

Revision Sheet

IGCSE Chemistry · Unit 6 Chemical reactions

11 vocabulary items · 35 marks of exam questions (13 questions)

Part 1 · Vocabulary review (11 items). The terms this unit is examined on most. Mark it yourself from the answer key.

Section A · Chinese to English

Write the English word.

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|-----|-------|-----|
| 1. | <hr/> | [1] |
| 2. | <hr/> | [1] |
| 3. | <hr/> | [1] |
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| 9. | <hr/> | [1] |
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| 11. | <hr/> | [1] |

Part 2 · Exam questions (35 marks, 13 questions) begins on the next page. They are ordered easy to difficult and none of them has been set before.

12 Sulfur dioxide is converted to sulfur trioxide in the Contact process.

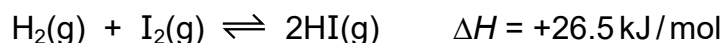
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The conditions used are 450 °C and 200 kPa with a vanadium(V) oxide catalyst.

Which row describes and explains the effect of changing conditions on the rate of reaction?

	change in conditions	effect on rate	explanation
A	no catalyst	lower	the activation energy is higher
B	higher pressure	higher	the particles have more kinetic energy
C	lower temperature	lower	the particles collide more frequently
D	lower pressure	higher	there are more particles per unit volume

13 Hydrogen gas reacts with iodine gas to form hydrogen iodide gas in an equilibrium reaction.

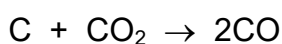
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Which changes increase the yield of HI at equilibrium?

- 1 adding a catalyst
- 2 adding more hydrogen gas
- 3 increasing the pressure
- 4 increasing the temperature

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

14 The equation for the reaction of carbon with carbon dioxide is shown.

☐

Which row identifies the carbon atom that is reduced and its change in oxidation number?

	atom that is reduced	change in oxidation number
A	carbon in CO ₂	+2 → +4
B	carbon in CO ₂	+4 → +2
C	elemental carbon, C	0 → +2
D	elemental carbon, C	+2 → 0

- 15** Aqueous iron(II) sulfate is added to acidified potassium manganate(VII). The purple colour of the potassium manganate(VII) disappears.



Aqueous potassium iodide is added to acidified potassium dichromate(VI). A dark brown solution forms.

Which row identifies the role of the iron(II) sulfate and the potassium dichromate(VI) in these reactions?

	iron(II) sulfate	potassium dichromate(VI)
A	oxidising agent	oxidising agent
B	oxidising agent	reducing agent
C	reducing agent	reducing agent
D	reducing agent	oxidising agent

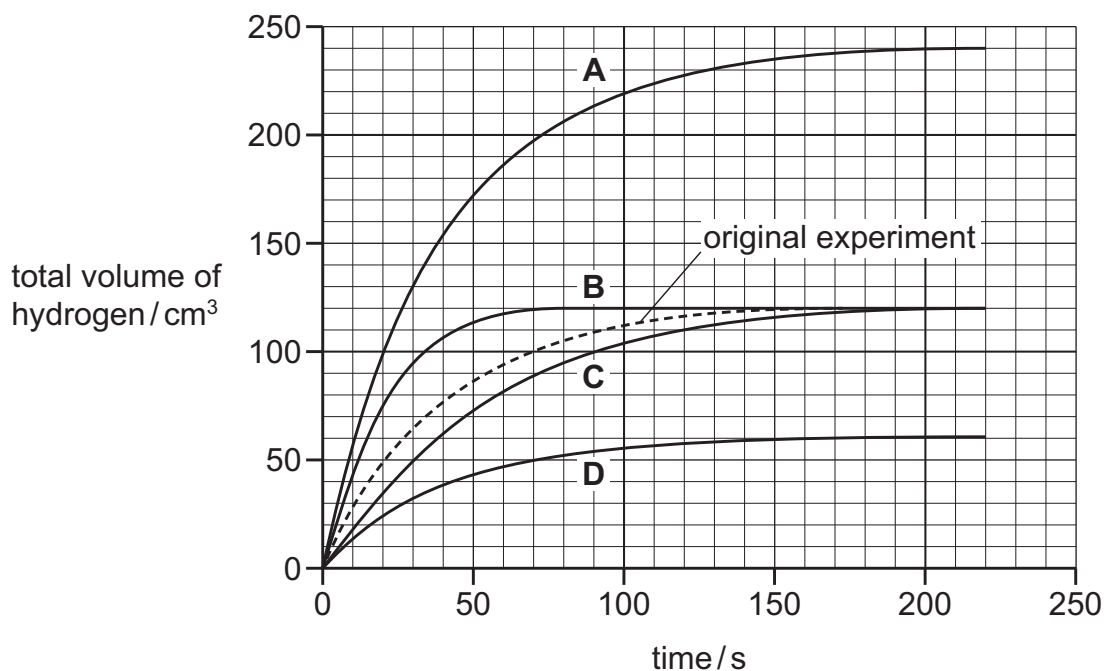
- 16** A student adds excess magnesium ribbon to 10 cm³ of 0.5 mol/dm³ sulfuric acid.



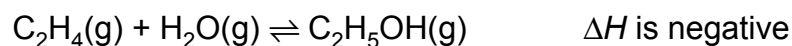
The hydrogen gas produced is collected and its total volume is measured every 10 seconds.

The experiment is repeated with 5 cm³ of 0.5 mol/dm³ sulfuric acid added to 5 cm³ of water using the same mass of magnesium ribbon.

Which line on the graph shows the results of the second experiment?



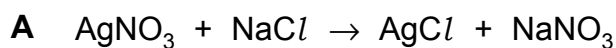
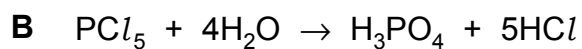
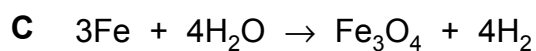
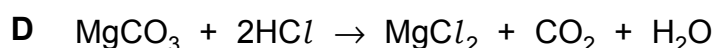
17 The equation represents the reversible reaction between ethene and steam.

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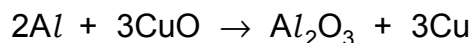
Which row describes the conditions that produce the greatest yield of ethanol?

	pressure	temperature
A	low	low
B	low	high
C	high	low
D	high	high

18 Which equation represents a redox reaction?

☐

19 The equation for the reaction between aluminium and copper(II) oxide is shown.

☐

Which statements about this equation are correct?

- 1 The oxidation number of the aluminium reactant is +2.
- 2 The oxidation number of the aluminium in the product is +6.
- 3 The oxidation number of the copper in the reactant is +2.
- 4 The oxidation number of the copper product is 0.

A 1, 2 and 3 **B** 1 and 2 only **C** 3 and 4 **D** 4 only

20 In the Contact process, sulfur dioxide is reacted with oxygen to form sulfur trioxide.

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Which conditions are used in this reaction?

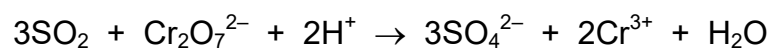
	temperature / °C	pressure / kPa	catalyst
A	300	200	iron
B	300	20 000	vanadium(V) oxide
C	450	200	vanadium(V) oxide
D	450	20 000	iron

21 Which reaction is reversible?

☐

- A** an iron nail rusting when left in moist air
- B** limestone reacting with an acid to form carbon dioxide gas
- C** magnesium burning in air to produce a white ash
- D** white anhydrous copper(II) sulfate turning blue when water is added

22 The equation for the reaction of sulfur dioxide with acidified potassium dichromate(VI) is shown.

☐

What is oxidised and what is the oxidising agent?

	oxidised	oxidising agent
A	SO_2	$\text{Cr}_2\text{O}_7^{2-}$
B	SO_2	H^+
C	$\text{Cr}_2\text{O}_7^{2-}$	H^+
D	$\text{Cr}_2\text{O}_7^{2-}$	$\text{Cr}_2\text{O}_7^{2-}$

- 4 Aqueous hydrogen peroxide, H_2O_2 , slowly forms water and oxygen at room temperature and pressure, r.t.p. This reaction is catalysed by manganese(IV) oxide.

The equation is shown.



- (a) State the test for oxygen gas.

test

observations

[1]

- (b) A student investigates the rate of formation of oxygen gas when manganese(IV) oxide is added to aqueous hydrogen peroxide.

The volume of oxygen gas formed is measured at regular time intervals at r.t.p. The results are plotted onto the graph in Fig. 4.1.

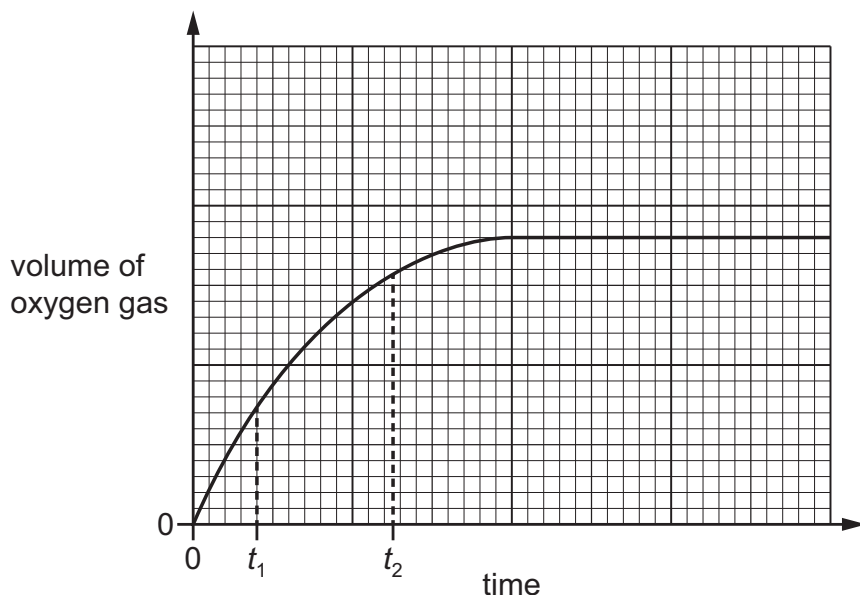


Fig. 4.1

- (i) State how the graph in Fig. 4.1 shows the rate of reaction at time t_2 , is lower than at time t_1 .

..... [1]

- (ii) Explain, using collision theory, why the rate of reaction at time t_2 is lower than at time t_1 .

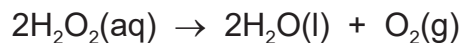
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..... [2]

- (iii) On Fig. 4.1, sketch the graph obtained when the experiment is repeated using aqueous hydrogen peroxide at a higher temperature. All other conditions remain the same. [2]

- (c) Manganese(IV) oxide is added to 20 cm³ of aqueous hydrogen peroxide. The total volume of oxygen gas produced is 72 cm³ at r.t.p.



Calculate the concentration of the aqueous hydrogen peroxide in g/dm³ using the following steps.

- Calculate the number of moles of oxygen gas produced.

..... mol

- Determine the number of moles of hydrogen peroxide which reacts.

..... mol

- Calculate the concentration of aqueous hydrogen peroxide in mol/dm³.

..... mol/dm³

- Calculate the concentration of aqueous hydrogen peroxide in g/dm³.

..... g/dm³
[5]

- (d) Suggest the identity of one **other** metal oxide which also catalyses this reaction.

..... [1]

[Total: 12]

5 Methane reacts with steam to produce hydrogen gas.

The reaction takes place at 1000 °C and 100 kPa pressure.

(a) The reaction is reversible and reaches an equilibrium in a closed system.

State **two** features of an equilibrium.

1

2

[2]

(b) State and explain, in terms of equilibrium, what happens to the concentration of hydrogen when:

(i) the pressure is increased

.....

..... [2]

(ii) the temperature is increased

.....

..... [2]

(iii) a catalyst is used.

.....

..... [2]

(c) Methane is a greenhouse gas which contributes to global warming.

(i) Name a greenhouse gas found in clean, dry air.

..... [1]

(ii) Explain, in terms of thermal energy, how greenhouse gases cause global warming.

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..... [3]

[Total: 12]