Chemical Reactions – 2022 Nov IGCSE Chemistry 0620

1. Nov/2022/Paper_11/No.13

Which process is a physical change?

A burning wood

B cooking an egg

C melting an ice cube

D rusting iron

2. Nov/2022/Paper_11/No.14

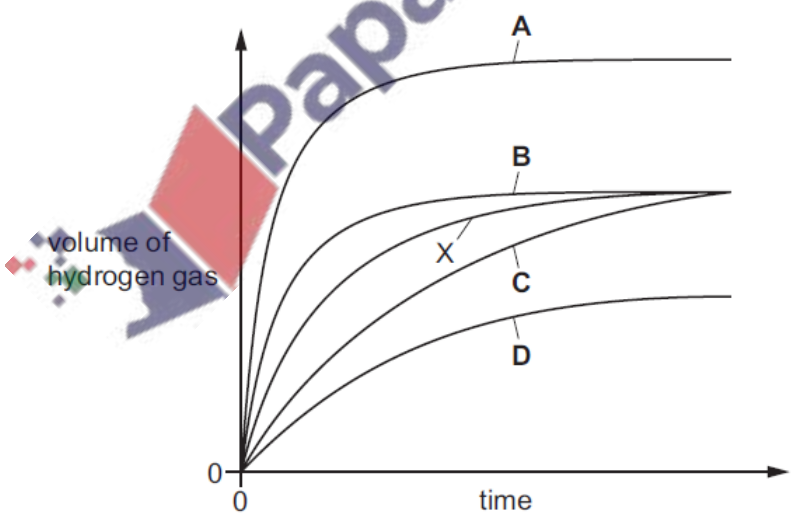
A student adds excess zinc to dilute hydrochloric acid at 25 °C.

The hydrogen gas produced is collected and measured at room temperature and pressure.

The results are plotted and labelled as curve X on the graph.

The experiment is repeated at 50 °C with all other conditions remaining the same.

Which graph shows the results at 50 °C?



3. Nov/2022/Paper_11/No.16

Substance Y is a pink solid.

When substance Y is heated gently it becomes a blue solid.

When the blue solid is cooled down it remains blue.

When water is added to the blue solid it becomes pink.

What is substance Y?

A anhydrous cobalt(II) chloride

B anhydrous copper(II) sulfate

C hydrated cobalt(II) chloride

D hydrated copper(II) sulfate

4. Nov/2022/Paper_12/No.13

Which process is a physical change?

A burning wood

B cooking an egg

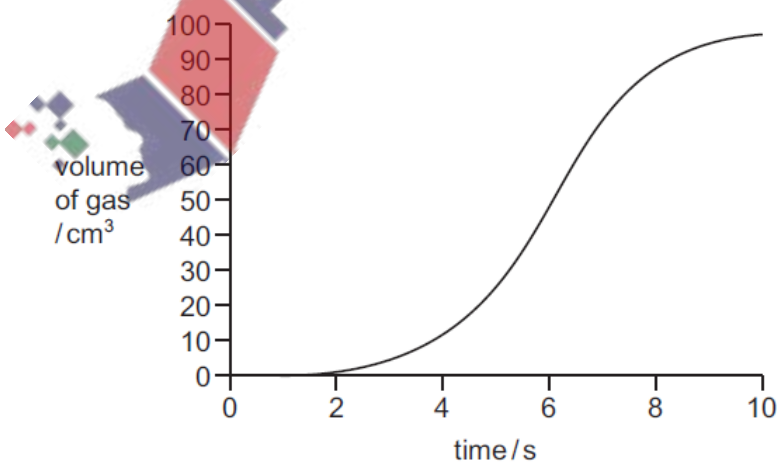
C melting an ice cube

D rusting iron

5. Nov/2022/Paper_12/No.14

The volume of gas given off in a chemical reaction is measured over time.

The results are shown.



At which time is the rate of reaction greatest?

A 0 s **B** 4 s **C** 6 s **D** 10 s

6. Nov/2022/Paper_12/No.15

Which row describes the colours of the named salts?

	hydrated copper(II) sulfate	hydrated cobalt(II) chloride	anhydrous copper(II) sulfate	anhydrous cobalt(II) chloride
A	blue	blue	white	pink
B	blue	pink	white	blue
C	white	blue	blue	pink
D	white	pink	blue	white

7. Nov/2022/Paper_12/No.16

When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

8. Nov/2022/Paper_13/No.13

Which process is a physical change?

A burning wood

B cooking an egg

C melting an ice cube

D rusting iron

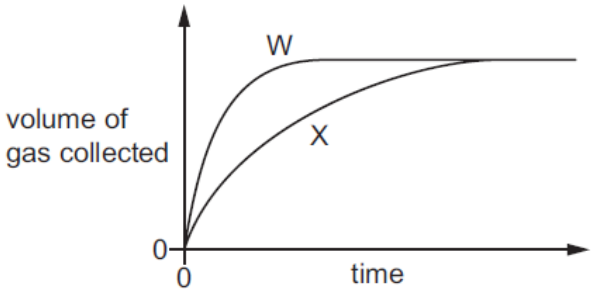
9. Nov/2022/Paper_13/No.14

Dilute hydrochloric acid is reacted with excess calcium carbonate and the total volume of gas is measured at regular intervals.

The results are shown by line W on the graph.

The experiment is repeated but with one change.

The results of the second experiment are shown by line X on the graph.



Which change is made in the second experiment?

A A catalyst is added.

B The calcium carbonate is broken into smaller pieces.

C The concentration of the dilute hydrochloric acid is increased.

D The temperature of the dilute hydrochloric acid is decreased.

10. Nov/2022/Paper_13/No.15

When hydrated copper(II) sulfate is heated, it produces white copper(II) sulfate. When water is added, the white copper(II) sulfate turns blue.

Which type of reaction is shown by these observations?

A decomposition

B displacement

C redox

D reversible

11. Nov/2022/Paper_13/No.16

When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

12. Nov/2022/Paper_21/No.14

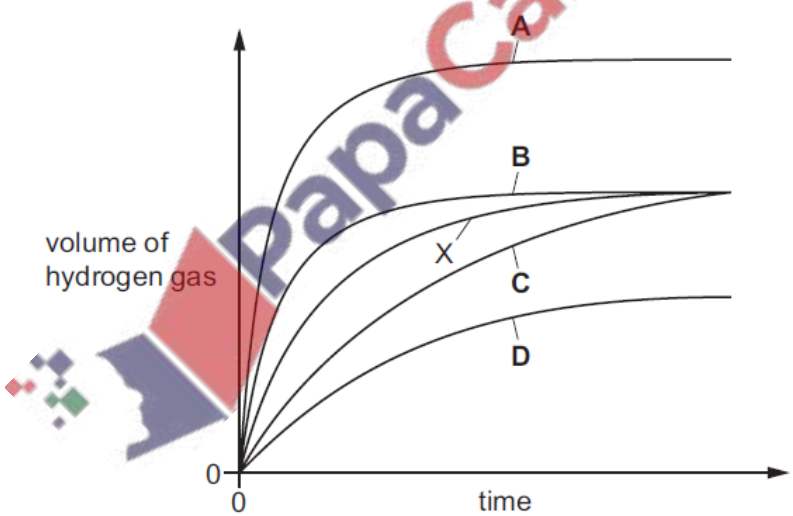
A student adds excess zinc to dilute hydrochloric acid at 25 °C.

The hydrogen gas produced is collected and measured at room temperature and pressure.

The results are plotted and labelled as curve X on the graph.

The experiment is repeated at 50 °C with all other conditions remaining the same.

Which graph shows the results at 50 °C?



13. Nov/2022/Paper_21/No.15

Dinitrogen tetroxide, N_2O_4, is converted into nitrogen dioxide, NO_2, in a reversible reaction.

$$N_2O_4(g) \rightleftharpoons 2NO_2(g)$$

The forward reaction is endothermic.

Which conditions give the highest equilibrium yield of nitrogen dioxide?

	pressure / atmospheres	temperature
A	2	high
B	2	low
C	50	high
D	50	low

14. Nov/2022/Paper_21/No.16

When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

15. Nov/2022/Paper_22/No.14

Dilute aqueous sodium chloride is electrolysed using carbon electrodes.

What is the product at the anode?

A carbon dioxide

B hydrogen

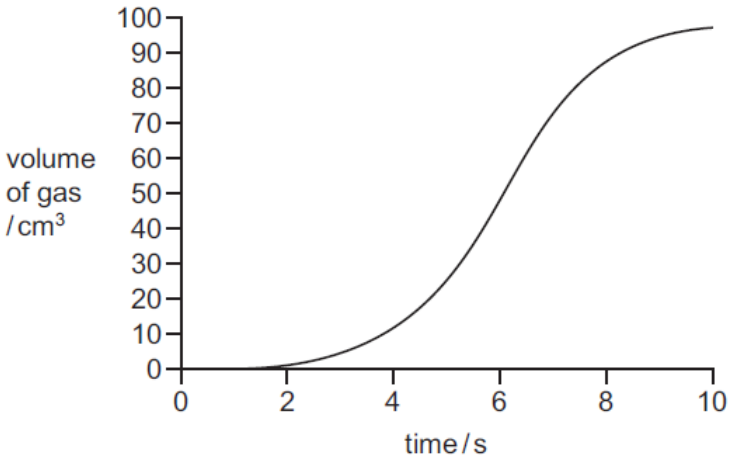
C oxygen

D sodium

16. Nov/2022/Paper_22/No.15

The volume of gas given off in a chemical reaction is measured over time.

The results are shown.



At which time is the rate of reaction greatest?

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$$Mg + ZnO \rightarrow MgO + Zn$$

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19. Nov/2022/Paper_23/No.13

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A	2	high
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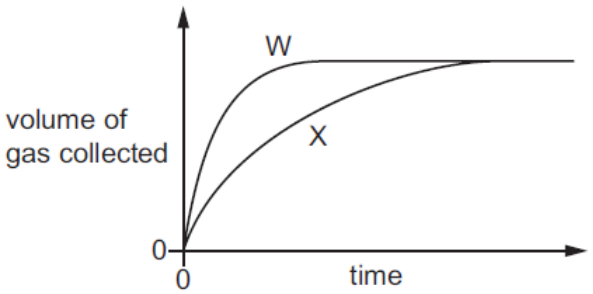
20. Nov/2022/Paper_23/No.14

Dilute hydrochloric acid is reacted with excess calcium carbonate and the total volume of gas is measured at regular intervals.

The results are shown by line W on the graph.

The experiment is repeated but with one change.

The results of the second experiment are shown by line X on the graph.



Which change is made in the second experiment?

A A catalyst is added.

B The calcium carbonate is broken into smaller pieces.

C The concentration of the dilute hydrochloric acid is increased.

D The temperature of the dilute hydrochloric acid is decreased.

21. Nov/2022/Paper_23/No.15

When hydrated copper(II) sulfate is heated, it produces white copper(II) sulfate. When water is added, the white copper(II) sulfate turns blue.

Which type of reaction is shown by these observations?

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22. Nov/2022/Paper_23/No.16

When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

23. Nov/2022/Paper_23/No.20

Ammonia, NH_3, dissolves in water to form a dilute solution of ammonium hydroxide, NH_4OH.

The reaction is reversible and exists as an equilibrium mixture.

$$NH_3(g) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$$

Which statement about the mixture is correct?

A All of the ammonia and water molecules have turned into ions.

B The ammonia and water molecules have stopped changing into ions.

C The concentrations of the ammonia molecules and ammonium ions are always equal.

D The rate of the formation of ammonia molecules is equal to the rate of formation of the ammonium ions.

24. Nov/2022/Paper_31/No.4(b)

(b) Fluorine reacts with water to produce hydrogen fluoride and oxygen.

(i) Complete the chemical equation for this reaction.

$$.....F_2 + 2H_2O \rightarrow .....HF + O_2$$ [2]

(ii) In this reaction both oxidation and reduction take place.

State the meaning of the term *oxidation*.

..... [1]

25. Nov/2022/Paper_31/No.6(b)

(b) (i) Small pieces of zinc react with excess hydrochloric acid of different concentrations. The time taken for each reaction to finish is recorded.

The concentrations of each acid are:

- 0.5 mol / dm^3
- 1.0 mol / dm^3
- 2.0 mol / dm^3.

All other conditions stay the same.

Complete the table by writing the concentrations in the first column.

concentration of acid in mol / dm^3	time taken for reaction to finish / s
	40
	20
	80

[1]

(ii) Describe the effect on the time taken for the reaction to finish when it is carried out at a lower temperature.

All other conditions stay the same.

..... [1]

(e) (i) Small pieces of zinc react with excess dilute hydrochloric acid at different temperatures. The time taken for each reaction to finish is recorded.

The temperatures are:

- 20 °C
- 40 °C
- 60 °C.

All other conditions stay the same.

Complete the table by writing the temperatures in the first column.

temperature of acid / °C	time taken for the reaction to finish / s
	64
	16
	256

[1]

(ii) Describe the effect on the time taken for the reaction to finish when it is carried out with dilute hydrochloric acid of a higher concentration.

All other conditions stay the same.

..... [1]

27. Nov/2022/Paper_32/No.4(b)

(b) Bromine reacts with sulfur dioxide and water.

(i) Complete the chemical equation for this reaction.

$$Br_2 + SO_2 + \text{.....}H_2O \rightarrow H_2SO_4 + \text{.....}HBr \quad [2]$$

(ii) In this reaction both oxidation and reduction take place.

State the meaning of the term *reduction*.

..... [1]

28. Nov/2022/Paper_33/No.4(b)

(b) When a mixture of sodium and sodium hydroxide is heated, sodium oxide and hydrogen are formed.

(i) Complete the chemical equation for this reaction.

$$\text{.....}Na + 2NaOH \rightarrow \text{.....}Na_2O + H_2 \quad [2]$$

(ii) Describe a test for hydrogen.

test .....

observations .....

[2]

29. Nov/2022/Paper_33/No.6(b)

(b) (i) Different sized pieces of magnesium react with excess dilute hydrochloric acid. The time taken for each reaction to finish is recorded.

The sizes of the pieces of magnesium are:

- large
- small
- very small.

Equal masses of magnesium are used in each reaction.

All other conditions stay the same.

Complete the table by writing the size of the magnesium pieces in the first column.

size of magnesium pieces	time taken for the reaction to finish / s
	30
	200
	90

[1]

(ii) Describe the effect on the time taken for small pieces of magnesium to react with hydrochloric acid of a lower concentration.

All other conditions stay the same.

..... [1]

30. Nov/2022/Paper_41/No.3(g, h)

(g) Explain, in terms of particles, what happens to the rate of reaction when the temperature is reduced.

.....

.....

.....

.....

..... [3]

(h) Give the formula of the compound formed when sulfuric acid reacts with ammonia.

..... [1]

31. Nov/2022/Paper_43/No.4(a)

This question is about compounds of phosphorus.

(a) Gaseous phosphorus(V) chloride decomposes into gaseous phosphorus(III) chloride and gaseous chlorine.

When the three gases are present in a closed container the system reaches equilibrium.

$$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$$

(i) Complete the table using only the words *increases*, *decreases* or *no change*.

	effect on the rate of the forward reaction	effect on the equilibrium yield ($PCl_3(g)$ and $Cl_2(g)$)
increasing the temperature		increases
decreasing the pressure		
adding a catalyst		no change

[4]

(ii) The table shows that when the temperature increases, the equilibrium yields of $PCl_3(g)$ and $Cl_2(g)$ increase.

State what conclusion can be made from this.

..... [1]