MEGA LECTURE

**TOPIC 5 EXERCISE 1 – Rates of Reaction**

1. a) Explain what is meant by the terms:

   i) collision frequency

   ii) collision energy

   iii) activation energy

   b) Explain why not all collisions lead to a chemical reaction.

   c) Complete the following table to show how collision frequency, collision energy and activation energy can be changed in a chemical system.

| | Increase in concentration | Increase in pressure | Increase in temperature | Addition of catalyst |
|---|---|---|---|---|
| Collision Frequency | | | | |
| Collision Energy | | | | |
| Activation Energy | | | | |

2. a) Sketch the Maxwell-Boltzmann distribution of molecular energies for a low temperature T1 and a higher temperature T2.

If the temperature is increased from T1 to T2, explain what happens to

i) the mean kinetic energy

ii) the area under the graph

iii) the number of particles having the most common amount of energy

b) Hence explain why an increase in temperature has such a large effect on the rate of reaction.

3. a) Explain the meaning of the term catalyst.

b) Explain how a catalyst lowers the activation energy for a reaction.

c) Use the Maxwell-Boltzmann distribution of molecular energies to explain how this leads to an increase in reaction rate.