

**Equilibria – 2022 GCSE Gateway Chemistry A****1. May/2022/Paper\_ J248/02/No.8**

Which statement describes dynamic equilibrium?

- A** Occurs in a closed system and the backward reaction is faster than the forward reaction.
- B** Occurs in a closed system and the forward reaction is faster than the backward reaction.
- C** Occurs in a closed system and the rates of the forward and backward reactions are equal.
- D** Occurs in an open system and the rates of the forward and backward reactions are equal.

Your answer

**[1]**

## 2. May/2022/Paper\_ J248/04/No.21

Hydrogen gas is made by the reaction between methane, CH<sub>4</sub>, and steam.

The reaction reaches a **dynamic equilibrium**.

This is the equation for the reaction.



(a) State what is meant by a **dynamic equilibrium**.

.....  
.....  
.....  
..... [2]

(b) The position of equilibrium moves if the reaction conditions are changed.

(i) The forward reaction is **endothermic**.

The **temperature** of the equilibrium mixture is **increased**.

State and explain what happens to the position of the equilibrium.

.....  
.....  
..... [2]

(ii) The highest yield of hydrogen gas is made using a low pressure, such as 1 atmosphere.

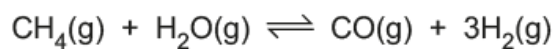
The reaction is actually carried out using a catalyst at a pressure of 30 atmospheres.

Suggest why a pressure of 30 atmospheres is used.

.....  
..... [1]

(c) A factory uses 200 tonnes of methane a day.

The factory produces 68.4 tonnes of hydrogen per day as shown in the equation.



Calculate the **percentage yield of hydrogen,  $\text{H}_2$** .

Give your answer to **2** significant figures.

Relative atomic mass ( $A_r$ ): H = 1.0   C = 12.0

Percentage yield of hydrogen = ..... % **[4]**