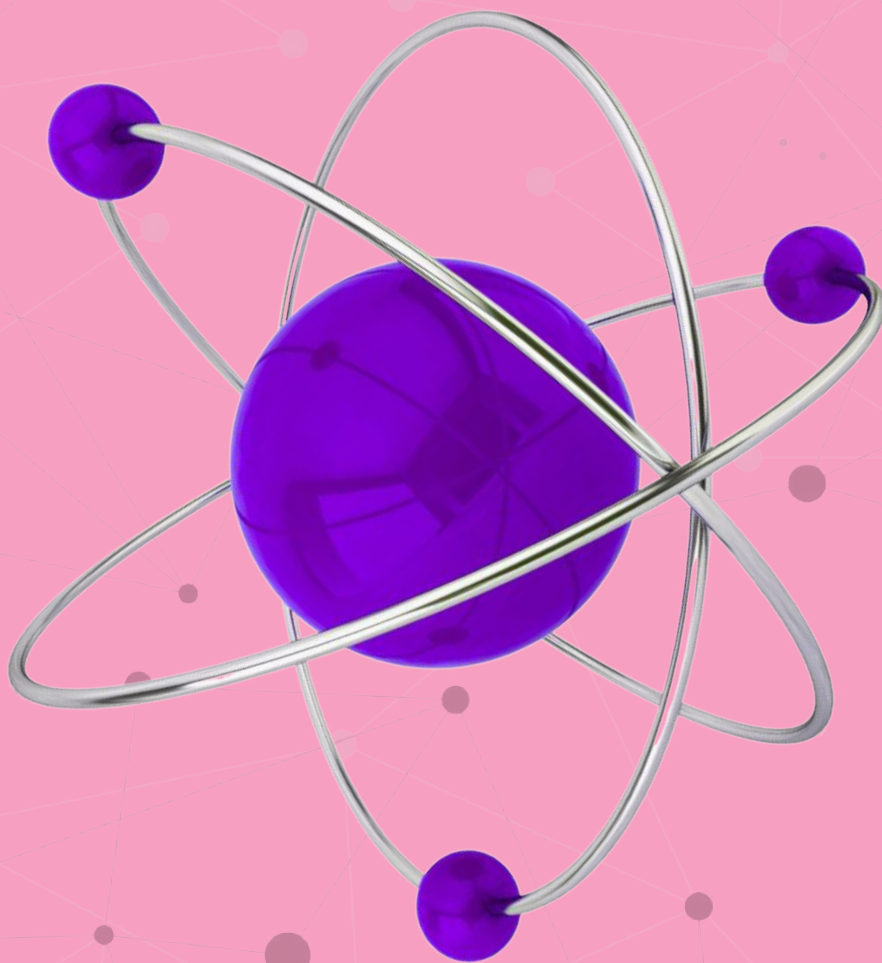
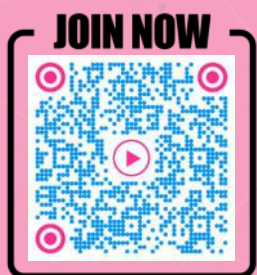


# Cambridge IGCSE Chemistry



## Fully Solved Exams Paper 6

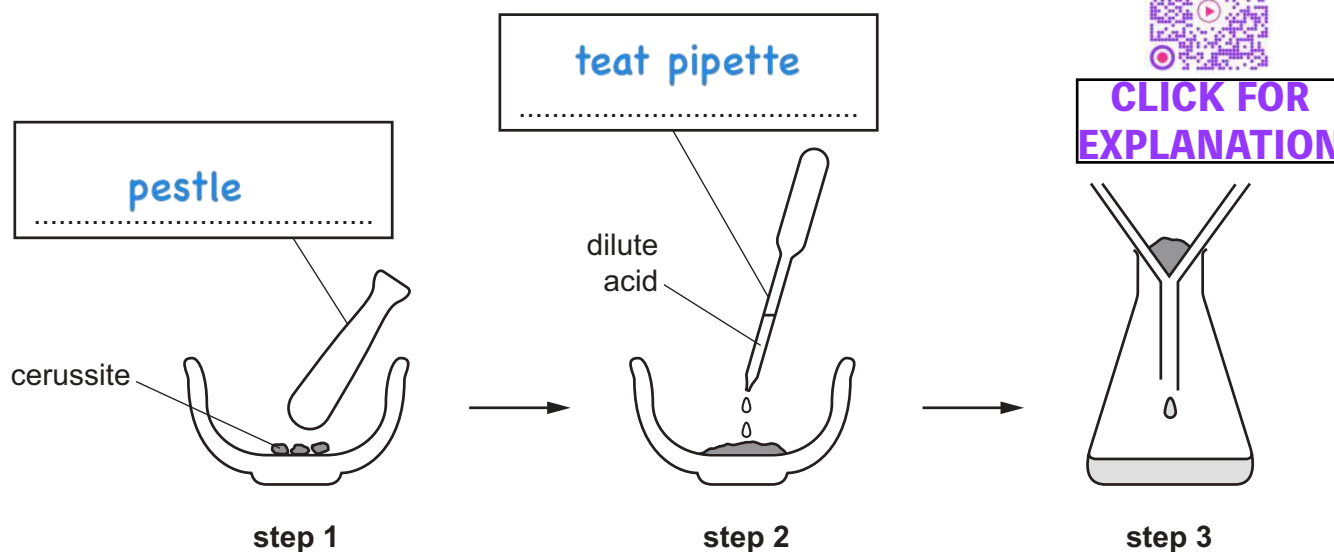


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answers and  
explanations**

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- 1 Cerussite is a lead ore which contains lead(II) carbonate. A student obtained a solution of lead(II) nitrate from cerussite using the apparatus shown.



(a) Complete the boxes to name the apparatus. [2]

(b) Why was the cerussite crushed in **step 1**?

to increase surface area and make it dissolve faster

[1]

(c) Name the dilute acid used in **step 2**.

nitric acid

[1]

(d) What is the general name given to an insoluble solid left on a filter paper after filtration?

residue

[1]

(e) Suggest how a sample of lead could be obtained from the solution of lead(II) nitrate.

add Mg

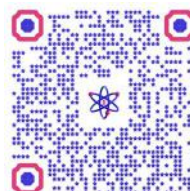
filter out lead

[2]

[Total: 7]



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- 2 A student investigated what happened to the temperature when two different solids, **W** and **X**, dissolved in water.

Two experiments were carried out.

### Experiment 1

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- Using a measuring cylinder,  $30\text{ cm}^3$  of distilled water were poured into a polystyrene cup. The initial temperature of the water was measured at time = 0 seconds.
- Solid **W** was added to the water, a timer was started and the solution was stirred with a thermometer.
- The temperature of the solution was measured every 10 seconds for 90 seconds.

(a) Use the thermometer diagrams to record the temperatures in the table.

| time / s                         | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|----------------------------------|----|----|----|----|----|----|----|----|----|----|
| thermometer diagram              |    |    |    |    |    |    |    |    |    |    |
| temperature of the solution / °C | 23 | 16 | 14 | 13 | 12 | 11 | 11 | 11 | 11 | 11 |

[2]

### Experiment 2

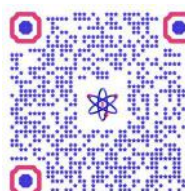
- The polystyrene cup was emptied and rinsed with water.
- Experiment 1 was repeated using solid **X**.
- The temperature of the solution was measured every 10 seconds for 90 seconds.

(b) Use the thermometer diagrams to record the temperatures in the table.

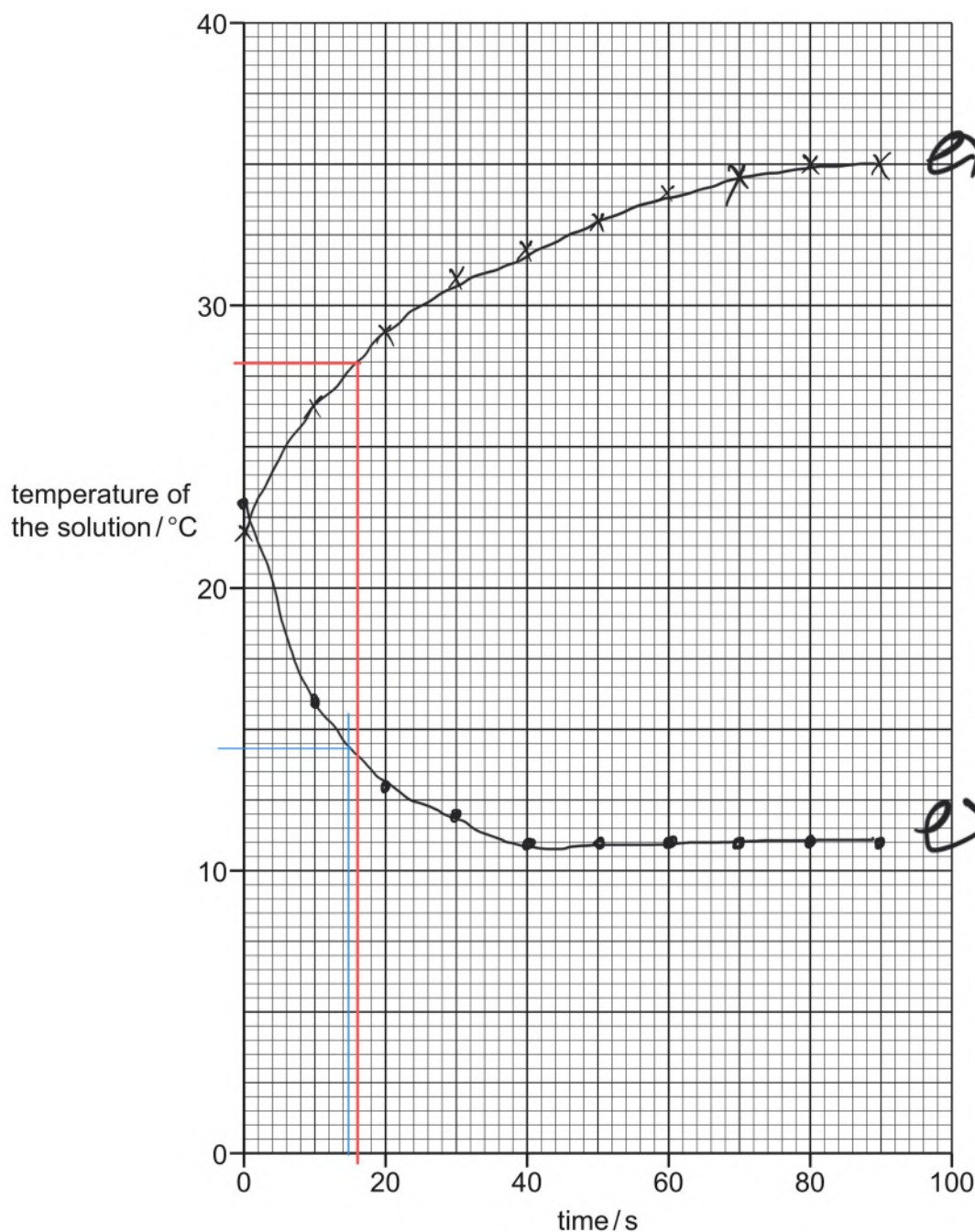
| time / s                         | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|----------------------------------|----|----|----|----|----|----|----|----|----|----|
| thermometer diagram              |    |    |    |    |    |    |    |    |    |    |
| temperature of the solution / °C | 22 | 26 | 29 | 31 | 32 | 33 | 34 | 35 | 35 | 35 |

[2]

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



exp 2 Solid X



CLICK FOR EXPLANATION

exp 1 solid W

[4]

- (d) (i) From your graph, deduce the temperature of the solution in Experiment 1 after 15 seconds. Show clearly on the grid how you worked out your answer.

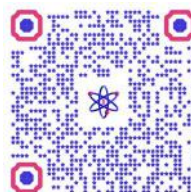
14 °C [2]

- (ii) From your graph, deduce the time taken for the temperature of the solution in Experiment 2 to change by 6 °C from the initial temperature. Show clearly on the grid how you worked out your answer.

27 s [2]



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3



- (e) Use the results to identify the type of energy change that occurs when solid **X** dissolves in water.

Exothermic

[1]

- (f) Predict the temperature of the solution in Experiment 2 after 1 hour. Explain your answer.

22 oC same as room temperature

because the reaction is finished

[1]

- (g) State **two** sources of error in these experiments. Give **one** improvement to reduce each of these sources of error.

source of error 1

measuring cylinder was used

improvement 1

use a pipette

source of error 2

heat loss

improvement 2

put a lid on polystyrene cup

[4]

- (h) When carrying out the experiments, what would be a disadvantage of taking the temperature readings only every 30 seconds?

less data are taken

graph will not be good enough to determine

temperature change

[1]

[Total: 19]



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EXPLANATION





- 3 Two solutions, Y and Z, were analysed.  
Solution Y was aqueous chromium(III) nitrate.  
Tests were carried out on both solutions.

#### tests on solution Y

Complete the expected observations.

The solution was divided into two equal portions in two test-tubes.

- (a) (i) A few drops of aqueous sodium hydroxide were added to the first portion of solution Y and the test-tube shaken to mix the solutions.

observations ..... green precipitate [2]

- (ii) An excess of aqueous sodium hydroxide was then added to the mixture.

observations ..... precipitate dissolves [1]

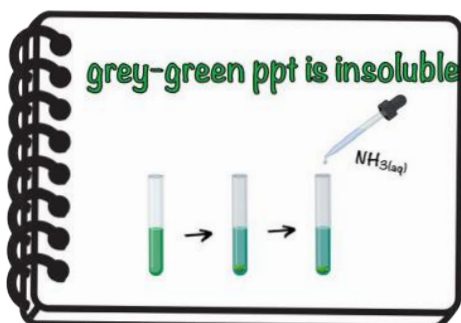
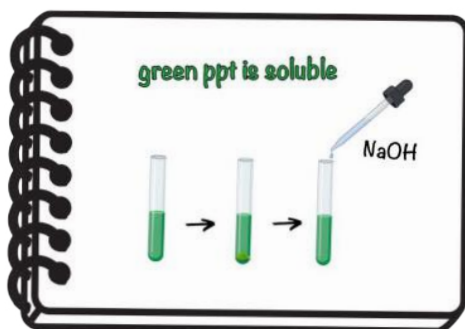
- (iii) The mixture from (a)(ii) was poured into a boiling tube and a small piece of aluminium foil was added.

The mixture was heated and the gas produced was tested.

observations ..... red litmus paper turn blue [3]

- (b) Identify the gas produced in (a)(iii).

..... ammonia [1]



### tests on solution Z

Tests were carried out and the following observations made.

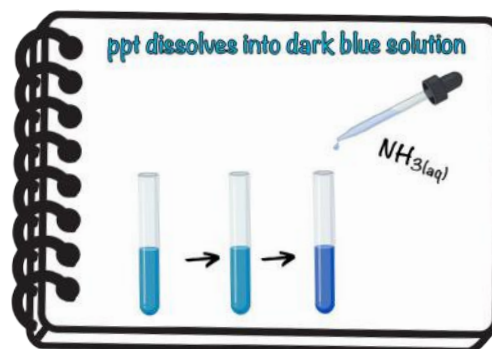
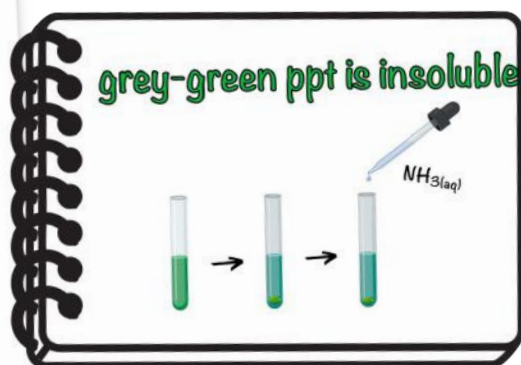
| tests on solution Z                                                                                                                                                                                 | observations                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <p>Solution Z was divided into three equal portions in three test-tubes.</p> <p><b>test 1</b></p> <p>The pH of the first portion of solution Z was tested.</p>                                      | pH 10                                                          |
| <p><b>test 2</b></p> <p>A few drops of aqueous copper(II) sulfate were added to the second portion of solution Z.</p> <p>An excess of aqueous copper(II) sulfate was then added to the mixture.</p> | dark blue solution formed<br><br>light blue precipitate formed |
| <p><b>test 3</b></p> <p>The second portion of solution Y was added to the third portion of solution Z.</p>                                                                                          | grey-green precipitate formed                                  |

(c) Identify solution Z.

(aqueous) ammonia

[1]

[Total: 8]



- 4 Washing soda crystals are crystals of hydrated sodium carbonate,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . When exposed to the air, some of the water is lost from the crystals and a new substance is formed. This process occurs faster in hotter climates.

Plan an experiment to determine the percentage of water by mass present in the new substance.

You are provided with common laboratory apparatus.

measure the mass of a sample of crystals using a balance

heat in a crucible

allow to cool down

then re-weigh

repeat until mass is constant

calculate  $\% = \frac{\text{final mass}}{\text{initial mass}} \times 100$



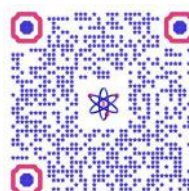
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[6]

[Total: 6]

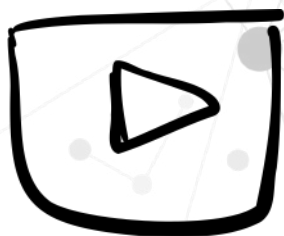


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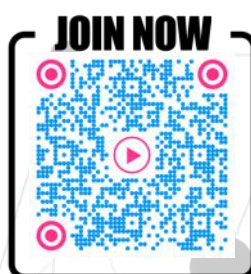
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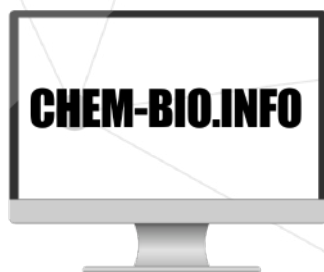
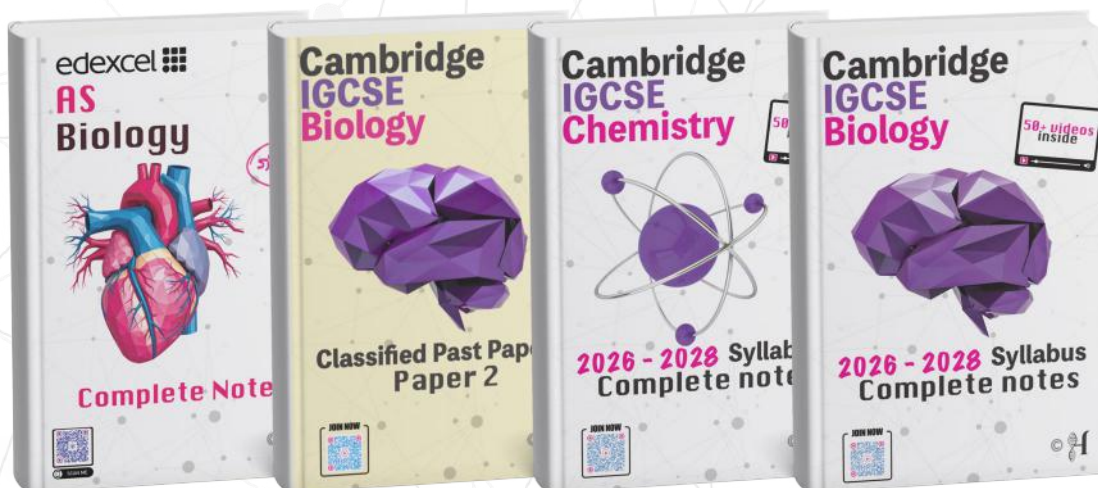
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