Parishram (2024)

Chemical Kinetics

DPP-01

1. The rate at which a substance reacts depends upon its
(1) atomic mass (2) equivalent mass
(3) molecular mass (4) active mass

2. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$, rate is expressed as
(1) $\frac{d[N_2]}{3dt} = -\frac{d[H_2]}{2dt} = 3\frac{d[NH_3]}{dt}$
(2) $-\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$
(3) $-\frac{d[N_2]}{dt} = -\frac{3d[H_2]}{dt} = \frac{2d[NH_3]}{dt}$
(4) $-\frac{d[N_2]}{dt} = -\frac{d[H_2]}{dt} = \frac{d[NH_3]}{dt}$

3. The rate of reaction that does not involve gases, is not dependent on
(1) pressure (2) temperature
(3) concentration (4) catalyst

4. For the reaction, A + B → 2C + D, which one is the incorrect statement?
(1) Rate of disappearance of A = Rate of disappearance of B
(2) Rate of disappearance of A= Rate of appearance of D
(3) Rate of disappearance of B = 2 × rate of appearance of C
(4) Rate of disappearance of B = $\frac{1}{2}$ × rate of appearance of C

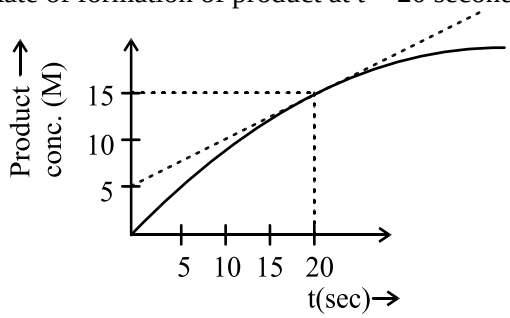
5. The term $-\frac{dx}{dt}$ in the rate expression refers to the
(1) instantaneous rate of reaction
(2) average rate of reaction
(3) increase in the concentration of reactants
(4) concentration of reactants

6. The rate of a reaction is expressed in different ways as follows:
$+\frac{1}{2}\frac{d[C]}{dt} = -\frac{1}{3}\frac{d[D]}{dt} = +\frac{1}{4}\frac{d[A]}{dt} = -\frac{d[B]}{dt}$
The reaction is:
(1) 4 A + B → 2C + 3D
(2) B + 3D → 4A + 2C
(3) A + B → C + D
(4) B + D → A + C

7. For the reaction 2A + 3B → 4C
The rate of reaction may be represented as:
(1) $r = -2.\frac{d(A)}{dt} = -\frac{d(B)}{dt} = 4\frac{d(C)}{dt}$
(2) $r = -2\frac{d(A)}{dt} = -4\frac{d(B)}{dt} = 3\frac{d(C)}{dt}$
(3) $r = -\frac{1}{2}\frac{d(A)}{dt} = \frac{1}{3}\frac{d(B)}{dt} = \frac{1}{4}\frac{d(C)}{dt}$
(4) $r = -\frac{1}{2}\frac{d(A)}{dt} = -\frac{1}{3}\frac{d(B)}{dt} = \frac{1}{4}\frac{d(C)}{dt}$

8. In a reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ the rate of appearance of NH_3 is 2.5×10^{-4} $molL^{-1}sec^{-1}$.The Rate of reaction & rate of disappearance of H_2 will be (ln mol $L^{-1}sec^{-1}$)
(1) 3.75×10^{-4}, 1.25×10^{-4}
(2) 1.25×10^{-4}, 2.5×10^{-4}
(3) 1.25×10^{-4}, 3.75×10^{-4}
(4) 5.0×10^{-4}, 3.75×10^{-4}

9. Rate of formation of product at t = 20 seconds is:



(1) 0.5 MS^{-1} (2) 1 M S^{-1}
(3) 1.5 M S^{-1} (4) 2 M S^{-1}

Note: Kindly find the Video Solution of DPPs Questions in the DPPs Section.

Answer Key

1.	**(4)**	**5.**	**(1)**
2.	**(2)**	**6.**	**(2)**
3.	**(1)**	**7.**	**(4)**
4.	**(3)**	**8.**	**(3)**
		9.	**(1)**

Hints and Solutions

1. **(4)**
Rate depends on active mass.

2. **(2)**
$$-\frac{1}{1}\frac{d[N_2]}{dt}=-\frac{1}{3}\frac{d[H_2]}{dt}=\frac{1}{2}\frac{d[NH_3]}{dt}$$

3. **(1)**
We calculate pressure for gases.

4. **(3)**
$$-\frac{1}{1}\frac{d[B]}{dt}=-\frac{1}{1}\frac{d[A]}{dt}=\frac{1}{2}\frac{d[C]}{dt}=\frac{1}{1}\frac{d[D]}{dt}$$

5. **(1)**
Instantaneous rate of reaction.

6. **(2)**

7. **(4)**

8. **(3)**

9. **(1)**