

Marks
3

- Briefly describe collision theory and how it relates to the Arrhenius equation.

Collision theory states that molecules must collide to react, and orientation, collision frequency and energy factors determine the reaction rate.

Not all collisions are effective - molecules need to be orientated correctly and they need to have enough energy (above the activation energy, E_a) for a reaction to occur.

Increasing the temperature increases the number of collisions that exceed E_a .

Collision theory is summarised in the Arrhenius law, $k = Ae^{-E_a/RT}$ where A is the “frequency factor”, or pre-exponential factor – related to collision frequency and orientation of colliding molecules.

Arrhenius law shows that the higher T , the larger the rate constant k , and the higher is the reaction rate.