CHEMSIRTY QUESTION BANK

CHAPTER-1: SOLID STATE

Multiple choice questions

1)The following types of solids contain molecules as constituent particles?

1. molecular solids
2. Ionic solids
3. metallic solids
4. covalent network solids

2)The following crystal systems contain 4 Bravais lattices?

1. cubic
2. tetragonal
3. orthorhombic
4. monoclinic

3)An octahedral void is surrounded by _____.

1. 4 spheres
2. 3 spheres
3. 8 spheres
4. 6 spheres

4)Which of the following is an amorphous solid?

1. Copper sulphate
2. magnesium
3. tar
4. diamond

5)A paired cation-anion vacancy is called _____.

1. Schottky defect
2. Frenkel defect
3. impurity defect
4. vacancy defect

6)The unit cell of a simple cubic system has atoms at the eight corners. Hence, number of atoms in a unit cell is _____.

1. 8
2. 3
3. 1
4. 2

7)In crystal lattice formed by primitive unit cell, the space occupied by particles is _____.

1. 47.6%
2. 52.4%
3. 32%
4. 68%

8)The coordination number of spheres in hcp lattice in three dimension is _____.

1. 2
2. 6
3. 4
4. 12

9)A compound is made up of two elements X and Y and crystallizes in bcc structure. Atoms of X are present at the corners of the cube. Atoms of Y are present at the centre of the cube. The formula of the compound is _____.

1. X_2Y
2. XY
3. XY_2
4. X_2Y_3

10)Sodium crystallizes in bcc structure. If the edge length of unit cell is 4.3×10^{-8} cm, the radius of Na atom is _____.

1. 1.86×10^{-8} cm
2. 1.52×10^{-8} cm
3. 2.15×10^{-8} cm
4. 4.3×10^{-8} cm

Very short answer questions 1M

1)Write the effect on density of a substance in the Frenkel defect?
2)Name the Bravais lattice in the triclinic system.
3)What are diamagnetic substances?

Answer the following in one or two sentences.

1)Mention two properties that are common to both hcp and ccp lattices.
2)Write the relationship between radius of atom and edge length of fcc unit cell.
3)Draw diagram of bcc unit cell.
4)The number of tetrahedral voids are formed if the number of atoms in a crystal is N/2.
5)Give the percentage of empty space in bcc lattice.
6)If the total volume of a simple cubic unit cell is 6.817×10^{-23} cm^3, what is the volume occupied by particles in unit cell?
7)The number of octahedral voids formed in 0.5 mol of a compound forming hcp structure?

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2 Marks Short answer questions (Type- I)

1)Distinguish between crystalline solid and amorphous solid
2)Classify the following solids as molecular, ionic, covalent and metallic solids.

Pb
MgF_2
SO_2
quartz

3)Find the number of atoms in the fcc unit cell.
4)Explain with diagram, the vacancy defect.
5)Calculate the number of unit cells in 0.3 g of a species having density of 8.5 g/cm^3 and unit cell edge length 3.25×10^{-8} cm.

6)A compound crystallizes in bcc structure. What is unit cell edge length if diameter of its atom is 120 pm?

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3 Marks Short answer questions (Type- II)

1)Calculate the packing efficiency for bcc and FCC lattice.
2)In case of hcp structure, how are spheres in first, second and third layers arranged?
3)A substance crystallizes in fcc structure. The unit cell edge length is 367.8 pm. Calculate the molar mass of the substance if its density is 21.5 g/cm^3.
4)The unit cell of Na is bcc and its density is 0.97 g/cm^3. What is the radius of a sodium atom if the molar mass of Na is 23 g/mol?
5)How are nonstoichiometric point defects classified? Explain with diagram the metal deficiency defect.
6)Explain with one example each, the diamagnetic, paramagnetic and ferromagnetic substances.

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4 marks Long answer questions

1)What are nonstoichiometric point defects?
2)Explain with a diagram the formation of F-centres
3)Give the classification of stoichiometric point defects.
4)What is a substitutional impurity defect?
5)Explain solid solutions of metals and vacancy through aliovalent cations.
6)Derive the relationship between density of substance, its molar mass, and the unit cell edge length. Explain how you will calculate the number of particles, and a number of unit cells in x g of metal.

CHAPTER-2: solution and colligative properties

1 Mark Multiple choice questions

1)Sugar dissolves in water because _____.

1. sugar is nonpolar
2. water is polar
3. it forms hydrogen bonding with water
4. sugar and water are both polar

2)The solubility of a gas in water _____.

1. decreases with increase in temperature
2. increases with increase in temperature
3. decreases with decrease in temperature
4. is not affected by temperature

3)The units of Henry's law constant are _____.

1. bar dm^3 mol^{-1}
2. mol L^{-1} bar^{-1}
3. L mol^{-1} bar^{-1}
4. bar L^{-1} mol^{-1}

4)The colligative properties of solutions _____.

1. depend on nature of solute particles
2. do not depend on number of solute particles
3. do not depend on dissociation of solute in solvent
4. depend on number of solute particles

5)The following solution/solvent has maximum vapour pressure _____.

1. 1 M copper sulphate solution
2. pure solvent water
3. 0.5 M copper sulphate solution
4. 2 M copper sulphate solution

6)According to Raoul's law, relative lowering of vapour pressure of solution containing dissolved non-volatile solute _____.

1. is equal to mole fraction of solvent
2. is equal to mole fraction of solute
3. does not depend on mole fraction of solute

4. is equal to molality of solution

7)Freezing point depression constant of a solvent is _____.

1. inversely proportional to molality of solution
2. directly proportional to molarity of solution
3. dependent on molality of solution
4. expressed in K kg mol^{-1}

8)Which of the following statements is applicable for 0.1 M urea solution and 0.1 M sucrose solution?

1. Osmotic pressure of urea solution is greater than that of sucrose solution.
2. Osmotic pressure of sucrose solution is greater than that of the urea solution.
3. Sucrose solution is not isotonic with urea solution.
4. Both the solutions have the same osmotic pressure.

9)The Henry's law constant of a gas is 6.7×10^{-4} mol/(L bar). Its solubility when the partial pressure of the gas at 298 K is 0.65 bar is _____.

1. 4.355×10^{-4} mol/L
2. 4.355×10^{-2} mol/L
3. 2.225×10^{-6} mol/L
4. 2.225×10^{-2} mol/L

VERY SHORT ANSWER QUESTIONS 1 Mark

1)What are hypertonic solutions?

2)What is a cryoscopy constant?

3)Write the effect of dissolution of a non-volatile solute on the freezing point of solvent.

4)Write the expression for relative lowering of vapour pressure.

5)State Raoult's law.

6)State Henry's law.

7)What type of solutions exhibit positive deviations from Raoult's law?

8)What is enthalpy change and volume change of mixing of two components forming an ideal solution?
9)The vapour pressures of pure liquids A and B are 0.600 bar and 0.933 bar respectively, at a certain temperature.
10)What is the mole fraction of liquid B in the solution when the total vapour pressure of their mixture is 0.8 bar?
11)The vapour pressure of a pure liquid is 0.043 bar at a certain temperature. When a non-volatile solute is dissolved into it, the vapour pressure of the solution is found to be 0.041 bar. What is the relative lowering of vapour pressure?

3 Marks Short answer questions (Type- II)

1)Derive the expression for molar mass of solute in terms of boiling point elevation of solvent.
2)Explain the osmotic pressure of a solution with the help of a thistle tube.
3)Explain the phenomenon of osmosis.
4)With the help of vapour pressure-temperature curves for solution and solvent, explain why boiling point of solvent is elevated when a non-volatile solute is dissolved into it.
5)A solution containing 3 g of solute A (M = 60 g/mol) in 1 L solution is isotonic with a solution containing 8.55 g of solute B in 500 mL solution. What is the molar mass of B?
6)The vapour pressure of a pure solvent at a certain temperature is 0.0227 bar. What is the vapour pressure of a solution containing 6 g of solute (M = 60 g/mol) in 50 g of solvent?

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4 Marks Long answer questions

1)What are nonideal solutions?
2)Explain with reasons and diagrams, the positive and negative deviations from Raoult's law shown by nonideal solutions.

3)Explain with vapour pressure-temperature curves that the freezing point of a solvent is lowered by dissolving a non-volatile solute into it. Give reason for such lowering of freezing of solvent.

4)Define Semipermeable membrane

5)Explain the term osmosis.

Answer the following in one or two sentences.

1)What is osmotic pressure?

2)What are isotonic solutions? Explain with one example.

Chapter 3: Ionic Equilibria

1 Mark Multiple choice questions

1)What is the percentage dissociation of 0.1 M solution of acetic acid? [$K_a(CH_3COOH) = 10^{-5}$]

1. 0.01%
2. 1%
3. 10%
4. 100%

2)For a reaction HClA(aq)+HA2OA(l)←−−−⇀HA3OA(aq)++ClA(aq)− Which of the following is a conjugate acid-base pair?

1. HCl and H_2O
2. H_3O^+
3. H_3O^+ and H_2O
4. HCl and H_3O^+

3)In biochemical system, pH of blood in our body is maintained due to the following buffer:

1. $NH_4OH + NH_4Cl$
2. HCOA3−+HA2COA3
3. $CH_3COOH + CH_3COONa$
4. citric acid + $Mg(OH)_2$

4)If 'IP' is the ionic product and 'K_{sp}' is the solubility product, precipitation of the compound will occur under the condition when:

1. IP = K_{sp}
2. IP > K_{sp}
3. IP < K_{sp}
4. IP < < K_{sp}

5)NH_4F is a salt of weak acid HF ($K_a = 7.2 \times 10^{-4}$) and weak base NH_4OH ($K_b = 1.8 \times 10^{-5}$), the solution of NH_4F will be _____.

1. slightly acidic
2. slightly basic
3. strongly basic
4. neutral

6)The theory which explain amphoteric nature of water is _____.

1. Arrhenius theory
2. Lewis theory
3. Ostwald theory
4. Bronsted-Lowry theory

7)The pK_b of weak base BOH [$K_b(BOH) = 1 \times 10^{-5}$] will be _____.

1. -5
2. 5
3. 1
4. 10^{-5}

1 Mark Very short answer questions

1)Name the buffer which is used to maintained pH of 8 to 10 for precipitation of cations III A group in qualitative analysis.

2)Write the solubility product of sparingly soluble salt Bi_2S_3. What is the pOH if the hydrogen ion concentration in solution is 1×10^{-3} mol dm^{-3}?

3)Write the relationship between molar solubility (S) and solubility product (K_{sp}) for CaF_2.

4)Give any one example of salt derived from weak acid and weak base.
5)Write the formula to calculate pH of buffer solution.
6)Label the one conjugate acid-base pair in the following reaction.
$COA3(aq)2-+HA2OA(l)\leftarrow---\rightarrow OHA-+HCOA3-$
7)Calculate the pOH of 10^{-8} M of HCl.

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2 Marks Short answer questions (Type- I)

1)Calculate the pH and pOH of 0.0001 M HCl solution.
2)The solubility product of $BaCl_2$ is 4.0×10^{-8}. What will be its molar solubility in mol dm^{-3}?
3)Classify the following species into Lewis acids and Lewis bases.

Cl-	
NHNH4+	
BCl3	
NH3	

4)Define p^{H}.
5)Define p^{OH}.
6)Define molar solubility. Write it's unit.
7)Write solubility product of following sparingly soluble salt.
$BaSO_4$
8)Write solubility product of following sparingly soluble salt.
CaF_2

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3 Marks Short answer questions (Type- II)

1)Define buffer solution.
2)Explain the types of buffer solutions.
3)Write one application of the following buffer: Citrate buffer
4)Write one application of the following buffer: HCOHCOHCO3- +H2CO3
5)Write one application of the following buffer: NH_4OH + NH_4Cl
6)Derive the equation which implies that the degree of dissociation of weak acid is inversely proportional to the square root of its concentration.
A buffer solution contains 0.3 mol dm^{-3} NH_4OH (K_b = 1.8 × 10^{-5}) and 0.4 mol dm^{-3} NH_4Cl. Calculate pOH of the solution.
7)The solubility of AgBr in water is 1.20 × 10^{-5} mol dm^{-3}. Calculate the solubility product of AgBr.

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4 Marks Long answer questions
1)Derive the equation p^H + p^{OH} = 14.
2)Distinguish between strong electrolyte and weak electrolyte.
3)If 'S' is solubility in mol dm^{-3} and Ksp is the solubility product, then write the relation between them for CaF_2 and $BaSO_4$.
Calculate the concentration of H_3O^+ ion in soft drink whose pH is 3.5.
4)Explain the amphoteric nature of water.
5)Define Solubility product.
6)Define Hydrolysis of salt.

Chapter 4: Chemical Thermodynamics

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1 Mark Multiple choice questions
1)An intensive property amongst the following is _____.
1. Mass

2. Volume
3. Number of moles
4. Temperature

2)The value of 1dm^3 bar is _____.

1. 10 J
2. 10^2 J
3. 10^3 J
4. 10^{-2} J

3)The work done in the dm3 bar when 200 mL of ethylene gas and 150 mL of HCl gas were allowed to react at 1 bar pressure is _____.

1. 0.10
2. 0.15
3. 0.20
4. 0.2

4)The work done in vacuum when 300 m mole of an ideal gas expands until its volume is increased by 2.3 dm^3 at 1 bar pressure is _____ mole.

1. Zero
2. One
3. Two
4. Three

5)For an Isothermal process

1. W = - Q
2. $\Delta U = W$
3. $\Delta U = Q + W$
4. $\Delta U = Q$

6)For an Isochoric process

1. $\Delta U = 0$
2. $\Delta V = 0$
3. $\Delta P = 0$
4. $Q = 0$

7)The change in internal energy in a reaction when 2kJ of heat is released by the system and 6 kJ of work is done on the system will be _____.

1. +4 kJ
2. 4kJ
3. +3 kJ
4. – 8 kJ

1 Mark Very short answer questions

1)Write the expression to calculate maximum work done when 1 mole of an ideal gas expands isothermally and reversibly from V_1 to V_2.
2)Write the mathematical relation between ΔH and ΔU during the formation of one mole of CO_2 under standard conditions.
3)The standard enthalpy of formation of water is - 286 kJ mol^{-1}. Calculate the enthalpy change for the formation of 0.018 kg of water.
4)Write the mathematical expression of the First Law of Thermodynamics for the Isobaric process
5)What is the sign convention when work is done on the system by the surrounding?
6)Write the expression showing the relation between enthalpy change and internal energy change for gaseous phase reaction.
7)Calculate enthalpy of formation of HCl if bond enthalpies of H_2, Cl_2 and HCl are 434 kJ mol^{-1}, 242 kJ mol^{-1} and 431 kJ mol^{-1} respectively.

2 Marks Short answer questions (Type- I)

1)Define the Standard enthalpy of combustion.
2)Define the Enthalpy of sublimation.
3)State and explain Hess's law of constant heat summation.
4)Write the features of reversible processes.
5)Derive an expression for pressure-volume work.
6)The enthalpy change of the following reaction
CHA4(g)+ClA2(g)⟶CHA3ClA(g)+HClA(g)
$\Delta H° = –104$ kJ. Calculate C – Cl bond enthalpy.
The bond enthalpies are

Bond	C – H	Cl – Cl	H – Cl
$\Delta H°/kJ\ mol^{-1}$	414	243	431

7)Calculate the standard enthalpy of combustion of $CH_{4(g)}$ if $\Delta_f H°(CH_4) = -74.8\ kJ\ mol^{-1}$, $\Delta_f H°(CO_2) = -393.5\ kJ\ mol^{-1}$ and $\Delta_f H°(H_2O) = -285.8\ kJ\ mol^{-1}$.

3 Marks Short answer questions (Type- II)

1)Define an isolated system.
2)Three moles of an ideal gas are expanded isothermally from 15 dm^3 to 20 dm^3 at a constant external pressure of 1.2 bar, calculate the amount of work in Joules.
3)What is enthalpy of fusion?
4)Derive the expression for the maximum work.
5)Derive the expression for work done in chemical reaction. Write the relationship between ΔH and ΔU for an isochoric process.
6)Define standard enthalpy of formation.
0.022 kg of CO_2 is compressed isothermally and reversibly at 298 K from an initial pressure of 100 kPa when the work obtained is 1200 J, calculate the final pressure.
7)Define the Enthalpy of vaporization.
8)Define the Standard enthalpy of combustion.
9)Why work done in vacuum is zero?

4 Marks Long answer questions

1)Define the Enthalpy of atomization.
2)Define the Extensive properties.
3)Calculate the standard enthalpy of formation of liquid methanol from the following data:

1. $CHA3OHA(l)+32\ OA2(g) \longrightarrow COA2(g)+2HA2OA(l) \quad \Delta H° = -726\ kJ\ mol^{-1}$

2. CA(Graphite)+OA2(g)⟶COA2(g) $\Delta_c H° = -393$ kJ mol^{-1}
3. HA2(g)+12 OA2(g)⟶HA2OA(l) $\Delta_f H° = -286$ kJ mol^{-1}

4)Define the Bond enthalpy.

5)Define the Enthalpy of ionisation.

Calculate the standard enthalpy of the reaction.

2FeA(s)+32 OA2(g)⟶FeA2OA3(s)

Given:

1.	2AlA(s)+FeA2OA3(s)⟶2FeA(s)+AlA2OA3(s),	$\Delta_r H° = -847.6$ kJ
2.	2AlA(s)+32 OA2(g)⟶AlA2OA3(s),	$\Delta_r H° = -1670$ kJ

6)How much heat is evolved when 12 g of CO reacts with NO_2? The reaction is:

$4CO_{(g)}$ $2NO_{2(g)} \rightarrow 4CO_{2(g)} + N_{2(g)}$, $\Delta_r H° = -1200$ kJ

7)Write an application of Hess's law.

Long answer questions

1)Does the following reaction represent a thermochemical equation?

CHA4(g)+2OA2(g)⟶COA2(g)+2HA2OA(g), $\Delta_f H° = -900$ kJ mol^{-1}

2)Classify the following into intensive and extensive properties.

Pressure, volume, mass, temperature.

3)Define state function and write two examples of it.

Chapter 5: Electrochemistry

1 Mark Multiple choice questions

1)Kohlrausch law is applicable for the solution _____.

1. At infinite dilution
2. a concentrated solution
3. concentrated as well as dilute solution
4. aqueous solution

2)During electrolysis of molten NaCl, which of the following statements is correct?

1. a pale green Cl_2 gas is released at anode
2. molten silvery white sodium is deposited at cathode
3. decomposition of NaCl into Na metal and Cl2 gas
4. all the above

3)SI unit of conductivity is _____.

1. Ω^{-1} m^{-1}
2. Ω cm^{-1}
3. Ω m^{-1}
4. Ω^{-1} m^2 mol^{-1}

4)In case of weak electrolyte the graph Λ vs cc is _____.

1. linear
2. not linear
3. straight line passing from origin
4. curved

5)In construction of Standard Hydrogen Electrode, platinum acts as _____.

1. inert electrode
2. positive ion producing electrode
3. negative ion producing electrode
4. null electrode

6)For hydrogen gas electrode, EHEH2 is calculated through to Nernst equation, where EHEH20 is always _____.

1. 1.1 V
2. 0 V
3. −1.1 V
4. 0.0592 V

7)When molten ionic compound is electrolyzed, a metal is formed at _____.

1. negative electrode
2. positive electrode
3. salt bridge
4. electrolyte

8)The molar conductivity and conductivity of $AgNO_3$ solution is 121.4 Ω^{-1} cm^2 mol^{-1} and 2.428 × 10^{-3} Ω^{-1} cm^{-1} at 25 °C. What is molar concentration of $AgNO_3$ solution?

1. 0.2 M
2. 0.02 M
3. 2.0 M
4. 2.2 M

9)A cell constituted by two electrodes A (EAAEA+/A0 = 0.35 V) and B (EBBEB+/B0) has value of EcellEcell0 equal to _____.

1. 0.77 V
2. 0.07 V
3. –0.77 V
4. –0.07 V

10)Calculate EcellEcell0 for galvanic cell with electrodes Co/Co^{3+}// Mn^{2+}/Mn.

EMnEMn0 = - 1.18 V, ECoECo0 = 1.82 V.

1. –3.0 V
2. +3.0 V
3. 1.36 V
4. 0.268 V

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1 Mark Very short answer questions

1)Give SI unit of resistivity.

2)What is cell voltage?

3)Write a mathematical expression for Standard Cell Potential.

4)Name the process by which water produces hydrogen gas at cathode during electrolysis of aqueous NaCl.

5)Give the chemical composition present in the salt bridge.

6)Write the potential produced through the NICAD storage cell.

7)Write an equation that shows the relationship between molar conductivity and degree of dissociation of weak electrolyte.

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2 Marks Short answer questions (Type- I)

1)Draw a neat and labelled diagram for electrolysis of fused NaCl.
2)What are the functions of a salt bridge in a galvanic cell?
3)Derive the relationship between standard cell potential and equilibrium constant of cell reaction.
4)Write applications of Kohlrausch's Law.
5)What is cell constant? Write its SI unit.
6)Mention difficulties in settings Standard Hydrogen Electrode.
7)What is the mass of copper metal produced at cathode during the passage of 2.03 A current through the $CuSO_4$ solution for 1 hour. Molar mass of Cu = 63.5 g mol^{-1}.
8)Mercury battery provides more constant voltage than any other dry cell: Explain.
9)Represent the galvanic cell from following overall cell reaction:
$3Ni_{(s)} + 2Al^{3+}$ (1 M) → $3Ni^{2+}$(1 M) + $2Al_{(s)}$
10)How many moles of electrons are required for reduction of 2 moles of Zn^{2+} to Zn?
11)Calculate standard cell potential of following galvanic cell:
Zn/Zn^{2+}(1 M) // Pb^{2+}(1 M)/Pb. If EPbEPb0 = 0.126 V
and EZnEZn0 = –0.763 V

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3 Marks Short answer questions (Type- II)

1)State Kohlrausch law of independent migration of ions.
2)Derive the relationship between Gibbs energy of cell reaction and cell potential.
3)Give the main difference between electrolytic conductivity and molar conductivity with respect to concentration. Also write one application of electrochemical series.
4)Write three important steps required to determine molar conductivity.
5)Draw a neat and well labelled diagram of Standard Hydrogen Electrode. Also write its one application.

6)Define Reference electrode. Write two applications of electrochemical series.
7)Calculate the voltage of the cell $Sn_{(s)}$ / Sn^{2+}(0.02 M) // Ag^{+} (0.01 M) / $Ag_{(s)}$ at 25 °C.
Given: ESnESn∘ = - 0.136, EAgEAg∘ = 0.800 V
8)Draw a well labelled diagram of a conductivity cell. Also write net cell reactions involved in electrolysis of aqueous NaCl.
9)Write a mathematical formula for mole ratio. How long will it take to produce 2.415g of Ag metal from its salt solution by passing a current of 3A? Molar mass of Ag= 107.9 g mol^{-1}.

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4 Marks Long answer questions

1)Why is Nickel-cadmium cell referred to as a secondary cell?
2)Write working of NICAD storage cell. Also write its applications.
3)Write relation between electrolytic conductivity and molar conductivity.
4)Calculate molar conductivities at zero concentration for $CaCl_2$ and NaCl.
5)Given: molar ionic conductivities of Ca^{2+}, Cl^{-}, Na^{+} ions are respectively, 104, 76.4, 50.1 Ω–1 cm^{-2} mol^{-1}
6)Calculate Ecell/Ecell∘ of the following galvanic cell:
$Mg_{(s)}$ / Mg^{2+}(1 M) // Ag^{+} (1 M) / $Ag_{(s)}$ if EMg/EMg∘ = – 2.37 V and EAg/EAg∘ = 0.8 V. Write cell reactions involved in the above cell. Also mention if cell reaction is spontaneous or not.
7)Explain construction, working in terms of cell reactions and the results of electrolysis of fused NaCl.

Chapter 6: Chemical Kinetics

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1 mark Multiple choice questions

1)A First order reaction is 50% complete in 69.3 minutes. Time required for 90% completion for the same reaction is _____.

1. 230.3 min
2. 100 min
3. 230 min
4. 125 min

2)Time required for 100% completion of a zero order reaction is _____.

1. a/k
2. a/2k
3. a.k
4. 2k/a

3)Rate constant of a reaction is $3.6 \times 10^{-3}\ s^{-1}$. The order of reaction is _____.

1. first
2. second
3. third
4. zero

4)The rate law relates to the rate of a chemical reaction in terms of _____.

1. concentration of catalyst
2. temperature
3. potential energy
4. mol/L of reactants

5)For first order reaction, the rate constant for the decomposition of N_2O_5 is $6 \times 10^{-4}\ s^{-1}$. The half-life period for decomposition in seconds is _____.

1. 11.55
2. 115.5
3. 1155
4. 1.155

6)Order of reaction for which unit of rate constant is mol $dm^{-3}\ s^{-1}$ is _____.

1. 1

2. 3
3. 0
4. 2

7)The rate of catalysed reaction is large than the uncatalysed reaction as _____.

1. E_a is larger
2. E_a is lower
3. E_a is same
4. threshold energy is absent

8)Which of the following is a unimolecular reaction?

1. $2HI \rightarrow H_2 + I_2$
2. $N_2O_5 \rightarrow N_2O_4 + ½O_2$
3. $H_2 + Cl_2 \rightarrow 2HCl$
4. $PCl_3 + Cl_2 \rightarrow PCl_5$

9)Effect of catalyst in a chemical reaction is to change the _____.

1. activation energy
2. equilibrium concentration
3. final products
4. heat of a reaction

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1 Mark Very short answer questions

1)Give one example of pseudo first-order reaction.

2)Write order of the following reaction:

3)2NHA3(g)⟶NA2(g)+3HA2(g) Identify molecularity of following reaction:

CA2HA5IA(g)⟶CA2HA4(g)+HIA(g)

4)Rate constant for the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ is 4.98×10^{-4} s^{-1}. Find the order of reaction?

5)Write a mathematical expression for integrated rate law for zero-order reaction.

6)Name the slowest step that determines the rate in a complex reaction.

7)Give one example of zero order reaction.

8)For the reaction 2NOA(g)+2HA2(g)⟶NA2(g)+2HA2OA(g),

9)The rate law is, rate = $k[NO]^2\ [H_2]$.What is the overall order of reaction?

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2 Marks Short answer questions (Type- I)

1)What is half life of first order reaction if time required to decrease concentration of reactants from 0.8 M to 0.2 M is 12 hours?

2)Distinguish between : Order and Molecularity of reaction

3)For the reaction $2NOBr \rightarrow 2NO_2 + Br_2$, the rate law is rate = $k[NOBr]_2$. If the rate of a reaction is 6.5×10^{-6} mol L^{-1} s^{-1}, when the concentration of NOBr is 2×10^{-3} mol L^{-1}. What would be the rate constant of the reaction?

4)Write four key points about order of reaction.

5)Explain pseudo first order reaction with a suitable example.

6)Define order of reaction with suitable examples.

7)Explain with the help of a potential energy diagram that the catalyst increases the rate of the reaction.

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3 Marks Short answer questions (Type- II)

1)Derive an integrated rate law expression for first order reaction: $A \rightarrow B + C$

2)Define molecularity. The rate constant of the first order reaction is 1.386 min^{-1}. Calculate the time required for 80% reactant to decompose?

3)A reaction occurs in the following steps:

Step 1: NOA2(g)+FA2⟶NOA2FA(g)+FA(g) (slow)

Step 2: FA(g)+NOA2(g)⟶NOA2F (Fast)

1. Write the equation of overall reaction.
2. Write the rate law.
3. Identify reaction intermediate.

4)Define half life of a reaction. Write units of rate constants for:

a. First-order reaction
b. Zero-order reaction

5)Write an expression for instantaneous rate of reaction:
$2N_2O_{(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$.

6)What is the order of reaction? Why is molecularity applicable for only elementary reactions whereas order of a reaction is applicable for elementary and complex reactions? Explain with suitable examples.
7)For a zero-order reaction, molecularity can never be equal to zero. Explain.
For the reaction $2A + B \rightarrow C$, rate of disappearance of A 0.076 mol s^{-1}.

1. What is the rate of formation of C?
2. What is the rate of consumption of B?
3. What is the rate of the overall reaction?

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4 Marks Long answer questions

1)In a first-order reaction $A \rightarrow B$, 60% of a given sample of a compound decomposes in 45 mins. What is the half-life of reaction? Also, write the rate law equation for the above first-order reaction.
2)Derive an expression for the relation between half-life and rate constant for first-order reaction.
3)The half-life period for the first order reaction is 1.7 hrs. How long will it take for 20% of the reactant to disappear?
4)Give one example of the reaction where order and molecularity are the same.
5)Mention any two factors that influence the rate of chemical reaction.
If for the reaction $A \rightarrow$ products, a straight line graph passing through origin is obtained between the rate of reaction against concentration of A, what would be the order of reaction? Why?