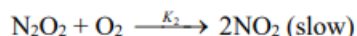
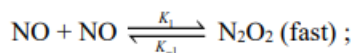


CHEMISTRY CLASS 12 BATCH

CHEMICAL KINETICS

DPP-03

1. The mechanism of the reaction $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$ is



The rate constant of the reaction is

- (A) K_2 (B) $K_2 K_1 (K_{-1})$
(C) $K_2 K_1$ (D) $K_2 \left(\frac{K_1}{K_{-1}} \right)$

2. Dinitrogen pentaoxide decomposes as
 $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$

The rate can be given in three ways

$$\frac{-d[\text{N}_2\text{O}_5]}{dt} = K_1[\text{N}_2\text{O}_5], \quad \frac{d[\text{NO}_2]}{dt} = K_2[\text{N}_2\text{O}_5],$$

$$\frac{d[\text{O}_2]}{dt} = K_3[\text{N}_2\text{O}_5]$$

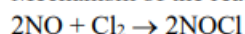
The relation between the rate constant K_1 , K_2 and K_3 is

- (A) $K_2 = 2K_1$ and $K_3 = \frac{1}{2}K_1$ (B) $K_1 = 2K_2$ and $K_3 = 2K_1$
(C) $K_1 = K_2 = K_3$ (D) $K_1 = 2K_2 = 3K_3$

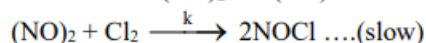
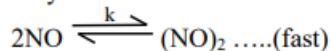
3. The mechanism of the reaction:
 $\text{A} + 2\text{B} + \text{C} \rightarrow \text{D}$
(step 1) (fast) equilibrium $\text{A} + \text{B} \rightleftharpoons \text{X}$
(step 2) (slow) $\text{X} + \text{C} \rightarrow \text{Y}$
(step 3) (fast) $\text{Y} + \text{B} \rightarrow \text{D}$
Which rate law is correct?

- (A) $r = k[\text{C}]$
(B) $r = k[\text{A}][\text{B}]^2[\text{C}]$
(C) $r = k[\text{A}][\text{B}][\text{C}]$
(D) $r = k[\text{D}]$

4. Mechanism of the reaction:



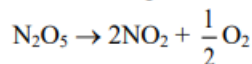
May be written as



Rate equation would be

- (A) $kk[(\text{NO})_2][\text{Cl}_2]$ (B) $kk[\text{NO}]^2[\text{Cl}_2]$
(C) $kk[\text{Cl}_2]$ (D) $kk[\text{NO}] \cdot [\text{Cl}_2]$

5. N_2O_5 decomposes as follows:



$$\text{If, } \frac{d[\text{N}_2\text{O}_5]}{dt} = k_1[\text{N}_2\text{O}_5];$$

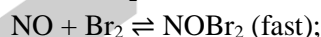
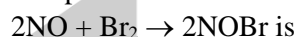
$$\frac{d[\text{NO}_2]}{dt} = k_2[\text{N}_2\text{O}_5];$$

$$\frac{d[\text{O}_2]}{dt} = k_3[\text{N}_2\text{O}_5];$$

Which one of the following is correct for k_1 , k_2 and k_3 ?

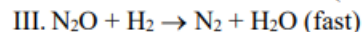
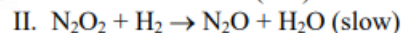
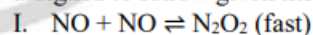
- (A) $k_1 + k_2 = k_3$ (B) $k_1 = k_2 + k_3$
(C) $k_1 = 2k_2 + \frac{1}{2}k_3$ (D) $2k_1 = k_2 = 4k_3$

6. The possible mechanism for the reaction:



- (A) $r = k[\text{NO}][\text{Br}_2]$
(B) $r = k[\text{NO}]^2[\text{Br}_2]^{-1}$
(C) $r = k[\text{NOBr}_2][\text{NO}]$
(D) $r = k[\text{NO}]^2[\text{Br}_2]$

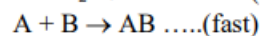
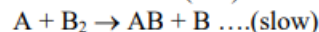
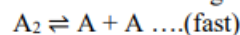
7. The reaction: $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$ has been assigned to follow given mechanism:



The rate constant of step II is $1.2 \times 10^{-4} \text{ mole}^{-1} \text{ L min}^{-1}$ while equilibrium constant of step I is 1.4×10^{-2} . What is the rate of reaction when concentration of NO and H_2 each is 0.5 mole L^{-1} .

- (A) $2.1 \times 10^{-7} \text{ mole L}^{-1} \text{ min}^{-1}$
(B) $3.2 \times 10^{-6} \text{ mole L}^{-1} \text{ min}^{-1}$
(C) $3.5 \times 10^{-4} \text{ mole L}^{-1} \text{ min}^{-1}$
(D) None of these

8. A hypothetical reaction, $\text{A}_2 + \text{B}_2 \rightarrow 2\text{AB}$ follows the mechanism as given below:



The order of the overall reaction is

- (A) 2 (B) 1
(C) $1\frac{1}{2}$ (D) zero

9. The chemical reaction, $2\text{O}_3 \rightarrow 3\text{O}_2$ proceeds as $\text{O}_3 \rightleftharpoons \text{O}_2 + [\text{O}]$ (fast)
 $[\text{O}] + \text{O}_3 \rightarrow 2\text{O}_2$ (slow)
 The rate law expression will be
 (A) Rate = $k[\text{O}][\text{O}_3]$
 (B) Rate = $k[\text{O}_3]^2[\text{O}_2]^{-1}$
 (C) Rate = $k[\text{O}_3]^2$
 (D) Rate = $k[\text{O}_2][\text{O}]$

10. Consider the reaction: $2\text{N}_2\text{O}_4 \rightleftharpoons 4\text{NO}_2$
 If $-\frac{d[\text{N}_2\text{O}_4]}{dt} = k$ and $\frac{d[\text{NO}_2]}{dt} = k'$ then
 (A) $2k' = k$ (B) $k' = 2k$
 (C) $k' = k$ (D) $k = \frac{1}{4}k'$

11. For a reaction, $2\text{NO} + 2\text{H}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$, the possible mechanism is
 $2\text{NO} \rightleftharpoons \text{N}_2\text{O}_2$
 $\text{N}_2\text{O}_2 + \text{H}_2 \xrightarrow{\text{slow}} \text{N}_2\text{O} + \text{H}_2\text{O}$
 $\text{N}_2\text{O} + \text{H}_2\text{O} \xrightarrow{\text{fast}} \text{N}_2 + \text{H}_2\text{O}$
 What is the rate law and order of the reaction?
 (A) Rate = $[\text{N}_2\text{O}_2]$, order = 1
 (B) Rate = $[\text{N}_2\text{O}_2][\text{H}_2]$, order = 2
 (C) Rate = $[\text{N}_2\text{O}_2]^2$, order = 2
 (D) Rate = $[\text{N}_2\text{O}_2]^2[\text{H}_2]$, order = 3

12. The reaction $2\text{NO} + \text{Br}_2 \rightarrow 2\text{NOBr}$, obeys the following mechanism:
 $\text{NO} + \text{Br}_2 \xrightarrow{\text{Fast}} \text{NOBr}_2$; $\text{NOBr}_2 + \text{NO} \xrightarrow{\text{Slow}} 2\text{NOBr}$
 The rate expression of the above reaction can be written as

- (A) $r = k[\text{NO}]^2[\text{Br}_2]$ (B) $r = k[\text{NO}][\text{Br}_2]$
 (C) $r = k[\text{NO}][\text{Br}_2]^2$ (D) $r = k[\text{NOBr}_2]$

Answer Key

1. (D)
2. (A)
3. (C)
4. (B)
5. (D)
6. (D)
7. (A)
8. (C)
9. (B)
10. (B)
11. (B)
12. (A)

