

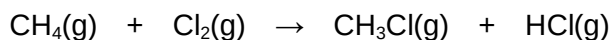
Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

The equation below represents a reaction between methane and chlorine.



- (a) State an essential condition required for this reaction to occur. Explain why this condition is essential.

Condition _____

Explanation _____

(2)

- (b) (i) State the type of mechanism involved in the above reaction.

- (ii) Name the three types of step involved in this mechanism.

Step 1 _____

Step 2 _____

Step 3 _____

(4)

- (c) In addition to CH_3Cl , compounds such as CH_2Cl_2 and $\text{CH}_3\text{CH}_2\text{Cl}$ may also be formed when chlorine reacts with methane.

- (i) Write equations for the two steps in the mechanism by which CH_2Cl_2 is formed from CH_3Cl

Equation 1 _____

Equation 2 _____

- (ii) Write an equation to represent a step in the mechanism in which $\text{CH}_3\text{CH}_2\text{Cl}$ is formed.

(3)

(Total 9 marks)

Q2.

Many hydrocarbon compounds burn readily in air.

- (i) Write an equation to show the complete combustion of $C_{15}H_{32}$

- (ii) One of the gaseous products of the incomplete combustion of methane in gas fires is known to be poisonous. Identify this product and write an equation for the reaction in which it is formed from methane.

Identity of product _____

Equation _____

(Total 4 marks)

Q3.

In the presence of ultraviolet light, methane and chlorine react to form a number of chlorine-containing products, including CH_2Cl_2 and CHCl_3

- (i) Write an equation for the initiation step in the mechanism for this reaction.

- (ii) Write the overall equation for the formation of CHCl_3 from CH_2Cl_2 and Cl_2

- (iii) Write equations for the two propagation steps by which CH_2Cl_2 is converted into CHCl_3

Equation 1 _____

Equation 2 _____

- (iv) Suggest what effect increasing the intensity of the ultraviolet light would have on the rate of the reaction between methane and chlorine. Explain your answer.

Effect on rate _____

Explanation _____

(Total 6 marks)