Time: 2 hours | Chemistry | Marks: 50

(Chemical kinetics)

NAME OF THE STUDENT:-______________________________ DATE:-

INSTRUCTION – ATTEMPT ALL QUESTIONS

Q.1. For the chemical reaction,

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ the correct options is

(a) $3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$

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

(c) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$

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

Q.2. The rate of the reaction : $2N_2O_5 \rightarrow 4NO_2 + O_2$ can be written in three ways.

$\frac{-d\,[N_2\,O_5]}{dt} = k[N_2\,O_5]$ $\frac{-d\,[NO_2]}{dt} = k'[N_2\,O_5]$; $\frac{d\,[O_2]}{dt} = k''[N_2\,O_5]$

The relationship between k and k' and between k and k '' are

(a) K' = 2k, K'' = k (b) k' = 2k, k'' = k/2

(c) k' = 2k, k'' = 2k (d) k' = k, k'' = k

Q.3. For the reaction $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + 1/2O_{2(g)}$ the value of rate of disappearance of N_2O_5 is given as 6.25×10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as:

(a) 6.25×10^{-3} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

(b) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$

(c) 6.25×10^{-3} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$

(d) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

Q.4. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$, if $\frac{d[NH_3]}{dt} = 2 \times 10^{-4}$ mol $L^{-1}s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be

(a) 4×10^{-4} mol $L^{-1}s^{-1}$ (b) 6×10^{-4} mol $L^{-1}s^{-1}$

(c) 1×10^{-4} mol $L^{-1}s^{-1}$ (d) 3×10^{-4} mol $L^{-1}s^{-1}$

Q.5. In the reaction

$$BrO^-_{3\,(aq)} + 5Br^-_{(aq)} + 6H^+_{(aq)} \rightarrow 3Br_{2(l)} + 3H_2O_{(l)}$$

The rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as

(a) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$ (b) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

(c) $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$ (d) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

Q.6. Consider the reaction :

$N_{2(g)} + 3H_{2\,(g)} \rightarrow 2NH_{3(g)}$

The equality relationship between

$\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is

(a) $\frac{d[NH_3]}{d\ dt} = -\frac{d[H_2]}{dt}$

(b) $\frac{[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$

(c) $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$

(d) $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$

Q.7. For the reaction, $2A + B \rightarrow 3C + D$, which of the following does not express the reaction rate?

(a) $-\frac{d[A]}{2dt}$ (b) $-\frac{d[C]}{3dt}$ (c) $-\frac{d[B]}{dt}$ (d) $\frac{d[D]}{dt}$

Q.8. $3A \rightarrow 2B$, rate of reaction $\frac{+d[B]}{dt}$ is equal to

(a) $-\frac{3d[A]}{2dt}$ (b) $-\frac{2d[A]}{3dt}$ (c) $-\frac{1d[A]}{3dt}$ (d) $+2\frac{d[A]}{dt}$

Q.9. For the reaction

$H^+ + BrO_3 + 3Br^- ---- 5Br_2 + H_2O$

which of the following relations correctly represents the consumption and formation of products?

(a) $\frac{d[Br-]}{dt} = -\frac{3d[Br_2]}{5dt}$ (b) $\frac{d[Br-]}{dt} = -\frac{3d[Br_2]}{5dt}$

(c) $\frac{d[Br-]}{dt} = -\frac{5d[Br_2]}{3dt}$ (d) $\frac{d[Br-]}{dt} = -\frac{5d[Br_2]}{3dt}$

Q.10. For the reaction $H_{2(g)} + I_{2(g)}\ 2H_{(g)}$, the rate of reaction is expressed as

(a) $\frac{\Delta[H_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[I_2]}{\Delta t} = -\frac{\Delta[HI]}{\Delta t}$

(b) $-\frac{\Delta[I_2]}{\Delta t} = -\frac{\Delta[H_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[HI]}{\Delta t}$

(c) $\frac{\Delta[I_2]}{\Delta t} = \frac{\Delta[H_2]}{\Delta t} = \frac{\Delta[HI]}{2\Delta t}$

(d) none of these.