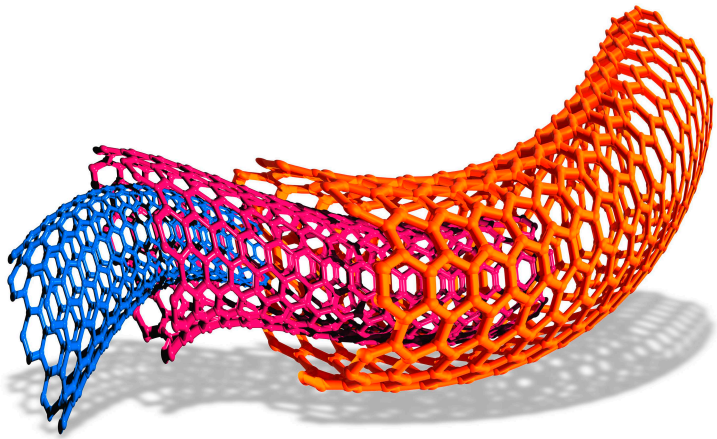
Cambridge Assessment International Education

Interactive

Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 1

Cambridge IGCSE™
Chemistry 0620



Version 2.0

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Select page

HIGH | MIDDLE | LOW

1 You are going to investigate what happens when two different metals, iron and magnesium, react with aqueous copper(II) sulfate.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

Use a measuring cylinder to pour 25 cm^3 of aqueous copper(II) sulfate into the polystyrene cup provided. Put the polystyrene cup into a 250 cm^3 beaker for support. Measure the initial temperature of the solution and then the temperature after 30 seconds and 60 seconds. Record your results in the table.

At 60 seconds add all of the iron to the aqueous copper(II) sulfate and stir the mixture continuously with the thermometer.

Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	20.5	20.5	20.5	22.0	23.0	24.0	24.5	24.5	25.0	25.0	25.0

[2]

(b) *Experiment 2*

Empty the polystyrene cup and rinse it with water.

Use a measuring cylinder to pour 25 cm^3 of aqueous copper(II) sulfate into the polystyrene cup. Put the polystyrene cup into a 250 cm^3 beaker for support. Measure the initial temperature of the solution and then the temperature after 30 seconds and 60 seconds. Record your results in the table.

At 60 seconds add all of the magnesium to the aqueous copper(II) sulfate and stir the mixture continuously with the thermometer.

Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	20.5	20.5	20.5	83.0	86.5	86.0	85.0	83.5	81.0	78.5	76.5

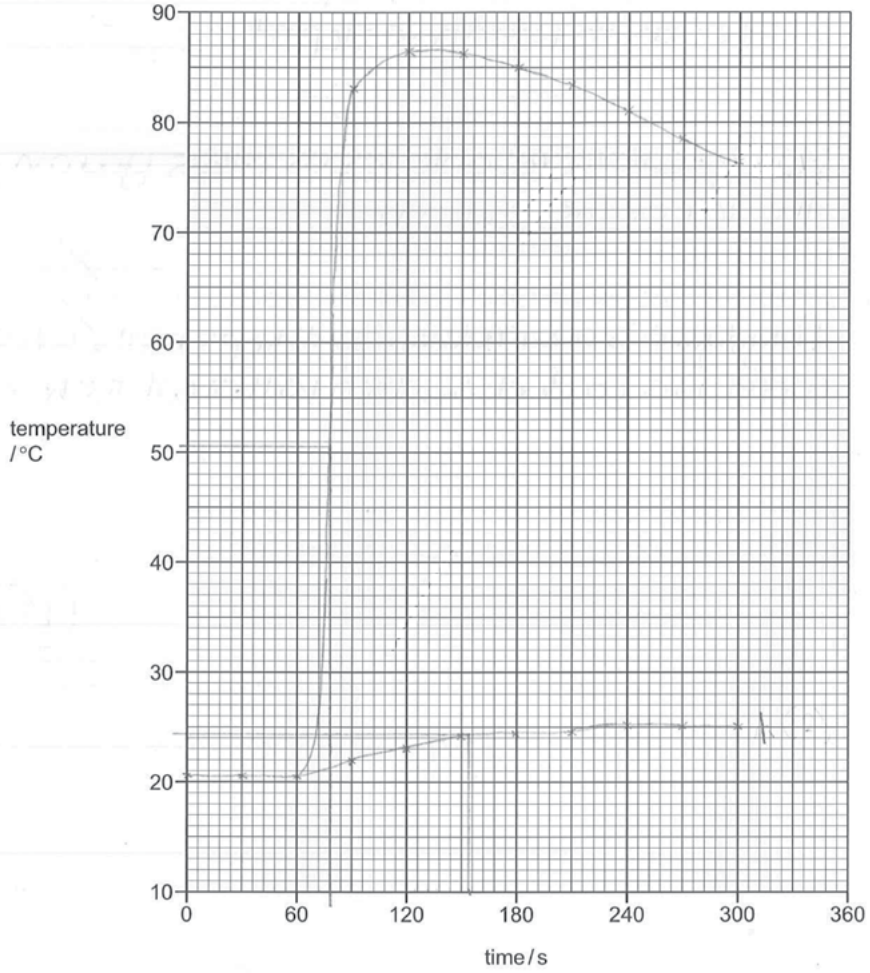
[2]

	Your Mark
1(a)	
1(b)	
1(c)	
1(d)(i)	
1(d)(ii)	
1(e)	
1(f)	
1(g)	

Q1	Mark scheme
(a)	table of results for Experiment 1 temperature boxes completed correctly results comparable to supervisor's
(b)	table of results for Experiment 2 temperature boxes completed correctly results comparable to supervisor's
(c)	all points correctly plotted ± half a small square smooth line graphs labelled
(d)(i)	value from graph –60 s
(d)(ii)	value from graph shown clearly
(e)	room temperature or initial temperature from results table reaction has finished/stopped
(f)	more readings/points/data smoother curve/better or more accurate graph
(g)	polystyrene is an insulator/copper is a (good) conductor reduced heat losses

EXAMINER COMMENTS | MARK SCHEME

(c) Plot the results for Experiments 1 and 2 on the grid and draw **two** smooth line graphs. Clearly label the graphs.



[4]

(d) (i) **From your graph**, deduce the temperature of the mixture in Experiment 1 after 135 seconds.
Show clearly **on the grid** how you worked out your answer.

24.5 °C [2]

(ii) **From your graph**, deduce the time taken for the temperature of the mixture in Experiment 2 to change by 30 °C **after the magnesium was added**.
Show clearly **on the grid** how you worked out your answer.

78 s [2]

	Your Mark
1(a)	
1(b)	
1(c)	
1(d)(i)	
1(d)(ii)	
1(e)	
1(f)	
1(g)	

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(e) Predict the temperature of the mixture in Experiment 2 after one hour. Explain your answer.

20.5°C, as that is the temperature of it's surroundings and the reaction would have stopped. [2]

(f) Suggest an advantage of taking the temperature readings every 15 seconds.

More ~~accurate~~ reliable results means you can judge the rate of the reaction better [2]

(g) Explain why a polystyrene cup is used in the experiments and **not** a copper can.

Polystyrene is an insulator, so it traps heat, whereas copper is a conductor, which will absorb the heat. [2]

[Total: 18]

Select page

HIGH MIDDLE LOW

	Your Mark
1(a)	
1(b)	
1(c)	
1(d)(i)	
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EXAMINER COMMENTS

MARK SCHEME

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At 60 seconds add all of the iron to the aqueous copper(II) sulfate and stir the mixture continuously with the thermometer.

Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	18	17	17	18	20	21	22	22	23	23	24

[2]

(b) *Experiment 2*

Empty the polystyrene cup and rinse it with water.

Use a measuring cylinder to pour 25 cm^3 of aqueous copper(II) sulfate into the polystyrene cup. Put the polystyrene cup into a 250 cm^3 beaker for support. Measure the initial temperature of the solution and then the temperature after 30 seconds and 60 seconds. Record your results in the table.

At 60 seconds add all of the magnesium to the aqueous copper(II) sulfate and stir the mixture continuously with the thermometer.

Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	18	18	18	60	78	80	80	78	77	74	73

[2]

	Your Mark
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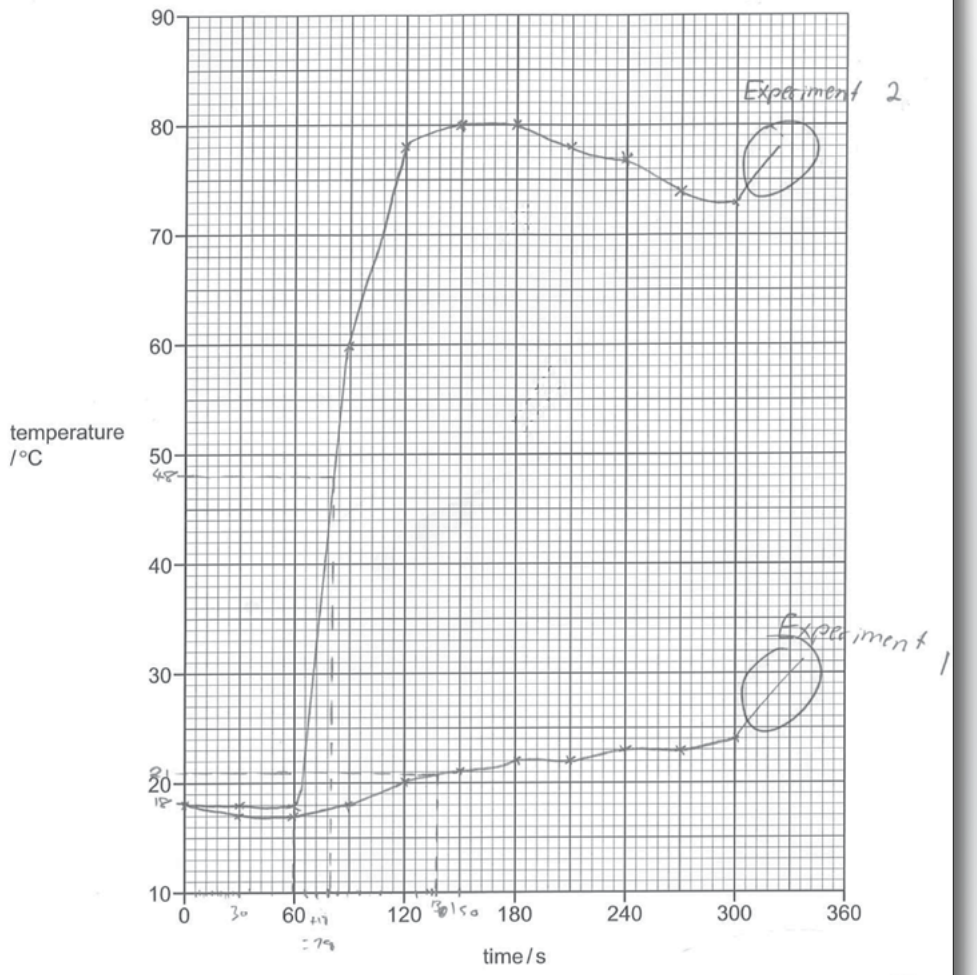
EXAMINER COMMENTS

MARK SCHEME

(c) Plot the results for Experiments 1 and 2 on the grid and draw **two** smooth line graphs. Clearly label the graphs.



[4]

(d) (i) **From your graph**, deduce the temperature of the mixture in Experiment 1 after 135 seconds.
Show clearly **on the grid** how you worked out your answer.

21 °C ..... °C [2]

(ii) **From your graph**, deduce the time taken for the temperature of the mixture in Experiment 2 to change by 30 °C **after the magnesium was added**.
Show clearly **on the grid** how you worked out your answer.

18 ..... s [2]

Select page

HIGH | MIDDLE | LOW

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EXAMINER COMMENTS | MARK SCHEME

(e) Predict the temperature of the mixture in Experiment 2 after one hour. Explain your answer.

19 °C, it would've naturally cooled down back to room temperature. [2]

(f) Suggest an advantage of taking the temperature readings every 15 seconds.

You will get more accurate results on the graph. [2]

(g) Explain why a polystyrene cup is used in the experiments and **not** a copper can.

Copper is conductive and also may react with the experiment, polystyrene is not conductive and will not react. [2]

[Total: 18]

Select page

HIGH | MIDDLE | LOW

	Your Mark
1(a)	
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Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	19	19	19	21	22	22	22.5	23	23	23.5	23.5

[2]

(b) *Experiment 2*

Empty the polystyrene cup and rinse it with water.

Use a measuring cylinder to pour 25 cm^3 of aqueous copper(II) sulfate into the polystyrene cup. Put the polystyrene cup into a 250 cm^3 beaker for support. Measure the initial temperature of the solution and then the temperature after 30 seconds and 60 seconds. Record your results in the table.

At 60 seconds add all of the magnesium to the aqueous copper(II) sulfate and stir the mixture continuously with the thermometer.

Measure the temperature of the mixture every 30 seconds for 300 seconds (5 minutes). Record your results in the table.

time/s	0	30	60	90	120	150	180	210	240	270	300
temperature /°C	19	19	19	78	85	87	85	84	81.5	79	77

[2]

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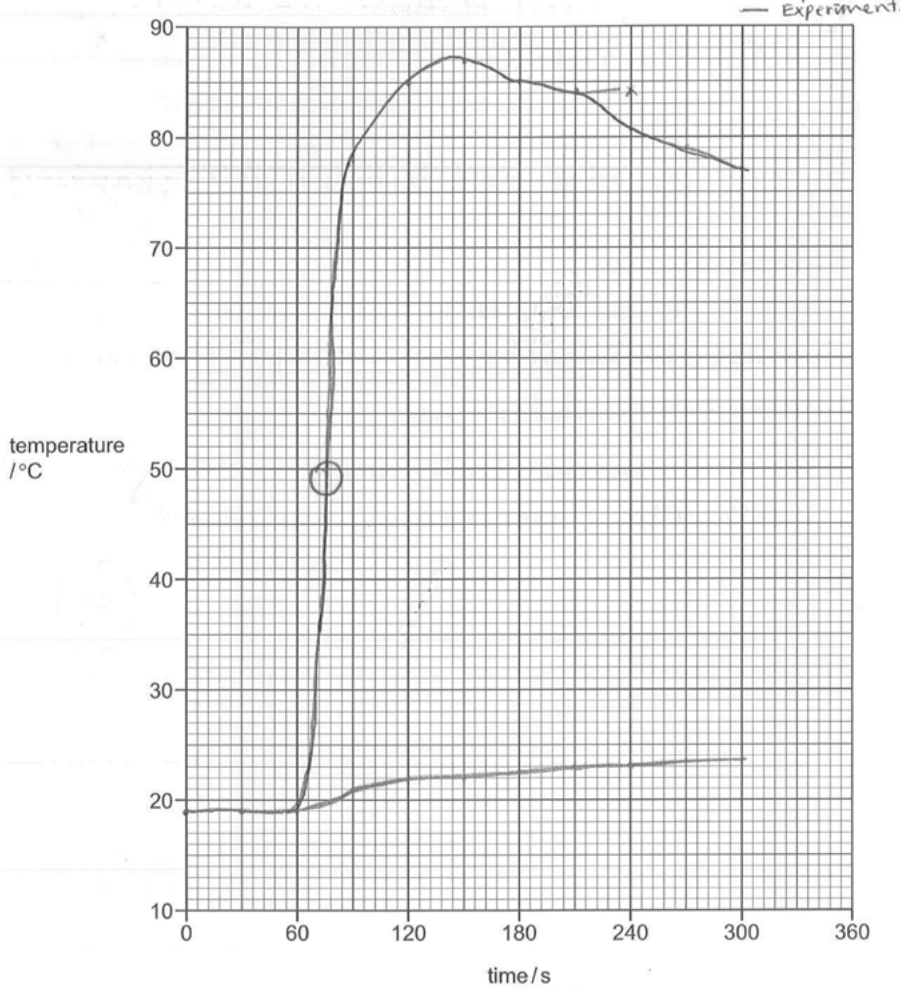

[4]

(d) (i) **From your graph**, deduce the temperature of the mixture in Experiment 1 after 135 seconds.
Show clearly **on the grid** how you worked out your answer.

22 °C [2]

(ii) **From your graph**, deduce the time taken for the temperature of the mixture in Experiment 2 to change by 30 °C **after the magnesium was added**.
Show clearly **on the grid** how you worked out your answer.

60 s [2]

Select page

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EXAMINER COMMENTS MARK SCHEME

(e) Predict the temperature of the mixture in Experiment 2 after one hour. Explain your answer.

It's getting lower. Because the mixture is getting cold. [2]

(f) Suggest an advantage of taking the temperature readings every 15 seconds.

We can see more details while it's changing. [2]

(g) Explain why a polystyrene cup is used in the experiments and **not** a copper can.

~~Because if the mixture is getting hot, then copper can is going hot together.~~ [2]

Because the chemicals might be able to reacts with copper can. [Total: 18]

Select page

HIGH MIDDLE LOW

	Your Mark
1(a)	
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EXAMINER COMMENTS

MARK SCHEME

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