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FOR HARYANA CLASS 12 PREPARATION

HBSE Class 12 Sample Paper 2027 Chemistry Marking Scheme

EXAM	YEAR	TYPE	SUBJECT
Haryana Class 12	2027	Answer Key	Chemistry

CLASS : 12th (Sr. Secondary)

MARKING SCHEME 2026-27

CHEMISTRY (Subject Code: 856)

Paper Code :- ……..

Q.No.	EXPECTED OUTCOMES /VALUE POINTS	Marks
	SECTION - A (1 Mark each)	
Q.1	(D) Depression in boiling point	**1**
Q.2	(C) Peptide bond	**1**
Q.3	(C) Thymine	**1**
Q.4	(A) Ethylamine	**1**
Q.5	(C) Propan-1-ol < Butan-2-ol < Butan-1-ol < Pentan-1-ol	**1**
Q.6	(B) Butan-2-ol	**1**
Q.7	(D) $[Co(NH3)_4Cl_2]^+$ (heteroleptic)	**1**
Q.8	(B) Diamminedichloridoplatinum(II)	**1**
Q.9	(C) [Ar] $3d^5$ $4s^1$	**1**
Q.10	Electrophilic substitution reactions	**1**
Q.11	Peptide linkage	**1**
Q.12	Rosenmund reduction	**1**
Q.13	$RMgX + CO_2 \rightarrow RCOOMgX \rightarrow H_3O^+ \rightarrow RCOOH$	**1**
Q.14	S^{-1}	**1**
Q.15	$S\ m^{-1}$	**1**
Q.16	(D) Assertion false, Reason true	**1**
Q.17	(A) Both true, Reason correct explanation	**1**
Q.18	(A) Both true, Reason correct explanation	**1**
	SECTION – B (2 Marks each)	
Q.19	(i) Pentaamminecarbonatocobalt(III) chloride. (1 Mark) (ii) Potassium tri(oxalato)ferrate(III). (1 Mark)	**1** **1**
Q. 20	(a) Methyl bromide with sodium in dry ether: $2CH_3Br + 2Na \rightarrow C_2H_6 + 2NaBr$ (Wurtz reaction) (1 Mark) (b) Ethyl chloride with aqueous KOH: $C_2H_5Cl + KOH(aq) \rightarrow C_2H_5OH + KCl$ (Ethanol formed) (1 Mark)	**1** **1**
Q. 21	(i) $Ca^{2+} + 2e^- \rightarrow Ca$ 40 g Ca requires 2F 20 g Ca requires 1F (ii) $Al^{3+} + 3e^- \rightarrow Al$ 27 g Al requires 3F Answer: (i) 1F (ii) 3F (1 mark each)	**1** **1**
OR	Cell Representation: $Mg(s)\|Mg^{2+}$ (0.130 M)$\|\|Ag^+$ (0.0001 M)$\|Ag(s)$	

	Calculation of Ecell : $Q = [Ag^+]^2 / [Mg^{2+}]$ $= (10^{-4})^2 / 0.130 \quad = 1.3 \times 10^{-7}$ $Ecell = E°cell - (0.0591 / 2) \log Q$ $= 3.17 - 0.02955 \log (1.3 \times 10^{-7}) = 3.17 - 0.210$ Ecell = 2.96 V	**1** **1**
Q. 22	Cannizzaro Reaction: $2HCHO + NaOH \rightarrow HCOONa + CH_3OH$ (1 Mark) HVZ Reaction: $CH_3COOH + Br_2/P \rightarrow CH_2BrCOOH + HBr$ (1 Mark)	**1** **1**
Q.23	First-order reaction: $k = 2.303/t \log(a/(a-x))$ $k = 2.303/5 \times \log(0.6/0.2)$ $= 2.303/5 \times 0.48$ $= 0.221\ min^{-1}$ Answer = 0.221 min−1	½ **1** ½
OR	$k = 2.54 \times 10^{-3}\ s^{-1}$ For 75% decomposition, 25% remains:$[R]^0/[R] = 4$ $t = 2.303/k \log [R]_0/[R]$ t = 544 s	 **1** **1**
Q.24	(i) Correct Structure (1 Mark) (ii) Ethanol will be formed , if correct equation (1mark)	**1** **1**
Q.25.	(a) Butanal + $H_2/Ni \rightarrow$ Butan-1-ol (1 Mark) (b) $CH_3CH=CH_2 + H_2O/H^+ \rightarrow CH_3CH(OH)CH_3$ Product: Propan-2-ol (1 Mark)	**1** **1**
OR	(a)Boiling point of alcohols increases with increase in molecular mass and decreases with branching. Methanol<Ethanol<Propan-1-ol<Butan-2-ol<Butan-1-ol<Pentan-1-ol (b)Boiling point increases with stronger intermolecular forces:n-Butane<Ethoxyethane<Pentanal<Pentan-1-ol	**1** **1**
Q.26	(i) Phenol → 2,4,6-Tribromophenol Reagent: Bromine water. (1 Mark) (ii) Propene → Propan-1-ol Reagent: $BH_3 \cdot THF$ followed by H_2O_2/OH^- (Hydroboration-oxidation). (1 Mark) (iii) Butan-2-one → Butan-2-ol Reagent: NaBH4 or LiAlH4. (1 Mark)	**1** **1** **1**

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OR	(i) Acid-catalysed hydration of alkene: Step 1: Protonation of alkene to form carbocation. Step 2: Attack of water molecule. Step 3: Deprotonation to form alcohol. Thus, alkene gives the corresponding alcohol. (ii) RCH_2OH (Carboxylic acid is reduced to primary alcohol.).	**2** **1**
Q.27	Moles of ethylene glycol = 45/62 = 0.726 mol Mass of water = 0.600 kg Molality = 0.726/0.600 = 1.21 m Formula (1 Mark) $\Delta T_f = K_f \times m$ $= 1.86 \times 1.21 \quad = 2.25°C$ Calculation (1 Mark) Freezing point = 0 − 2.25 = −2.25°C Answer (1 Mark)	**1** **1** **1**
Q.28	$[Ni(CN)_4]^{2-}$: $Ni^{2+} = 3d^8$ CN^- is strong field ligand. Pairing occurs and dsp2 hybridisation formed. Square planar and diamagnetic. (1.5 Marks) $[NiCl_4]^{2-}$: Cl− is weak field ligand. No pairing occurs. sp3 hybridisation formed. Tetrahedral and paramagnetic. (1.5 Marks)	**1 ½** **1 ½**
Q.29	(a) Hydrolysis products: Sucrose → Glucose + Fructose (1 Mark) Lactose → Glucose + Galactose (1 Mark) (b) Vitamin C is water-soluble and excess amount is excreted through urine, therefore it cannot be stored in the body. (1 Mark)	**1** **1** **1**
Q.30	$k = 1.15 \times 10{-}3\ s^{-1}$ Formula (1 Mark) $t = 2.303/k \log(a/a{-}x)$ $t = 2.303/(1.15{\times}10{-}3) \times \log(5/3)$ Calculation (1 Mark) $= 2002.6 \times 0.222 \quad = 444.6$ s Answer ≈ 445 s Answer (1 Mark)	**1** **1** **1**
OR	Given: t = 40 min 30% decomposed ⇒ 70% remains For a first-order reaction, $t = (2.303/k) \log (a/(a - x))$ $40 = (2.303/k) \log (100/70) \quad 40 = (2.303/k) \times 0.155$ $k = 8.92 \times 10^{-3}\ min^{-1}$	**2**

	Now, $t_{1/2} = 0.693/k$ $t_{1/2} = 0.693/(8.92 \times 10^{-3})$ = 77.7 min Answer: $t_{1/2} \approx 78$ min.	**1**
Q.31	(a) Complete the following equations: (i) CH_3CONH_2 ⟶(i) $LiAlH_4$ / (ii) H_2O⟶ $CH_3CH_2NH_2$ (ii) p-Nitrotoluene ⟶Fe + HCl⟶ p-Toluidine (p-$CH_3C_6H_4NH_2$) (b) Primary amines have higher boiling points than tertiary amines because primary amines form stronger intermolecular hydrogen bonds. (c) Classification of amines: • $C_2H_5NHCH_3$ – Secondary amine • CH_3NH_2 – Primary amine • $(CH_3)_2NC_2H_5$ – Tertiary amine OR (c) Butane-1-ol is more soluble in water than Butane-1-amine because the –OH group forms stronger hydrogen bonds with water than the $–NH_2$ group.	**1** **1** **1** **1** **1**
Q.32	(a) Calculation of mass of $CaCl_2$ Formula: $\pi = (i\ nRT) / V$ $n = (\pi V) / (iRT)$ $n = (0.70 \times 2.46) / (2.59 \times 0.082 \times 300)$ $n = 0.0271$ mol Mass of $CaCl_2$: $m = n \times M$ $m = 0.0271 \times 111$ $m = 3.01$ g Answer: Mass of $CaCl_2 = 3.01$ g (b) Endosmosis OR (b) Osmotic pressure can be measured accurately for very dilute solutions at room temperature. (c) Reverse Osmosis (RO)	**1** **1** **1** **1** **1**

Q,33	(i) Propanone → Propene $CH_3COCH_3 \rightarrow CH_3CHOHCH_3 \rightarrow CH_3CH=CH_2$ (2 Marks) (ii) Benzoic acid → Benzaldehyde Use SOCl2 then H2/Pd-BaSO4 (Rosenmund reduction) (1 Mark) (iii) Benzene → m-Nitroacetophenone Acetylation followed by nitration. (1 Mark) Reactivity toward HCN: $(CH_3)_3C\text{-}CO\text{-}C(CH_3)_3 < CH_3COCH_3 < CH_3CHO$ (1 Mark)	**2** **1** **1** **1**
OR	(a) Chemical Tests : (i) Acetophenone and Benzophenone Iodoform Test: • Acetophenone → Yellow precipitate of CHI_3 (positive test) • Benzophenone → No precipitate (ii) Propanal and Propanone Tollens' Test: • Propanal → Silver mirror formed • Propanone → No reaction (iii) Pentan-2-one and Pentan-3-one Iodoform Test: • Pentan-2-one → Yellow precipitate of CHI_3 • Pentan-3-one → No precipitate (b) (i) Stronger Acid :- $CH_2FCOOH > CH_3COOH$ Reason: F atom shows strong –I effect, which stabilizes the carboxylate ion and increases acidity. (ii) Increasing order of boiling points: $CH_3CH_2CH_3 < CH_3CHO < CH_3COCH_3 < CH_3CH_2OH$	**1** **1** **1** **1** **1**
Q.34	Given: $\kappa = 1.06\times10^{-2}$ S cm^{-1} Molar conductivity: Λm calculation (2 Marks) $\Lambda m = \kappa \times 1000/M$ $= 1.06\times10^{-2} \times 1000/0.1 = 106$ S cm^2 mol^{-1} $\Lambda°m = 50.1 + 76.5 = 126.6$ cm^2 mol^{-1} Λ°m calculation (2 Mark) Degree of dissociation: $\alpha = 106/126.6 = 0.837$ Degree of dissociation (1 Marks)	**2** **2** **1**

OR	(a) Given: $\kappa_1 = 1.29 \times 10^{-2}$ S cm^{-1} (for 0.1 M KCl) , $R_1 = 100\ \Omega$, $R_2 = 300\ \Omega$ Cell constant = $\kappa_1 \times R_1 = (1.29 \times 10^{-2}) \times 100 = 1.29$ cm^{-1} Conductivity of 0.01 M KCl: κ_2 = Cell constant / R_2 $= 1.29 / 300 = 4.3 \times 10^{-3}$ S cm^{-1} Molar conductivity: $\Lambda_m = (\kappa \times 1000) / C$ $= (4.3 \times 10^{-3} \times 1000) / 0.01 = 430$ S cm^2 mol^{-1} (b) (i) Any two advantages of H_2–O_2 fuel cell: • High efficiency. • Environment-friendly; water is the only product. (ii) Cell potential of mercury cell remains constant because the overall reaction does not involve any change in concentration of reactants or products.	**1** **1** **1** **1** **1**
Q.35	Preparation of $KMnO_4$: 1. Pyrolusite (MnO_2) fused with KOH in air to form K_2MnO_4. 2. Oxidation of manganate to permanganate. 3. Crystallisation of KMnO4. Oxalate ion reaction: $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$ Iodide ion reaction: $2MnO_4^- + 10I^- + 16H^+ \rightarrow 2Mn_2^+ + 5I_2 + 8H_2O$	**2** **1 ½** **1 ½**
OR	(i) (a) Transition metals form complex compounds because they have vacant d-orbitals and small size with high charge density. (b) Zn^{2+} salts are colourless because Zn^{2+} has completely filled $3d^{10}$ orbitals, while Ni^{2+} salts are coloured due to partially filled 3d orbitals causing d-d transitions. (c) Cr^{2+} is a strong reducing agent because it readily loses an electron to form the more stable Cr^{3+} ion. (ii) The f-block elements (Lanthanoids and Actinoids) are called inner transition elements. General electronic configuration: $(n-2)\ f^{1-14}\ (n-1)\ d^{0-2}\ ns^2$	**1** **1** **1** **1** **1**