Test

Chemical Kinetics

Q1 The role of a catalyst is to change _____.
   a) Gibbs energy of reaction.
   b) Enthalpy of reaction.
   c) Activation energy of reaction.
   d) Equilibrium constant.

Q2 Activation energy of a chemical reaction can be determined by _____.
   a) Determining the rate constant at standard temperature.
   b) Determining the rate constants at two temperatures.
   c) Determining probability of collision.
   d) Using catalyst.

Q3 Which of the following statements is correct?
   a) The rate of a reaction decreases with passage of time as the concentration of reactants decreases.
   b) The rate of a reaction is same at any time during the reaction.
   c) The rate of a reaction is independent of temperature change.
   d) The rate of a reaction decreases with increase in concentration of reactant(s).

Q4 Which of the following expressions is correct for the rate of reaction given below?

$$5\,Br^{-1}_{(aq)} + BrO^{-1}_{3\,(aq)} + 6\,H^{+1}_{(aq)} \rightarrow 3\,Br_{2\,(aq)} + 3H_2O_{(l)}$$

   a) $\dfrac{\Delta[Br^{-1}]}{\Delta t} = 5\,\dfrac{\Delta[H^+]}{\Delta t}$

   b) $\dfrac{\Delta[Br^{-1}]}{\Delta t} = \dfrac{6}{5}\,\dfrac{\Delta[H^+]}{\Delta t}$

   c) $\dfrac{\Delta[Br^{-1}]}{\Delta t} = \dfrac{5}{6}\,\dfrac{\Delta[H^+]}{\Delta t}$

   d) $\dfrac{\Delta[Br^{-1}]}{\Delta t} = 6\,\dfrac{\Delta[H^+]}{\Delta t}$

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
   a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
   b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
   c) Assertion is correct, but reason is wrong statement.
   d) Assertion is wrong but reason is correct statement.
   e) Both assertion and reason are wrong statements

Q5 Assertion:
   Order of the reaction can be zero or fractional.
   Reason:
   We cannot determine order from balanced chemical equation.

Q6 Assertion:
   Order and molecularity are same.

Reason:

Order is determined experimentally and molecularity is the sum of the stoichiometric coefficient of rate determining elementary step.

Q7   What is rate law expression? Define with suitable example

Q8   A reaction is having rate constant of 3.36×10^{-4} $mol^{-5/2}lit^{5/2}S^{-1}$. What is order of reaction?

Q9   For a reaction: $X_2 + 3Y_2 \rightarrow 2XY_2$, write the equation in terms of rate of disappearance of Y_2?

Q10 For a reaction:

$2NO_2 \rightarrow 2NO + O_2$

   a) Write expression for rate of reaction?

   b) If the rate of disappearance of NO_2 is 6.0×10^{-12} S^{-1}, calculate corresponding rates in terms of increase in NO and O_2 concentrations

Q11 For a hypothetical reaction $A + 3B \rightarrow 2AB$, when [A] is increased by four times the rate of reaction doubles. Bur when [B] is increased by 27 times the rate of reaction by three times what is order of reaction and also write units for rate constant?

Q12 When a graph of log $K \rightarrow 1/T$ is plotted the slope of graph was found to be -1.865 $\times 10^{-6}$ calculate activation energy for the reaction?

Q13 A first order reaction is found to have a rate constant of $k = 5. \times 10^{-14}$ S^{-1}. What is half life period for reaction in hours?

Q14 Three experiments were performed for the following reaction

$$2NO_{(g)} + Cl_{2\ (g)} \rightarrow 2NOCl_{(g)}$$
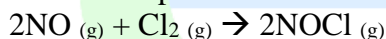
Expt.	Initial [NO] mol/lit	Initial [Cl_2] mol/lit	Initial rate mol/lit/s
I	0.01	0.02	2.40×10^{-4}
II	0.03	0.02	2.16×10^{-3}
III	0.03	0.04	4.32×10^{-3}

   a) Determine the rate of reaction w.r.t Cl_2 and NO

   b) Rate Law expression.

   c) Order of reaction

Q15 A thermal decomposition of compound is a first order reaction. If 40% of the compound is decomposed in 120 minutes how long it will take for 90% of compound to decompose?

Q16 The half life for a first order decomposition of nitramide is 2.1 hrs at 15° C. NH_2NO_2 $_{(aq)} \rightarrow N_2O_{(g)} + H_2O_{(l)}$. If 6.5 gm of NH_2NO_2 is allowed to decompose, calculate time taken for NH_2NO_2 to decompose 99%

Q17 The activation energy of reaction is 94.14 kJ/mol and the value of rate constant at 313 K is 1.8×10^{-5} sec^{-1} Calculate time frequency factor A.