



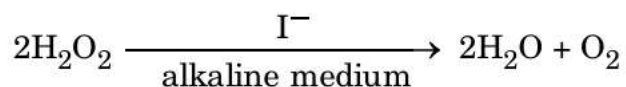
## CHEMISTRY

### CHAPTER: 4 Chemical Kinetics

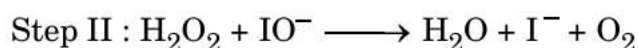
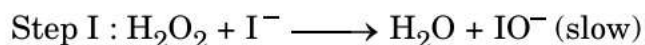
Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: XII Sec: \_\_\_\_\_

**Choose the correct answer**

- For the reaction  $X + 2Y \rightarrow P$ , the differential form equation of the rate law is : (2024)  
(A)  $2d[P]/dt = d[Y]/dt$  (B)  $-d[P]/dt = -d[X]/dt$  (C)  $+d[X]/dt = -d[p]/dt$  (D)  $-2d[Y]/dt = +dP/dt$
- In the Arrhenius equation, when  $\log k$  is plotted against  $1/T$ , a straight line is obtained whose :  
A) slope is  $A/R$  and intercept is  $E_a$ . B) slope is  $A$  and intercept is  $-E_a/R$   
C) slope is  $-E_a/RT$  and intercept is  $\log A$ . D) slope is  $-E_a/2.303R$  and intercept is  $\log A$ .
- For a chemical reaction,  $A \rightarrow B$ , it was observed that the rate of reaction doubles when the concentration of A is increased four times. The order of the reaction is :  
a) 1 b) 2 c)  $\frac{1}{2}$  d)  $\frac{1}{3}$
- Given below is the decomposition of hydrogen peroxide in alkaline medium, which is catalysed by iodide ions :



The above reaction takes place in two steps :



Molecularity of Step I and Step II is :

- Step I – 2, Step II – 2
  - Step I – 1, Step II – 2
  - Step I – 2, Step II – 1
  - Step I – 3, Step II – 1
- For the reaction  $A + 2B \rightarrow C + D$ , the order of the reaction with respect to A & B are  
A) 1 with respect to A and 2 with respect to B  
B) 2 with respect to A and 1 with respect to B  
C) Order can't be predicted as it is an experimental quantity.  
D) 3

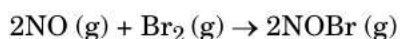


## Answer the following

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | For the reaction $P \rightarrow Q$ the rate of reaction becomes 2 times when the concentration of A is increased 8 times. What is the order of reaction?                                                                                                                                                                                                                                                                                                                                                                                        |
| 2. | $X_2 + 3Y_2 \rightarrow 2XY_3$ . Write the rate equation in terms of disappearance of $Y_2$                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3. | The reaction; $2N_2O_5 \rightarrow 4NO_2 + O_2$ , shows an increase in concentration of $NO_2$ by $20 \times 10^{-3} \text{ mol/l}$ in 5 second. Calculate (a) rate of appearance of $NO_2$ , (b) rate of reaction and (c) rate of disappearance of $N_2O_5$ .                                                                                                                                                                                                                                                                                  |
| 4. | A first order reaction is 60% complete in 20 minutes. Calculate the time taken for the reaction to complete 84%.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5. | <p>From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants.</p> <p>i) <math>3NO \rightarrow N_2O</math> Rate = <math>k[NO]^2</math></p> <p>(ii) <math>H_2O_2(aq) + 3I^-(aq) + H^+ \rightarrow 2H_2O(l) + I_3^-</math> Rate = <math>k[H_2O_2][I^-]</math></p> <p>(iii) <math>CH_3CHO(g) \rightarrow CH_4(g) + CO(g)</math> Rate = <math>k[CH_3CHO]^{3/2}</math></p> <p>(iv) <math>C_2H_5Cl(g) \rightarrow C_2H_2(g) + HCl(g)</math> Rate = <math>k[C_2H_5Cl]</math></p> |
| 6. | A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed. [Given : $\log 2 = 0.3010$ , $\log 3 = 0.4771$ , $\log 4 = 0.6021$ ]                                                                                                                                                                                                                                                                                                                                              |
| 7. | The rate of a reaction triples when temperature changes from $27^\circ\text{C}$ to $37^\circ\text{C}$ . Calculate energy of activation for the reaction                                                                                                                                                                                                                                                                                                                                                                                         |



8. The following initial rate data were obtained for the reaction :



| Expt. No. | [NO]/mol L <sup>-1</sup> | [Br <sub>2</sub> ]/mol L <sup>-1</sup> | Initial Rate<br>(mol L <sup>-1</sup> s <sup>-1</sup> ) |
|-----------|--------------------------|----------------------------------------|--------------------------------------------------------|
| 1         | 0.05                     | 0.05                                   | $1.0 \times 10^{-3}$                                   |
| 2         | 0.05                     | 0.15                                   | $3.0 \times 10^{-3}$                                   |
| 3         | 0.15                     | 0.05                                   | $9.0 \times 10^{-3}$                                   |

- (a) What is the order with respect to NO and Br<sub>2</sub> in the reaction ?  
(b) Calculate the rate constant (k).  
(c) Determine the rate of reaction when concentration of NO and Br<sub>2</sub> are 0.4 M and 0.2 M, respectively.

1+1+1=3

(2023)

- 8 Assertion Reason questions

- a) Assertion & Reason are correct and reason is the correct explanation for assertion  
b) Assertion & Reason are correct and reason is not the correct explanation for assertion  
c) Assertion is true but reason is false  
d) Assertion is false and reason is true
- Assertion: The fastest elementary step in a complex reaction decides the rate of the reaction.  
Reason: The order can be zero
  - Assertion: Unit of rate constant is independent of order of reaction.  
Reason: The power of concentration terms in the rate equation keep changing with change in order.
  - Assertion: Reactions of higher order are rare  
Reason: The chances of multimolecular collision are extremely small.
  - Assertion (A) : The molecularity of the reaction  $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$  appears to be 2. (2024)  
Reason (R) : Two molecules of the reactants are involved in the given elementary reaction.
  - Assertion (A) : Rate constant increases with increase in temperature.  
Reason (R) : Increasing the temperature of the substance increases the fraction of molecules, which collide with energies greater than activation energy. (2024)