

Ozone decomposes according to the equation

$2\text{O}_3(\text{g}) \rightarrow 3\text{O}_2(\text{g})$ Mechanism of the reaction is

Step I : $\text{O}_3(\text{g}) \rightleftharpoons \text{O}_2(\text{g}) + \text{O}(\text{g})$ (fast)

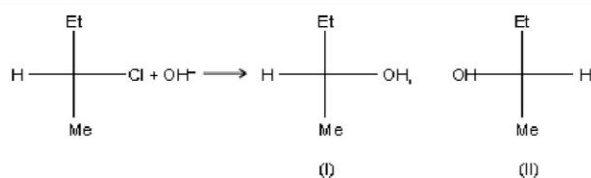
Step II : $\text{O}_3(\text{g}) + \text{O}(\text{g}) \rightarrow 2\text{O}_2(\text{g})$ (slow)

Which of the following is correct ?

- ☐ A. for step I, molecularity is 2
- ☐ B. for step II, molecularity is 1
- ☐ C. step II is rate determining step
- ☐ D. Rate law expression for the overall reaction is $-\frac{d}{dt}[\text{O}_3] = k[\text{O}_3]^2[\text{O}_2]^{-1}$

For a reaction : $2\text{A} + 2\text{B} \rightarrow \text{products}$, the rate law expression is $r = k[\text{A}]^2 [\text{B}]$. Which of the following is/are correct?

- ☐ A. The reaction is first order w.r.t. B
- ☐ B. The reaction is of second order w.r.t. A
- ☐ C. The reaction is of third order, overall
- ☐ D. Slowest step of the reaction is given as $\text{A} + \text{B} \rightarrow \text{AB}$



Which of the following statements are correct ?

- ☐ A. It is $\text{S}_{\text{N}}1$ if (I) or (II) is formed.
- ☐ B. It is $\text{S}_{\text{N}}1$ if equimolar mixture of (I) and (II) is formed.
- ☐ C. It is $\text{S}_{\text{N}}2$ if (I) or (II) is formed.
- ☐ D. It is $\text{S}_{\text{N}}2$ if (II) is formed.

A reaction is catalysed by H^+ ion. In presence of HA, rate constant is $2 \times 10^{-3} \text{ min}^{-1}$ and in presence of HB rate constant is $1 \times 10^{-3} \text{ min}^{-1}$. HA and HB being strong acids, we may conclude that

- ☐ A. HB is stronger acid than HA.
- ☐ B. HA is stronger acid than HB.
- ☐ C. Relative strength HA and HB is 2.
- ☐ D. HA is weaker than HB and relative strength is 0.5.

Statement-1 : The overall rate of a reversible reaction may decrease with the increase in temperature.

Statement-2 : When the activation energy of forward reaction is less than that of backward reaction, then the increase in the rate of backward reaction is more than that of forward reaction on increasing the temperature.

- ☐ A. If both the statements are true and statement-2 is the correct explanation of statement-1.
- ☐ B. If both the statements are true and statement-2 is not the correct explanation of statement-1.
- ☐ C. If statement-1 is True and statement-2 is False.
- ☐ D. If statement-1 is False and statement-2 is True.

Match the column

Column - I

- (A) First order reaction
- (B) Second order reaction
- (C) Zero order reaction
- (D) Fractional (+ve) order reaction

Column - II

- (P) Rate constant increases on increasing the concentration
- (Q) Half life depends on the initial concentration
- (R) Reaction must be complex
- (S) Half life decreases on increasing the temperature
- (T) The plot of concentration of reactant versus time will be a rectangular hyperbola