केन्द्रीय विद्यालय संगठन, अहमदाबाद संभाग

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कक्षा बारहवीं के लिए संभागीय स्तर प्रथम परीक्षा (2024-25)

FIRST COMMON MONTHLY TEST FOR CLASS XII

SUBJECT: CHEMISTRY **M.M.: 40**

CLASS: XII **TIME: 90 Minutes**

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GENERAL INSTRUCTIONS:

1. There are 19 questions in this question paper with internal choice.
2. SECTION A consists of 9 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 4 very short answer questions carrying 2 marks each.
4. SECTION C consists of 3 short answer questions carrying 3 marks each.
5. SECTION D consists of 1 case- based questions carrying 4 marks each.
6. SECTION E consists of 2 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed**

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	SECTION-A		
1	The charge required for reduction of 1 mol of $Cr_2O_7^{2-}$ ions to Cr^{3+} is-		1
	A	96500 C	
	B	2 x 96500 C	
	C	6 x 96500 C	
	D	4 x 96500 C	
2	When aqueous solution of NaCl is electrolyzed the product obtained at the cathode is-		1
	A	Hydrogen gas	
	B	Sodium metal	
	C	Oxygen gas	
	D	Chlorine gas	
3	The emf of the cell: Ni / Ni^{2+} (1.0 M) // Au^{3+} (1.0 M) / Au is: **(E° = -0.25 V for Ni^{2+}/Ni; E° = 1.5 V for Au^{3+}/Au)**		1
	A	1.25 V	
	B	-1.25 V	
	C	1.75 V	

	D	2.0 V	
4	When two liquids A and B are mixed, their boiling points become greater than both. The mixture is:		1
	A	ideal solution	
	B	non-ideal solution with negative deviation	
	C	non-ideal solution with positive deviation	
	D	normal solution	
5	Which of the following condition is not satisfied by an ideal solution?		1
	A	$\Delta H_{mixing} = 0$	
	B	$\Delta V_{mixing} = 0$	
	C	Raoult's Law is obeyed	
	D	Formation of an azeotropic mixture	
6	Consider the reaction: $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$. The equality relationship between $\frac{d[NH_3]}{2dt}$ and $-\frac{d[H_2]}{3dt}$ is-		1
	A	$\frac{d[NH_3]}{2dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$	
	B	$\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$	
	C	$\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$	
	D	$\frac{d[NH_3]}{dt} = -\frac{1}{2}\frac{d[H_2]}{dt}$	

Q.No. 7-9 Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below:

	A	Both A and R are true and R is the correct explanation of A.	
	B	Both A and R are true but R is not the correct explanation of A.	
	C	A is true but R is false.	
	D	A is false but R is true.	
7	**Assertion (A):** Osmotic pressure is the minimum pressure which needs to be applied to a solution to prevent the inward flow of its pure solvent across a semipermeable membrane.		1
	Reason (R): 0.1M NaCl will have same osmotic pressure as that of 0.1M Urea solution.		
8	**Assertion (A):** In a first-order reaction, the concentration of the reactant is doubled, its half-life is also doubled.		1

	Reason (R): First order reaction never be completed throughout life.	
9	**Assertion (A):** Copper sulphate cannot be stored in zinc vessel.	1
	Reason (R): Zinc is less reactive than copper.	
	SECTION – B	
10	What do you mean for secondary cell? Give chemical reaction taking place at anode, cathode and total cell reaction during discharging of lead storage battery.	2
11	Represent the cell in which the following reaction takes place. The value of E° for the cell is 1.260V. What is the value of E_{cell}? $2Al + 3Cd^{2+}(0.1M) \rightarrow 3Cd + 2Al^{3+}(0.01M)$	2
	OR	
	The cell in which the following reaction occurs: $2Fe^{3+}(aq) + 2I^-(aq) \rightarrow 2Fe^{2+}(aq) + I_2(s)$ has $E^\circ_{cell}=0.236$ V at 298 K. Calculate the standard Gibbs energy and the equilibrium constant (Log K) of the cell reaction.	2
12	(i) Define order of reaction. (ii) For an elementary reaction $H_2 + Cl_2 \rightarrow 2HCl$; Rate =k (a) Write the order and molecularity of this reaction. (b) Write the unit for rate constant (k)	2
13	State Henry's law. Why do gases always tend to be less soluble in liquids as the temperature is raised?	2
	SECTION - C	
14	(i) Write any two differences between ideal and non-ideal solutions. (ii) On mixing liquid X and liquid Y, the volume of resulting solution increases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?	3
15	(i) State Faraday's First Laws of electrolysis?	3
	(ii) Three electrolytic cells A, B, C containing solutions of $ZnSO_4$, $AgNO_3$ and $CuSO_4$ respectively are connected in series. A steady current of 1.5 amperes was passed through them until 1.45 g of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited?	
16	(i) Define half-life period for a reaction.	3
	(ii) Draw a graph between half-life and initial concentration of the reactant for a first order reaction.	

	(iii)	A first order reaction is found to have a rate constant, $k = 5.5 \times 10^{-14}$ S^{-1}. Find the half-life of the reaction.	
		OR	
	(i)	Define rate of reaction	3
	(ii)	A first order reaction takes 10 minutes for 25% decomposition. Calculate $t_{1/2}$ for the reaction. (Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021).	
		SECTION – D (CASE BASED)	
		Question no. 17 is case-based question and carries 4 (1+1+2) marks each.	
		Read the passage carefully and answer the questions that follow.	
17		**" Effect of Concentration on conductivity and molar conductivity"** Both conductivity and molar conductivity change with the concentration of the electrolyte. Conductivity always decreases with decrease in concentration both, for weak and strong electrolytes. The conductivity of a solution at any given concentration is the conductance of one-unit volume of solution kept between two platinum electrodes with unit area of cross section and at a distance of unit length. Molar conductivity increases with decrease in concentration. This is because the total volume, V, of solution containing one mole of electrolyte also increases. It has been found that decrease in κ (kappa) on dilution of a solution is more than compensated by increase in its volume. Physically, it means that at a given concentration, Λ_m can be defined as the conductance of the electrolytic solution kept between the electrodes of a conductivity cell at unit distance but having area of cross section large enough to accommodate sufficient volume of solution that contains one mole of the electrolyte. When concentration approaches zero, the molar conductivity is known as limiting molar conductivity and is represented by the symbol Λ°_m. Molar conductivity for weak electrolytes can be obtained from molar conductivities of strong electrolytes at infinite dilution by doing algebraic addition. For example, molar conductivity of weak electrolyte like CH_3COOH can be obtained from molar conductivities at infinite dilution of strong electrolytes like CH_3COONa, HCl and NaCl according to Kohlrauch's law $\Lambda^\circ_{m\ CH3COOH} = [\Lambda^\circ_{mCH3COO-} + \Lambda^\circ_{m\ Na+}] + [\Lambda^\circ_{m\ H+} + \Lambda^\circ_{m\ Cl-}] - [\Lambda^\circ_{m\ Na+} + \Lambda^\circ_{m\ Cl-}]$	
	(i)	Define limiting molar conductivity.	
	(ii)	The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1}. Calculate its molar conductivity.	1
	(iii)	How conductivity and molar conductivity does vary with dilution for both weak and strong electrolyte?	2
		OR	
	(iii)	Calculate Λ°_m for AgCl if Λ°_m ($AgNO_3$) = 133.4, Λ°_m(KCl)=149.9, $\Lambda^\circ_m(KNO_3)$=144.9 Scm^2mol^{-1}	2
		SECTION – E	
18	(i)	With the help of a labelled diagram show the role of catalyst for an exothermic reaction.	2

	(ii)	The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.	3
		OR	
	(i)	The following results have been obtained during the kinetic studies of the reaction. $2A+B \longrightarrow C + D$	3

Exp.	$\frac{A}{mol\,L^{-1}}$	$\frac{B}{mol\,L^{-1}}$	Initial rate of formation of $\frac{D}{mol\,L^{-1}\,min^{-1}}$
1	0.1	0.1	6.0×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-1}
4	0.4	0.1	2.4×10^{-2}

Determine the order of reaction, rate law and the rate constant for the reaction.

	(ii)	Consider a certain reaction A → Products with $k = 2.0 \times 10^{-2}\ s^{-1}$. Calculate the concentration of A remaining after 100 s if the initial concentration of A is 1.0 mol L^{-1}.	2
19	(i)	Name the suitable colligative property to determine molecular weight of biomolecules.	1
	(ii)	What happens when blood cells are placed in pure water (hypotonic)?	1
	(iii)	When a pressure higher than the osmotic pressure is applied on the surface of the solution separated from a solvent by semi permeable membrane, what will happen?	1
	(iv)	A 5% solution of electrolyte $Na_2SO_4.10H_2O$ (MW = 322 g mol^{-1}) is isotonic with 2% solution of non- electrolytic, non-volatile substance X. Find out the molecular weight of X. Consider complete dissociation for $Na_2SO_4.10H_2O$.	2
		OR	
	(i)	Define Van't Hoff factor.	1
	(ii)	Give the value of Van't Hoff factor in case of the following: (a) Association (b)Dissociation	1
	(iii)	3.9 g of benzoic acid dissolved in 49 g of benzene shows a depression in freezing point of 1.62K. Calculate the van't Hoff factor and predict the nature of solute (associated or dissociated)	3

		(Given molar mass of benzoic acid = 122 g mol $^{-1}$, Kf for benzene = 4.9 K kg mol $^{-1}$)	

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