

Reversible Reacts + Dynamic Equilibrium

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.6 Rate + Extent Chemical Change
Sub-Topic	Reversible Reacts + Dynamic Equilibrium
Difficulty Level	Standard Level
Booklet	Question Paper

Time Allowed: 29 minutes

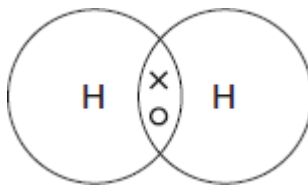
Score: /29

Percentage: /100

Grade Boundaries:

Q1.Hydrogen gas is produced by the reaction of methane and steam.

- (a) The diagram represents a molecule of hydrogen.



- (i) What type of bond joins the atoms of hydrogen?

Tick (✓) **one** box.

Covalent

☐

Metallic

☐

Ionic

☐

(1)

- (ii) A catalyst is used in the reaction.

Draw a ring around the correct answer to complete the sentence.

A catalyst

increases the rate of reaction.

increases the temperature.

increases the yield of a reaction.

(1)

- (b) The equation for the reaction of methane and steam is:



- (i) What is meant by the symbol \rightleftharpoons ?

.....

(1)

- (ii) Lowering the pressure reduces the rate of reaction.

Explain why, in terms of particles.

.....

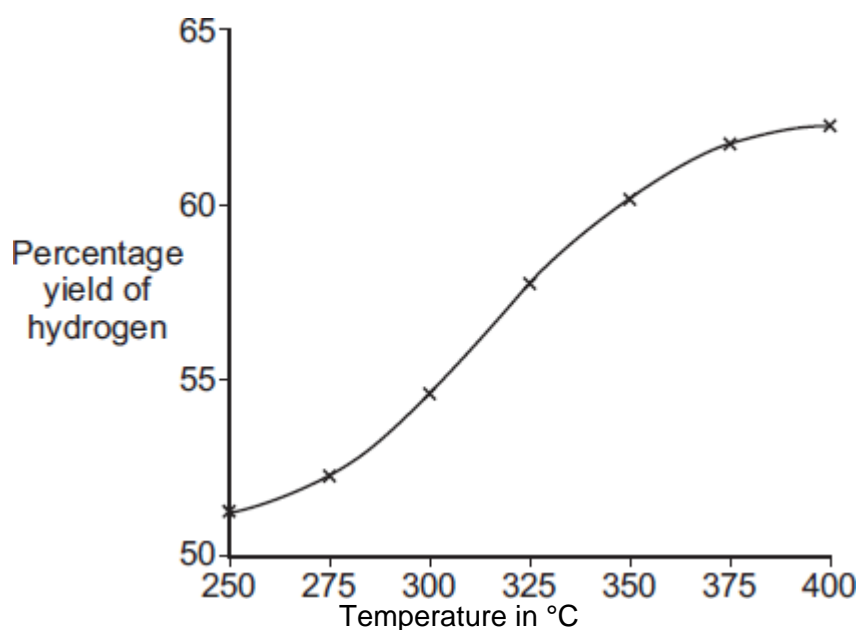
.....

.....

.....

(2)

- (iii) The graph shows the yield of hydrogen at different temperatures.



The forward reaction is endothermic.

How does the graph show that the forward reaction is endothermic?

.....

.....

(1)

- (iv) Why is a higher yield produced if the reaction is repeated at a lower pressure?

.....

.....

(1)

- (c) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Car engines are being developed that use hydrogen gas as a fuel instead of petrol.

The table compares the two fuels.

	Hydrogen	Petrol
Energy	5700 kJ per litre	34 000 kJ per litre
State	Gas	Liquid
Equation for combustion	$2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$	$2\text{C}_8\text{H}_{18} + 25\text{O}_2 \rightarrow 16\text{CO}_2 + 18\text{H}_2\text{O}$
How the fuel is obtained	Most hydrogen is produced from coal, oil or natural gas. Hydrogen can be produced by the electrolysis of water or the solar decomposition of water.	Fractional distillation of crude oil.

Use the information in the table and your knowledge of fuels to evaluate the use of hydrogen instead of petrol as a fuel.

You should describe the advantages and disadvantages of using hydrogen instead of petrol.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Extra space

.....

.....

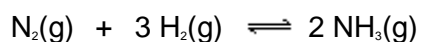
.....

.....

.....

(6)
(Total 13 marks)

Q2. Transition metals are useful as catalysts. Iron is used as a catalyst in the manufacture of ammonia.



(i) What is meant by \rightleftharpoons in the chemical equation?

.....

.....

(1)

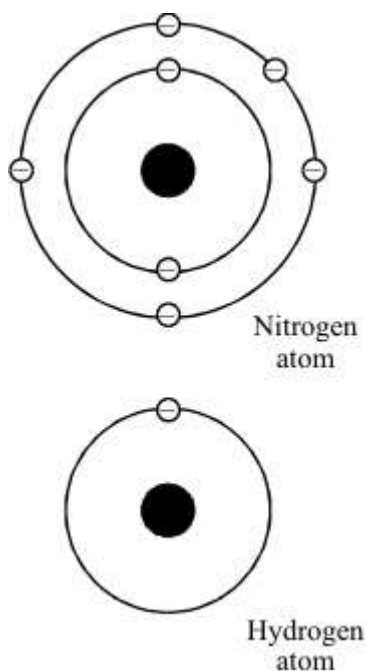
(ii) What would be the effect on the yield of ammonia if the pressure was increased?

.....

.....

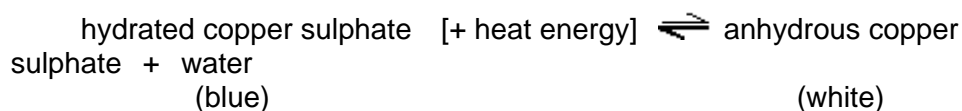
(1)

- (iii) Draw a diagram to show the arrangement of the electrons in a molecule of ammonia. The electron arrangement of each atom is shown.



(1)
(Total 3 marks)

Q3.Hydrated copper sulphate is a blue solid. When it is heated, white solid anhydrous copper sulphate is made. This is a reversible reaction.



- (a) To make the forward reaction work, the hydrated copper sulphate must be heated all the time.

What type of reaction is this?

.....
.....

(1)

- (b) Anhydrous copper sulphate can be used in a test for water. What **two** things will happen when water is added to anhydrous copper sulphate?

1

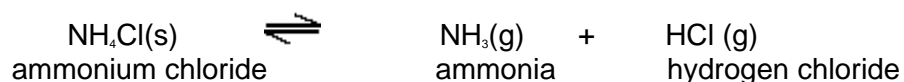
.....

2

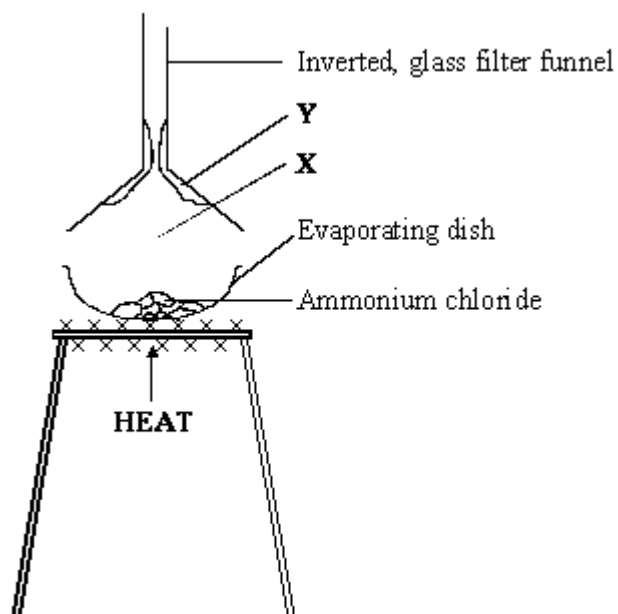
.....

(2)
(Total 3 marks)

- Q4.** (a) The equation for the reaction that takes place when ammonium chloride is heated is:



The diagram shows how a teacher demonstrated this reaction. The demonstration was carried out in a fume cupboard.



- (i) Apart from the gases normally in the atmosphere, which two gases would be at **X**?

..... and

(1)

(ii) Name the white solid that has formed at Y.

.....

(1)

(iii) Why was the demonstration carried out in a fume cupboard?

.....

.....

(1)

(iv) Complete the **four** spaces in the passage.

The chemical formula of ammonia is NH_3 . This shows that there is one atom of and three atoms of in each of ammonia. These atoms are joined by bonds that are formed by sharing pairs of electrons. This type of bond is called a bond.

(4)

(b) Electrons, neutrons and protons are sub-atomic particles.

(i) Complete the **three** spaces in the table.

Name of sub-atomic particle	Relative mass	Relative charge
.....	1	+1
.....	1	0
.....	$\frac{1}{1840}$	-1

(2)

(ii) Which **two** sub-atomic particles are in the nucleus of an atom?

..... and

(1)

(Total 10 marks)