

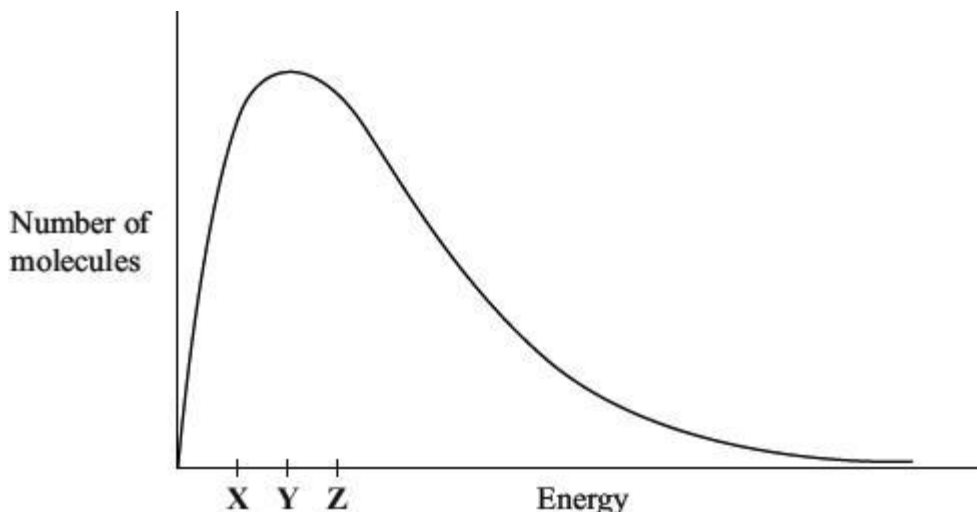
Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

The diagram below shows the Maxwell–Boltzmann distribution of molecular energies in a sample of a gas.



- (a) (i) State which one of **X**, **Y** or **Z** best represents the mean energy of the molecules.

- (ii) Explain the process that causes some molecules in this sample to have very low energies.

(3)

- (b) On the diagram above, sketch a curve to show the distribution of molecular energies in the same sample of gas at a higher temperature.

(2)

- (c) (i) Explain why, even in a fast reaction, a very small percentage of collisions leads to a reaction.

- (ii) Other than by changing the temperature, state how the proportion of successful collisions between molecules can be increased. Explain why this method causes an increase in the proportion of successful collisions.

Method for increasing the proportion of successful collisions _____

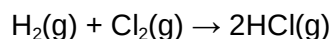
Explanation _____

(4)

(Total 9 marks)

Q2.

The gas-phase reaction between hydrogen and chlorine is very slow at room temperature.



- (a) Define the term *activation energy*.

(2)

- (b) Give **one** reason why the reaction between hydrogen and chlorine is very slow at room temperature.

(1)

- (c) Explain why an increase in pressure, at constant temperature, increases the rate of reaction between hydrogen and chlorine.

(2)

- (d) Explain why a small increase in temperature can lead to a large increase in the rate of reaction between hydrogen and chlorine.

(2)

- (e) Give the meaning of the term *catalyst*.

(1)

- (f) Suggest **one** reason why a solid catalyst for a gas-phase reaction is often in the form of a powder.

(1)

(Total 9 marks)