

Kandi Raj College
B.Sc. 2nd Semester Hons. Internal Assessment examination
Subject: Physical Chemistry [CHEMHT-3]

F.M. 10

Answer any ten. Choose the correct option for each of the following questions. Write only the question number and your chosen answer in your answer scripts.

1x10=10

1. Which of the following observations is incorrect about the order of a reaction?
 - a) Order of a reaction is always a whole number
 - b) The stoichiometric coefficient of the reactants doesn't affect the order
 - c) Order of reaction is the sum of power to express the rate of reaction to the concentration terms of the reactants.
 - d) Order can only be assessed experimentally

2. Which of the following is correct?
 - a) For an isolated system, $dS \geq 0$
 - b) For a reversible process, $dS = 0$
 - c) For an irreversible process, $dS > 0$
 - d) All of the mentioned

3. In the reaction $2A + B \rightarrow A_2B$, if the concentration of A is doubled and that of B is halved, then the rate of the reaction will
 - a) increase 2 times
 - b) increase 4 times
 - c) decrease 2 times
 - d) remain the same

4. Efficiency of heat engine cycle is the ratio of
 - a) total heat input to the cycle (Q_{in}) to net work output of the cycle (W_{net})
 - b) net work output of the cycle (W_{net}) to total heat input to the cycle (Q_{in})
 - c) net work output of the cycle (W_{net}) to heat rejected from the system (Q_{out})
 - d) none of the above.

5. The rate constant of a reaction is $k = 3.28 \times 10^{-4} \text{ s}^{-1}$. Find the order of the reaction.
 - a) Zero order
 - b) First order
 - c) Second order
 - d) Third order

6. A cyclic heat engine operates between a source temperature of 927°C and a sink temperature of 27°C . What will be the maximum efficiency of the heat engine?
 - a) 100 %
 - b) 80 %
 - c) 75 %
 - d) 70 %

7. For a second-order reaction, what is the unit of the rate of the reaction?
- s^{-1}
 - $\text{mol L}^{-1}\text{s}^{-1}$
 - $\text{mol}^{-1} \text{L s}^{-1}$
 - $\text{mol}^{-2} \text{L}^2 \text{s}^{-1}$
8. All spontaneous processes are
- reversible
 - irreversible
 - quasi-static
 - none of the above
9. Which of the following factor affects the heat of reaction based on Kirchhoff equation?
- molecularity
 - temperature
 - pressure
 - volume
10. A catalyst alters, which of the following in a chemical reaction?
- Entropy
 - Enthalpy
 - Internal energy
 - Activation energy
11. Any attainable value of absolute temperature is _____
- always less than zero
 - always equals to zero
 - always greater than zero
 - none of the above.
12. A substance 'A' decomposes by a first-order reaction starting initially with $[A] = 2.00\text{M}$ and after 200min, $[A]$ becomes 0.15M. For this reaction $t_{1/2}$ is
- 50.49 min
 - 53.72 min
 - 48.45 min
 - 46.45 min

Kandi Raj College
Department of Chemistry
Internal Assessment-2021
B.Sc. (Hons) Sem-II
Paper-CHEMHT-3(Inorganic)

1. Answer any five

5x2=10

- a) What is disproportionation reaction?
- b) Calculate the equivalent weight of KMnO_4 in neutral medium?
- c) The reaction $\text{Zn(s)} + \text{Co}^{+2}(\text{aq}) = \text{Co(s)} + \text{Zn}^{2+}(\text{aq})$ occurs in a cell. Represent the cell and calculate the standard EMF of the cell. Given $E^\circ_{\text{Zn}/\text{Zn}^{2+}} = 0.76\text{v}$, $E^\circ_{\text{Co}/\text{Co}^{2+}} = 0.77\text{v}$.
- d) What is redox indicator, Give an example.
- e) Calculate the equilibrium constant of the following reaction
 $\text{Fe}^{2+} + \text{Ce}^{4+} = \text{Fe}^{3+} + \text{Ce}^{3+}$. Given $E^\circ_{\text{Ce}^{4+}/\text{Ce}^{3+}} = 1.44\text{v}$, $E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.44\text{v}$.
- f) Balance the following reaction in ion electron method
Reaction between KMnO_4 and sodium stannite (Na_2SnO_2) in presence of alkaline medium.
- g) What is Z-R solution?

KANDI RAJ COLLEGE

U.G. 2nd Semester Internal Examination-2021

CHEMISTRY HONOURS

Paper: CHEMHT-4

Full marks: 10

Time: 30 min.

1) Answer any five questions from the following:

2x5=10

- i) What is atropisomerism? Explain with Example.
- ii) Draw the most stable conformation of 1,2-dibromoethane and ethylene glycol-Explain.
- iii) Benzyl chloride (PhCH_2Cl) is more reactive than Ethyl chloride ($\text{CH}_3\text{CH}_2\text{Cl}$) both in $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ conditions. Explain.
- iv) What is stereoelectronic requirement for $\text{S}_{\text{N}}2$ reaction mechanism? Why neo-pentyl bromide ($\text{Me}_3\text{C-CH}_2\text{-Br}$) cannot undergo $\text{S}_{\text{N}}2$ displacement?
- v) What is activation energy of a chemical reaction? Draw the energy profile diagram for a single-Step reaction.
- vi) E_2 and $\text{E}_{1\text{cB}}$ reactions are kinetically indistinguishable. Explain.
- vii) Acetylacetone shows 15% enol content in water whereas 92% enol content in n-Hexane.- Explain.
- viii) Show the conversion of (S)-2-pentanol to (R) -2-pentanol.
- ix) Hydrolysis of methyl bromide takes place at a much faster rate in presence of little amount of NaI. Explain.

