LECTURE 9

PREVIOUS YEAR JEE PROBLEM

Q1

JEE MAIN 2019 (9 Jan 2019 2nd SHIFT)

10. For the reaction, $2A + B \rightarrow$ products, when the concentrations of A and B both wrere doubled, the rate of the reaction increased from 0.3 mol $L^{-1}s^{-1}$ to 2.4 mol L^{-1} s^{-1}. When the concentration of A alone is doubled, the rate increased from 0.3 mol $L^{-1}s^{-1}$ to0.6 mol $L^{-1}s^{-1}$

Which one of the following statements is correct ?

(1) Order of the reaction with respect to Bis2

(2) Order of the reaction with respect to Ais2

(3) Total order of the reaction is 4

(4) Order of the reaction with respect to B is 1

ANSWER : **1**

For the reaction 2A + B → Products

Let, the rate of expression is

$r \propto [A]^a[B]^b$

From the experiment 1

When the concentrations of A and B both were doubled, the rate of the reaction increased from 0.3 mol L^{-1} S^{-1} to 2.4 mol $L^{-1}S^{-1}$

$\frac{r_2}{r_1} = \left(\frac{2A}{A}\right)^a \left(\frac{2B}{B}\right)^a$

$\frac{2.4}{0.3} = 2^a \times 2^b = 2^3 = 2^{a+b}$

$\Rightarrow 3 = a + b$ ----(1)

For the experiment 2

$\frac{r_2}{r_1} = \left(\frac{2A}{A}\right)^a \left(\frac{B}{B}\right)^a$

$\Rightarrow \frac{0.6}{0.3} = 2^a \times 1$

$\Rightarrow 2^1 = 2^a$

$\Rightarrow a = 1$ ----(2)

$\therefore$ From the equation 1, 1 + b = 3

$\Rightarrow b = 2$

Order of the reaction (n) = a + b = 1 + 2 = 3

Order of the reaction with respect to A = 1

Order of the reaction with respect to B = 2