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Physical Chemistry

Chemical Kinetics

DPP: 2

Q1 In the reaction: $BrO_3^-(aq) + 5Br^-(aq) + 6H^+ \rightarrow 3Br_2(I) + 3H_2O(I)$

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

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

Q2 For the reaction $A + B \rightarrow$ Products, it is observed that

I) On doubling the initial concentration of A only, the rate of reaction is also doubled and

II) On doubling the initial concentration of both A and B, there is a change by a factor of 8 in the rate of the reaction.

The rate of this reaction is given by

(A) Rate $= k[A][B]^2$

(B) Rate $= k[A]^2[B]^2$

(C) Rate $= k[A][B]$

(D) Rate $= k[A]^2[B]$

Q3 For the following reaction $C_6H_{12}O_6(aq) + H_2(g) \rightleftharpoons C_6H_{14}O_6(aq)$.

Which one of the following is not affected by the addition of catalyst?

(A) Rate of forward reaction

(B) Rate of backward reaction

(C) Time required to reach the equilibrium

(D) Spontaneity

Q4 A chemical reaction is catalyzed by a catalyst X. Hence X

(A) Reduces enthalpy of the reaction

(B) Does not affect equilibrium constant of reaction

(C) Decreases rate constant of the reaction

(D) Increases activation energy of the reaction

Q5 The rate of a reaction is expressed as $\frac{1}{2}\frac{\Delta[C]}{\Delta t} = \frac{1}{3}\frac{\Delta[D]}{\Delta t} = \frac{1}{4}\left(\frac{-\Delta[A]}{\Delta t}\right) = \left(\frac{-\Delta[B]}{\Delta t}\right)$

Then reaction is

(A) $4A + B \rightarrow 2C + 3D$

(B) $B + 3D \rightarrow 4A + 2C$

(C) $A + B \rightarrow C + D$

(D) $B + D \rightarrow A + C$

Q6 A reaction involving two different reactants can never be a

(A) Second order reaction

(B) Biomolecular reaction

(C) Unimolecular reaction

(D) First order reaction

Q7 For the homogeneous elementary reaction, $A + B \rightarrow C$, the unit of rate constant is

(A) s^{-1}

(B) s^{-1} mol L^{-1}

(C) $s^{-1}\ mol^{-1}\ L$

(D) s

Q8 The rate constant is numerically the same for three reactions of first, second and third order respectively. Which one is true for rate of three reaction, if concentration of reactant is greater than $1M$?

(A) $r_1 = r_2 = r_3$ (B) $r_1 > r_2 > r_3$

(C) $r_1 < r_2 < r_3$ (D) All of these

Answer Key

Q1	(D)	Q5	(A)
Q2	(A)	Q6	(C)
Q3	(D)	Q7	(C)
Q4	(B)	Q8	(C)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Video Solution:

Q2 Video Solution:

Q3 Video Solution:

Q4 Video Solution:

Q5 Video Solution:

Q6 Video Solution:

Q7 Text Solution:

Rate Law for the given reaction : Rate = K[A] [B].

According to which, order of this reaction is Second.

And for second order reactions, the rate constant has unit

mol^{-1} L s^{-1}

Video Solution:

Q8 Video Solution: