SUBJECT - CHEMISTRY
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PAPER - II
GROUP - A
TOPIC - order and molecularity of reaction

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Order of reaction: The Sum of the powers of the concentration terms in the rate equation of a chemical reaction is called order of that reaction.

Order of reaction	Name of reaction
0	Zero order reaction
1	1st " "
2	2nd " "
⋮	⋮
n	nth " "

The order of reaction denotes the dependency of the rate of reactant on the variation of concentration of reactant or reactants in the slowest st. Hence it may have any value - positive, negative, zero, integral or fraction. The order of reaction is always less than or equal to the molecularity reaction but never greater than the molecularity. It is obtained from the rat law equation which is determined experimentally. for the reaction:

$$nA + mB \longrightarrow \text{products}$$

The rate of reaction $= K[A]^x [B]^y$

The value of x and y may or may not be equal to m and n respectively because the values of x and y are determined experimentally.

experimental rate law differs from the theoretical rate law as a reaction completed usually in more than one step and the slowest step is the determining step so the rate equation has no empirical relation with overall chemical equation

e.g (I) $A + B \xrightarrow[\text{reaction}]{\text{1st order}}$ products

Rate of reaction $= K[A]\ [B]^0 = K[A]$

(II) $A + B \xrightarrow[\text{reaction}]{\text{2nd order}}$ products

Rate of reaction $= K[A]\ [B]$

∴ The sum of powers of Conc. terms in rate equation

$= 1+1 = 2$

Therefore it is 2nd order reaction.

The chlorination of methane in presence of Sunlight is an example of zero order reaction.

$CH_4 + Cl_2 \xrightarrow[\text{reaction}]{\text{zero order}}$ products

Because the rate of reaction does not depend upon the variation of Concentration of either of reactants CH_4 or Cl_2, hence the rate of reaction

$= K[CH_4]^0\ [Cl_2]^0 = K$