RAFFLES INSTITUTION RAFFLES PROGRAMME - YEAR THREE CHEMISTRY

REACTION KINETICS (RATE OF REACTION)

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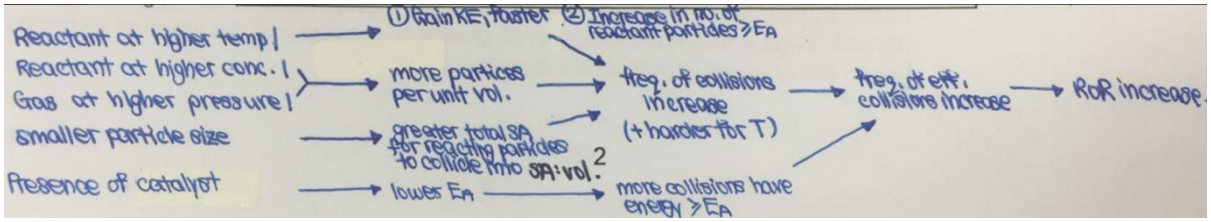
For reaction to occur, there must be an effective collision between reactant particles. Effective collisions are collisions between two reactant particles that have energy equal to or higher than the activation energy EA. The rate of reaction is therefore dependant on the frequency of effective collisions.

When the EA is high, the rate of reaction is slow as only a few collisions are between reactant particles with energy equal to or higher than the activation energy (i.e. effective collisions).
When the EA is low, the rate of reaction is fast as more collisions are effective.

There are five factors which affect the rate of reaction: Temperature, Concentration of Reactants, Pressure (only for Gaseous Reactants), Surface Area of Reactants, and Catalysts. During exams, answer using the flowchart below. In comparison between all of the factors, Temperature causes the greatest change.



However it is important to note that for Temperature, Pressure, Surface Area, and Catalysts, the yield of the reaction is still the same and only the rate of reaction has been changed.
For Concentration, if the reactant is limiting, then the change in its concentration will change the moles of limiting reactant and hence affect the yield.
However, if the reactant is excess, then the change in its concentration will only change the moles of excess reactant and not limiting reactant, hence not affecting the yield. (Unless the excess reactant becomes a limiting reactant.)

The gradient of the graph is the steepest at the start of the reaction, where the concentration/amount of reactants is the greatest. Over time, as the reactant is being reacted, the concentration/amount of reactant decreases. This causes the rate of reaction to become slower. At a point where all the reactant has been reacted away (or if the limiting reactant is reacted away), then the reaction will stop. On the graph, this is represented by a plateau.