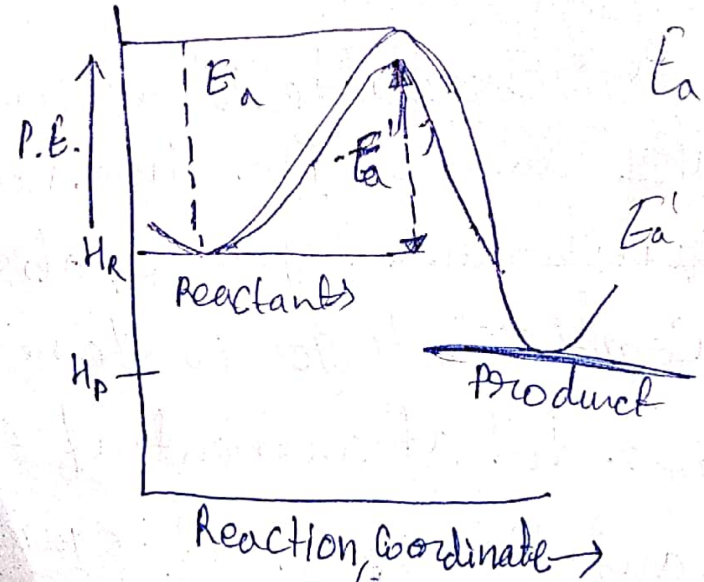
D. B. College (Jaynagar)
Akhilesh kumar Singh
Chemistry department BSc (Hons) Part-I
Mob!- 8750390927 lect-1-19

General Characteristis of Catalyst

- A Catalyst does not initiate the reaction, it simply fastens it.
- Only a small amount of Catalyst can Catalyst can catalyse the reaction.
- A Catalyst does ~~not~~ alter the position of equilibrium i.e. magnitude of equilibrium Constant and hence ΔG. It simply lowers the time needed to attain equilibrium.

This mean if a reversible reaction in ~~ΔG. It simply lowers the time needed to attain equilibrium. This in~~ absence of catalyst Completes to go to the needed extent of 75% till attainment of equilibrium, and this sate of equilibrium is attained in 20 minutes then in presence of a catalyst also the reaction will go to 75% of completion before the attainment of equilibrium but the time needed for this will be less than 20 minutes.

A Catalyst drives the reaction through a different route for which energy barrier is ~~of~~ shortest height and Hence E_a is of lower magnitude. That is, the function of the ~~of the~~ Catalyst is to lower the s



E_a = Energy of activation in absence of catalyst.

E_a' = Energy of activation in Presence of Catalyst.

If K and K_{cat} be the rate Constant of a reaction at a given temperature T, and E_a and E'_a are the activation energies of the reaction in absence and presence of Catalyst, respectively, the

$$\frac{K_{cat}}{K} = \frac{Ae^{-E'_a/RT}}{Ae^{-E_a/RT}}$$

$$\frac{K_{cat}}{K} = Ae^{(E_a - E'_a)/RT}$$

Since E_a, E'_a is +ve, so $K_{cat} > K$ The ratio $\frac{K_{cat}}{K}$ gives the number of times the rate of reaction will increases by the use of Catalyst at a given temperature and this depends upon $E_a - E'_a$. Greater the value of $E_a - E'_a$. more number of times K_{cat} is greater than K

The rate of reaction in the presence of Catalyst at any temperature T_1 may be made equal to the rate of reaction in absence of Ctalyst but we will have to raise the temperature. Let, this temperature be T_2, then $e^{-E'_a/RT_1} = e^{-E_a/RT_2}$

or $\frac{E'_a}{T_1} = \frac{E_a}{T_2}$

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