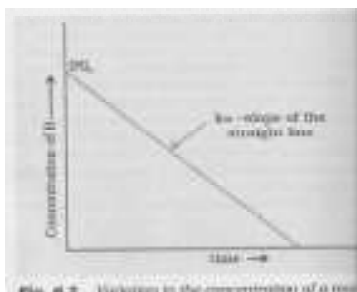


## UNIT – 4

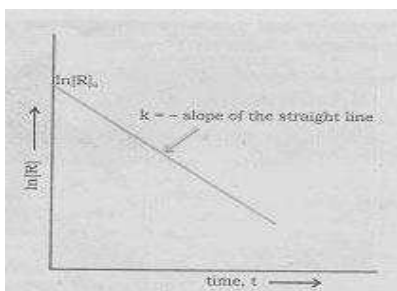
### CHEMICAL KINETICS

#### 1 Mark Questions

1. If rate law is;  $\text{rate} = [\text{A}]^{3/2} [\text{B}]^{-1}$ , determine the order.
2. A gas decomposition of AB follows the rate law;  $\text{rate} = K[\text{AB}]^{3/4}$ . Write units of K.
3. State any one condition under which a bimolecular reaction may be kinetically of first order.
4. In some cases, it is found that a large number of colliding molecules have energy more than threshold energy, yet the reaction is slow. Why?
5. Variation of concentration of a reactant with time for a given reaction is shown below. What is its order of reaction?

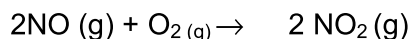


6. Variation of concentration of a reactant,  $\ln[\text{R}]$  with time for a given reaction is shown below. What is its order of reaction?



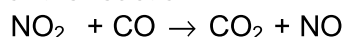
#### 2 / 3 Mark Questions

7. The kinetics of the reaction:  $\text{A} + 2\text{B} \rightarrow \text{Products}$ ; obeys the rate equation  $\text{Rate} = k [\text{A}]^x [\text{B}]^y$ . For it, find
  - a) Order of the reaction
  - b) Apparent molecularity of reaction
  - c) Order of reaction when B is in large excess.
8. Following reaction takes place in one step

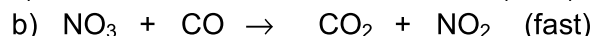
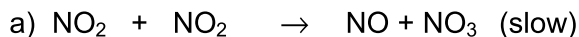


How will the rate of above reaction change if the volume of the reaction vessel is diminished to one third of its original volume? Will there be any change in order of reaction with the reduced volume?

9. For the reaction



Mechanism of reaction is

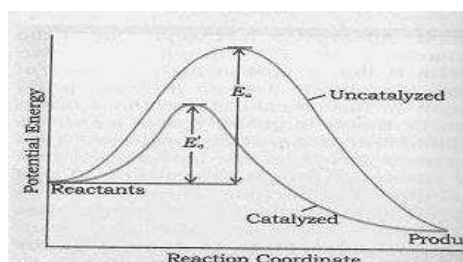


Write its rate law.

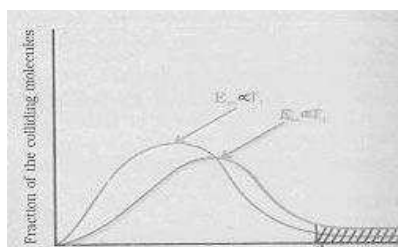
10. The activation energy of a first order reaction is 30 kJ/mol at 298K. The activation energy for the same reaction in the presence of a catalyst is 24 kJ/mol at 298K. How many times the reaction rate has changed in the presence of a catalyst?
11. A reaction is carried out at two different initial concentrations of a reactant. The initial concentrations are  $1 \text{ mol L}^{-1}$  and  $2 \text{ mol L}^{-1}$ . The half-life values obtained were 20 minutes and 40 minutes respectively. What is the order of reaction?
12. In the Arrhenius equation for a certain reaction, the value of A and  $E_a$  are  $4 \times 10^{13} \text{ s}^{-1}$  and  $98.6 \text{ kJ mol}^{-1}$  respectively. If the reaction is of first order; at what temperature will its half life period be ten minutes?
13. The time required for 10% completion of a first order reaction at 298 K is equal to that required for its 25% completion at 308K. If the pre-exponential factor for the reaction is  $3.56 \times 10^9 \text{ sec}^{-1}$ , calculate its rate constants at 318K and also the energy of activation.

### 5 Mark Questions

14. Following is a graph between reaction co-ordinate and potential energy. Explain how a catalyst influence the reaction.



15. In a given graph, if 'E' is the activation energy for a given reaction, explain how temperature influences the rate of reaction.



16. In the following figure, orientations of reaction molecules are shown. Explain the influence of orientation of molecules in a chemical reaction?

