Kinetics

Simple collision theory

For a collision to be **successful**, two particles must collide with each other in a proper orientation and with sufficient energy.
The minimum energy required by the reacting particles for a successful collision to take place is called **activation energy.**
With an increase in pressure or concentration, the **frequency of collisions** increases.

Rate of reaction

The **rate of a reaction** is the change in concentration of a substance in unit time. Its unit is **mol/dm^{3}s**.
The rate of the reaction:
over a time period: finding the **gradient** of curve in a concentration-time graph.
at an instant: the **gradient of tangent** of a curve at that instant is taken

Effect of concentration and pressure on rate of reaction

When pressure or concentration increases, the average number of molecules per unit volume increases, resulting in more frequent collisions.

The graph of increased concentration has the same shape, but the peak is at the higher energy level.

Catalysts

A **catalyst** is a chemical substance that increases the rate of reaction and remains chemically unchanged till the end of reaction.

Types:
Homogenous: in the same phase as that of the reactants
Heterogenous: is in a phase that is different from that of the reactants
A catalyst lowers the temperature and pressure constraints on a reaction.

Effect of temperature and catalysts on the rate of reaction

Catalysis **increases** the rate of reaction by lowering the activation energy. The proportion of molecules with energies greater than the activation energy **increases.**

With the increase in temperature, more successful collisions take place and the rate of reaction **increases**. Curve **shifts to right**.

Boltzmann distribution

The **energy distribution** at a given temperature with respect to the number of molecules.