

LECTURE - 02 CHEMICAL KINETICS





Today's Goal

Rate Law Order and Molecularity of a Reaction







Rate Law

The rate of reaction is directly proportional to the product of concentration (Active masses) of reactants to the some power which may or may not be equal to respective stoichiometric coefficients.



Order

- **Experimental quantity** 1.
- 2. Order = Coefficient

x = a, y = b

- 3. Order can be +ve, -ve, zero or fractional
- 4. For complex reaction order can be calculated by mechanism of reaction





Unit of K





Factors affecting K

- K depends on the temperature and is independent of the concentration • of the reactants and pressure.
- At a fixed temperature, K is a constant
- Smaller K indicates slow reactions. ullet





Molecularity

The number of reactant molecules which must be collided to bring about a chemical reaction.





OP Points

- Molecularity is a theoretical quantity
- It can never be zero or –ve
- It can be 1,2,3
- Molecularity greater than 3 is rarely observed
- For elementary reaction order = Molecularity
- There is no meaning of molecularity for complex reaction (but we can • find molecularity for Rate determining step)











G 3. For a hypothetical reaction $A + B \rightarrow$ products, the rate law is, R = k [B] [A]°, the order of reaction is-







Q For an elementary reaction $2A + B \rightarrow C + D$ The active mass of B is kept constant but that of A is tripled The rate of reaction will -



Decrease by 3 times



Increase by 9 times



Increase by 3 times



Unpredictable







In the reaction : A + 2B + C → D + 2E The rate of reaction remains unchanged if the concentration of B is doubled and that of A and C is kept constant. What is the order with respect to B





The rate of certain hypothetical reaction $A + B + C \rightarrow Products$ Is given, by $r = K [A]^{1/2} [B]^{1/3} [C]^{1/4}$ The order of reaction is given by –





G For a gaseous reaction the rate equation is r = k [A][B]. If the volume of each gaseous system is suddenly reduced to 1/3 of initial volume. The rate would become -

1/9 times

9 times

1/6 times

6 times



If the concentration is expressed in mol per litre, the unit of the rate constant for a first order reaction is



Mol litre⁻¹ sec⁻¹



Mol litre⁻¹





Mol⁻¹ litre sec⁻¹









Q Order of reaction can be



0



Fraction



Whole number



All of these







G Molecularity of reaction can be





THANK YOU !!

Homework

NCERT LAST CHAPTER READING DPP Of this Lecture





