

# Hydrogen & Water

## Question Paper

Level	GCSE
Subject	Chemistry
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1C)
Topic	Chemistry of the Elements
Sub-Topic	Hydrogen & Water
Booklet	Question Paper

**Time Allowed:** 52 minutes

**Score:** /43

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

# Edexcel (I)GCSE

## Chemistry

Double Award (Paper 1C)

Chemistry of The Elements:

Hydrogen & Water

**Total Marks: 43**

**You must have:**

**Ruler**

**Calculator**

### **Instructions:**

---

Use black ink or ball-point pen.

Answer All questions.

Answer the questions in the spaces provided there may be more space than you need

Show all the steps in any calculations and state the units.

### **Information:**

---

The total mark for this paper is 43

The marks for each question are shown in brackets use this as a guide as to how much time to spend on each question.

### **Advice:**

---

Read each question carefully before you start to answer it.

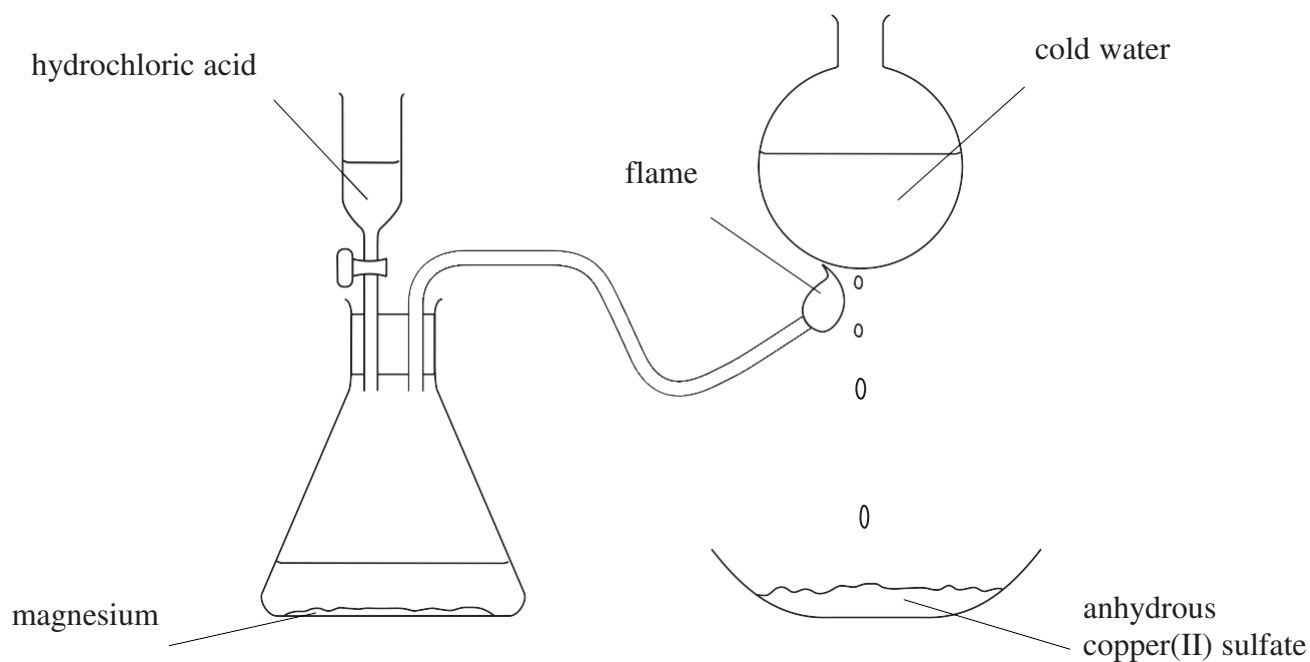
Keep an eye on the time.

Write your answers neatly and in good English.

Try to answer every question.

Check your answers if you have time at the end.

1. A student set up the following apparatus.



(a) The reaction between magnesium and hydrochloric acid forms hydrogen gas.

(i) State **one** observation the student would make during this reaction.

(1)

(ii) Identify the other product formed during this reaction.

(1)

(b) The hydrogen gas burns in air to form steam. The steam changes to water on the surface of the round flask.

(i) Write a chemical equation for the burning of hydrogen in air.

(2)

(ii) What name is used for the process in which steam changes into water?

(1)

(c) The water drips onto anhydrous copper(II) sulfate and causes a reaction.  
The product of this reaction has the formula  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

(i) State the final colour of the copper(II) sulfate in this reaction.

(1)

.....  
(ii) The colour change of the anhydrous copper(II) sulfate shows that the liquid contains water.

Describe a test to show that the water is pure.

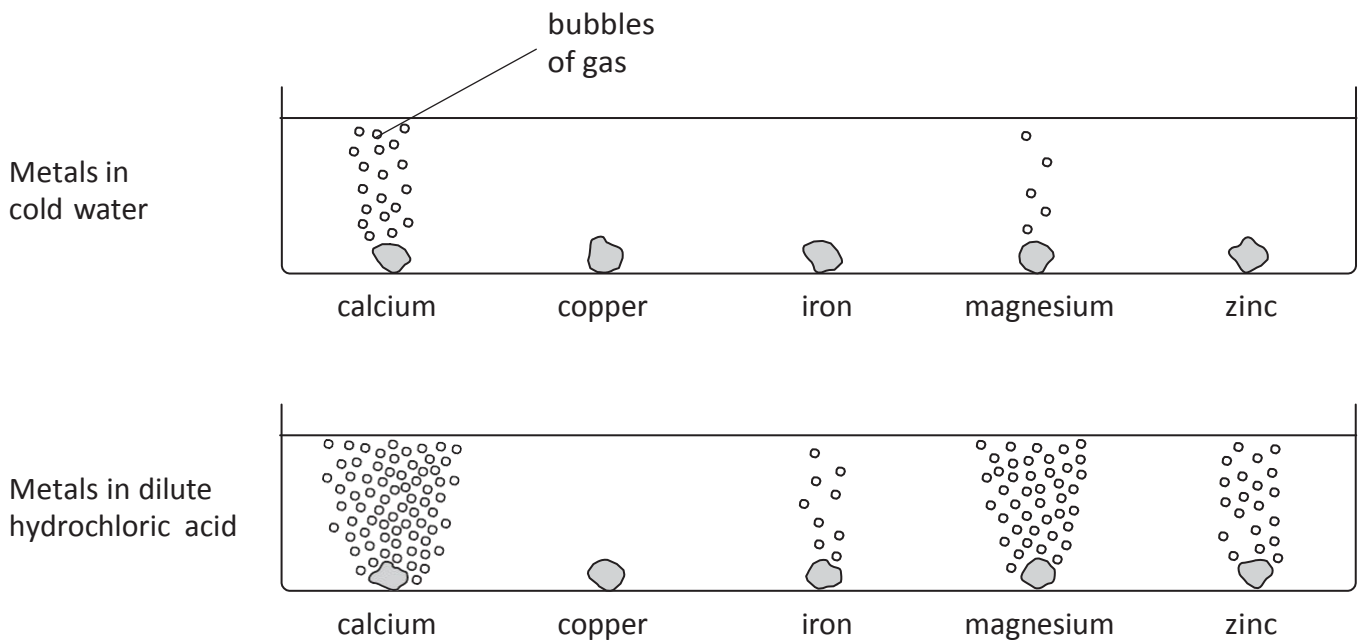
(2)

.....  
.....  
.....  
.....  
.....  
.....  
.....

---

**(Total for Question 1 = 8 marks)**

2 The diagrams show the reactions of some metals with cold water and with dilute hydrochloric acid.



(a) Answer the following questions, using only the metals that appear in the diagrams.

(i) Name **two** metals that react with cold water.

(2)

..... and .....

(ii) Name **one** metal that reacts with dilute hydrochloric acid but **not** with cold water.

(1)

.....

(iii) Arrange the five metals in order of reactivity.

(3)

**Most reactive metal** .....

.....

.....

.....

**Least reactive metal** .....

(b) Some magnesium powder is added to dilute sulfuric acid in a test tube.  
A colourless solution is formed and a gas is given off.

When more magnesium is added, the reaction continues for a while and then stops,  
leaving some magnesium powder in the test tube.

When a flame is placed at the mouth of the test tube, the gas burns with a  
squeaky pop.

(i) Identify the gas produced. (1)

.....

(ii) Suggest why the reaction stops. (1)

.....

.....

(iii) State the name of the colourless solution. (1)

.....

(iv) How could you separate the magnesium powder from the colourless solution? (1)

.....

.....

(c) In some fireworks, magnesium powder reacts quickly with oxygen in the air.  
During this reaction heat energy is produced.

(i) What name is given to reactions in which heat energy is produced? (1)

.....

(ii) Name the compound formed when magnesium reacts with oxygen. (1)

.....

**(Total for Question 2 = 12 marks)**

3 A student found this information about hydrogen.

Robert Boyle discovered that hydrogen was produced when iron reacted with dilute acids.	Henry Cavendish found that water was formed when hydrogen burned.	Jacques Charles launched the first hydrogen-filled balloon.	James Dewar liquefied hydrogen for the first time.
1671	1781	1783	1898
Year			

(a) (i) The student repeated Boyle's experiment using iron and dilute sulfuric acid.

State **two** observations that he could have made.

(2)

1 .....

2 .....

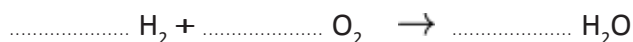
(ii) Complete the word equation for this reaction.

(1)

iron + sulfuric acid ..... + .....

(b) Balance the equation for the complete combustion of hydrogen.

(1)



(c) To show that the liquid produced by burning hydrogen was pure water, a student carried out a chemical test and a physical test.

(i) The chemical test involved adding a few drops of the liquid to a sample of anhydrous copper(II) sulfate.

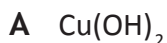
State the colour change observed.

(2)

Initial colour .....

Final colour .....

(ii) Place a cross in one box to show the formula of the compound formed in this chemical test. (1)



(iii) The physical test involved measuring a property of the liquid.

State a suitable physical property and give the value for pure water. (2)

Physical property .....

Value .....

(d) (i) Suggest what property of hydrogen makes it suitable for filling balloons. (1)

.....

(ii) Helium is now used instead of hydrogen to fill balloons.

State the property of helium that makes it more suitable than hydrogen for filling balloons. (1)

.....

(e) Write an equation, including state symbols, to show the process that occurs when hydrogen is liquefied. (1)

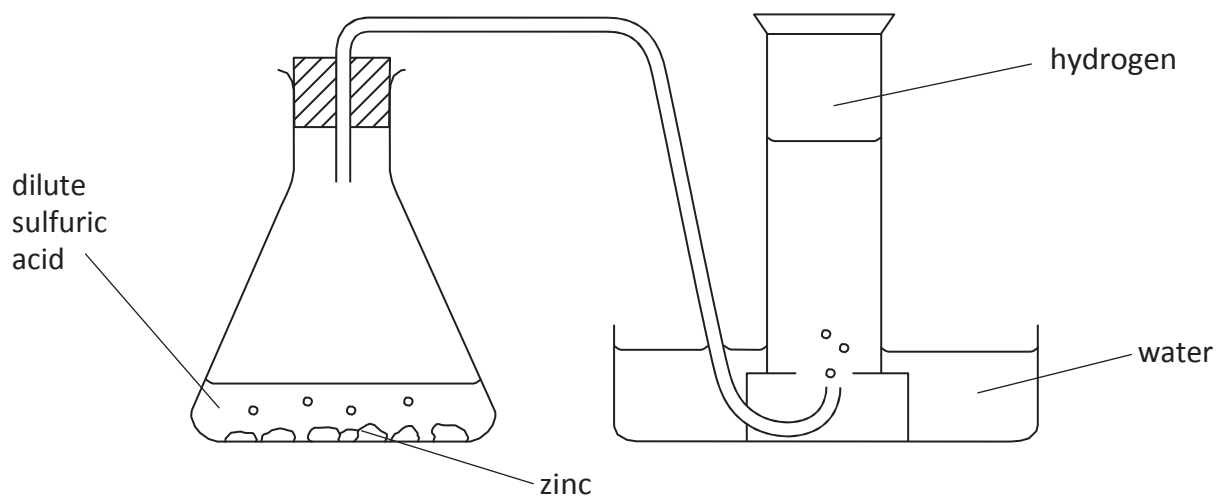
.....

**(Total for Question 3 = 12 marks)**

---



4 A student used this apparatus to make and collect a sample of hydrogen gas.



(a) The reaction in the flask can be shown by this word equation.



(i) The name of the salt formed in the student's experiment is

(1)

- A zinc sulfate
- B zinc sulfide
- C zinc sulfite
- D zinc sulfur

(ii) The student could have used other metals in this experiment.

Place crosses (☒) in **two** boxes to show the names of two other metals that could be safely used to make hydrogen.

(2)

- A copper
- B iron
- C magnesium
- D potassium
- E silver

(b) Describe a test to show that the gas collected is hydrogen.

(1)

(c) Water is formed when hydrogen combines with oxygen.

Balance the equation for this reaction.

(1)



(d) Equation 1 represents a reaction using cobalt(II) chloride that can be used to show a liquid contains water.



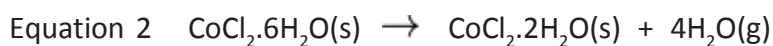
In this reaction there is a colour change from blue to pink.

(i) Which word describes **both** cobalt compounds in equation 1?

(1)

- A anhydrous
- B aqueous
- C hydrated
- D saturated

(ii) When the product in equation 1 is gently heated, another reaction occurs. Equation 2 represents this reaction.



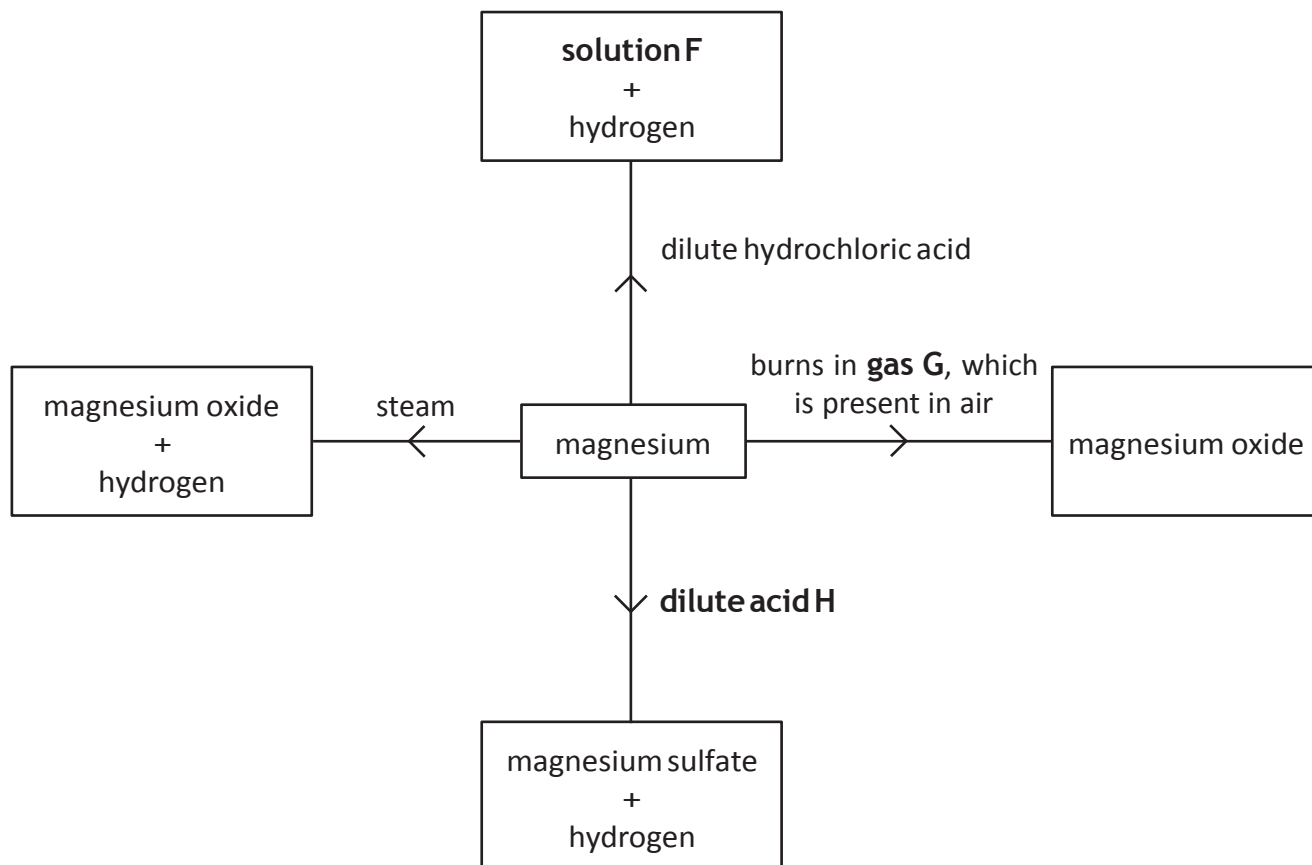
What do equations 1 and 2 suggest about the reactions?

(1)

---

(Total for Question 4 = 7 marks)

5 The diagram shows some of the reactions of magnesium.



(a) Complete the table to give the identity of substances F, G and H.

(3)

Substance	Identity
solution F	
gas G	
dilute acid H	

(b) Write a chemical equation for the reaction between magnesium and steam.

(1)

---

(Total for Question 5 = 4 marks)