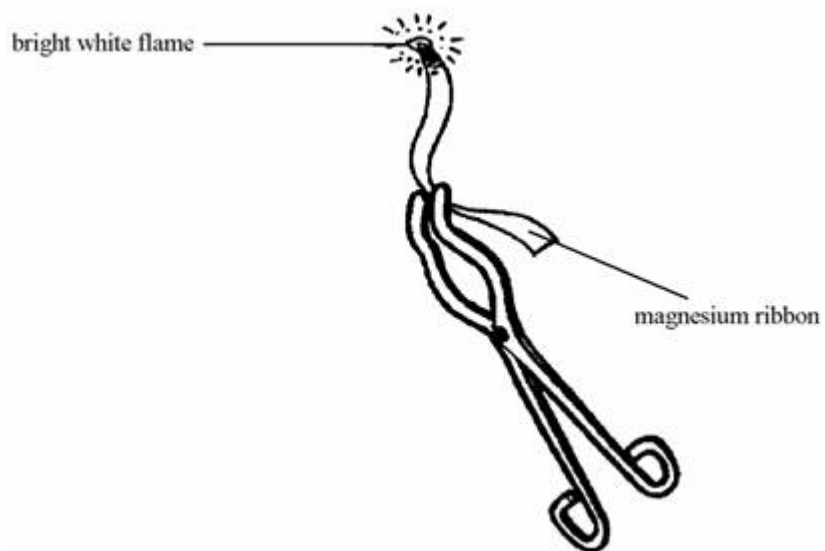
- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

The diagram shows some magnesium ribbon burning.



(a) Choose words from the list to complete the sentences below.

electrical heat light kinetic

an endothermic an exothermic a neutralisation a reduction

When magnesium burns, it transfers _____

and _____ energy to the surroundings.

We say that it is _____ reaction.

(3)

(b) Complete the word equation for the reaction.

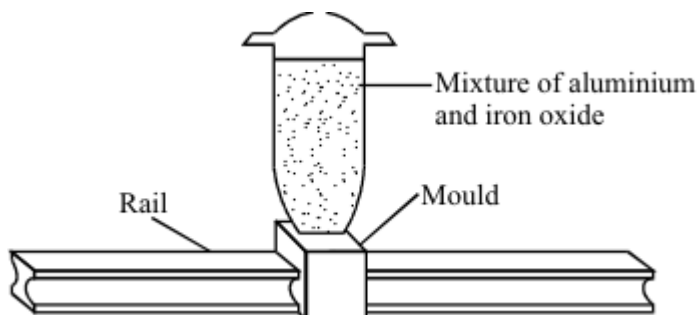
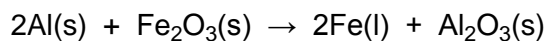
magnesium + _____ → magnesium oxide

(1)

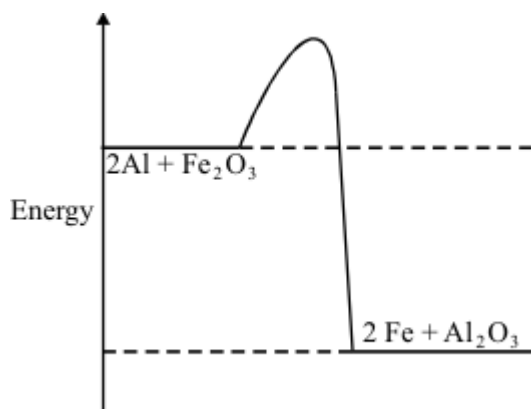
(Total 4 marks)

2.

The reaction between aluminium and iron oxide is used to weld together railway lines.



A simple, qualitative energy level diagram for this reaction is shown.



Use the energy level diagram to:

- (i) describe the idea of activation energy;

(1)

- (ii) explain why the reaction produces molten iron.

(2)

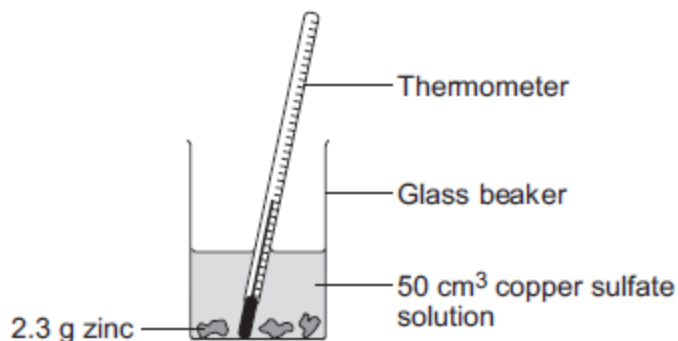
(Total 3 marks)

3.

A student investigated the temperature change when zinc reacts with copper sulfate solution.

The student used a different concentration of copper sulfate solution for each experiment.

The student used the apparatus shown below.



The student:

- measured 50 cm³ copper sulfate solution into a glass beaker
- measured the temperature of the copper sulfate solution
- added 2.3 g zinc
- measured the highest temperature
- repeated the experiment using copper sulfate solution with different concentrations.

The equation for the reaction is:



(a) The thermometer reading changes during the reaction.

Give **one** other change the student could **see** during the reaction.

(1)

(b) Suggest **one** improvement the student could make to the apparatus.

Give a reason why this improves the investigation.

Improvement _____

Reason _____

(2)

- (c) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The student's results are shown in the table below.

Experiment number	Concentration of copper sulfate in moles per dm ³	Increase in temperature in °C
1	0.1	5
2	0.2	10
3	0.3	12
4	0.4	20
5	0.5	25
6	0.6	30
7	0.7	35
8	0.8	35
9	0.9	35
10	1.0	35

Describe **and** explain the trends shown in the student's results.

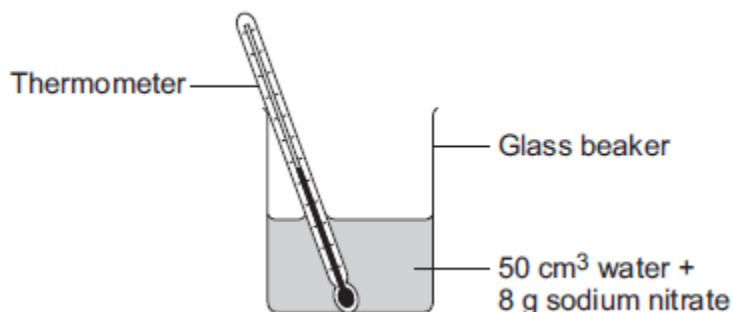
(6)
(Total 9 marks)

4.

This question is about temperature changes.

- (a) A student investigated the temperature change when 8 g of sodium nitrate dissolves in 50 cm³ of water.

The diagram below shows the apparatus the student used.



The student did the experiment five times.

Table 1 shows the results.

Table 1

Experiment	Decrease in temperature of water in °C
1	5.9
2	5.7
3	7.2
4	5.6
5	5.8

- (i) Calculate the mean decrease in temperature.
Do not use the anomalous result in your calculation.

Mean decrease in temperature = _____ °C

(2)

- (ii) Suggest **one** change in the apparatus in the diagram above which would improve the accuracy of the results.
Give a reason for your answer.

(2)

- (b) The student investigated the temperature change when different masses of sodium carbonate were added to 50 cm³ of water at 20 °C.

Table 2 below shows the results.

Table 2

Mass of sodium carbonate in g	Final temperature of solution in °C
2.0	21.5
4.0	23.0
6.0	24.5
8.0	26.0
10.0	26.6
12.0	26.6
14.0	26.6

Describe the relationship between the mass of sodium carbonate added and the final temperature of the solution.

Use values from **Table 2** in your answer.

(3)
(Total 7 marks)