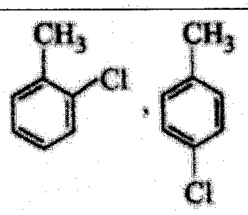
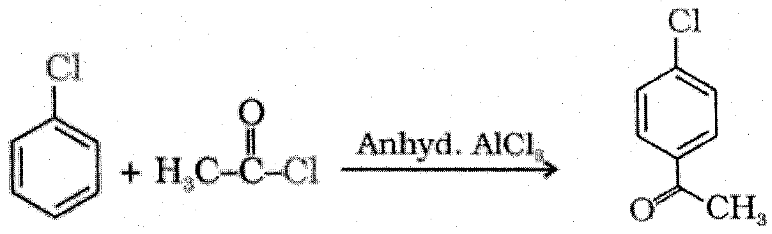
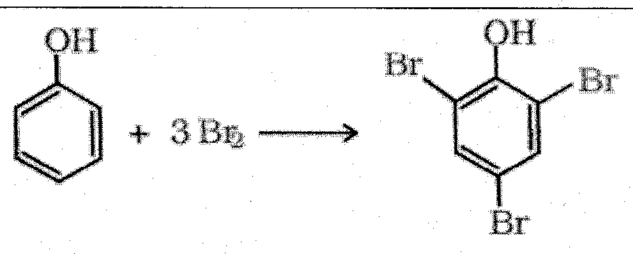
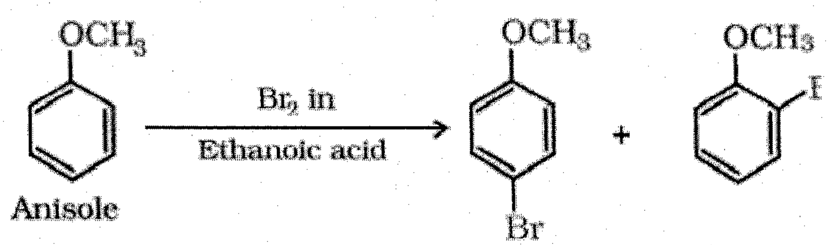
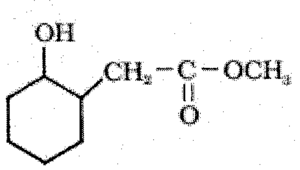
COMMON PRE-BOARD EXAMINATION 2022-23

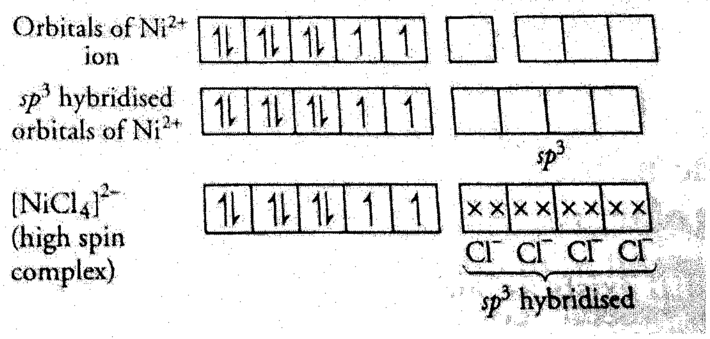
Subject: (Chemistry - 043)

CLASS XII – MARKING SCHEME

1.	c. 307	**1**
2.	a. mol L^{-1} s^{-1}	**1**
3.	b. First order of reaction	**1**
4.	c. 10 $t_{½}$ = $t_{99.9\%}$	**1**
5.	a. Cr	**1**
6.	b. C_6H_5-NH_2	**1**
7.	b. Dimethylamine	**1**
8.	d. Methanal	**1**
9.	c. Benzene-1,2-dicarbaldehyde	**1**
10.	(a) 	**1**
11.	c. *(A)*-RNC , *(B)*- RCN	**1**
12.	c. EDTA	**1**
13.	a. $[Ni(CO)_4]$	**1**
14.	c. Ethoxyethane and Ethene	**1**
15.	d. A is false but R is true.	**1**
16.	d. A is false but R is true.	**1**
17.	b. Both A and R are true but R is not the correct explanation of A.	**1**
18.	d. A is false but R is true.	**1**
19.	a) Primary battery b) Anode: $Zn(Hg) + 2OH^- \longrightarrow ZnO(s) + H_2O + 2e^-$ Cathode: $HgO + H_2O + 2e^- \longrightarrow Hg(l) + 2OH^-$ The overall reaction is: $Zn(Hg) + HgO(s) \longrightarrow ZnO(s) + Hg(l)$	**½** **½** **½** **½**
20.	a) Rate increases by 27 times. b) 2^{nd} order reaction.	**1** **1**
21.	a) At a high temperature, collision frequency or kinetic energy of the particles increases. b) The probability that more than three molecules can collide and react simultaneously is very small.	**1** **1**

22.	a) $K_2[NiCl_4]$ b) $[Pt(NH_3)_4Cl(NO_2)]SO_4$	**1** **1**
23.	a) CH_3I. Iodine is a better leaving group because of larger size. b) CH_3Cl.Primary halide reacts faster in S_N2 reaction **OR** a)  b) $2CH_3CH_2Cl + 2Na \xrightarrow[\text{Wurtz reaction (-2NaCl)}]{\text{Dry ether}} CH_3CH_2-CH_2-CH_3$ Chloroethane *n*-butane	**1** **1** **1** **1**
24.	The oxide linkage through which two monosaccharide units are joined together by the loss of a water molecule to form a molecule of disaccharide is called the glycosidic linkage. OR (i) Peptide bond: Proteins are condensation polymers of α-amino acids in which the same or different α-amino acids are joined by peptide bonds. (ii) Primary structure: Proteins may contain one or more polypeptide chains. The specific sequence in which the various amino acids present in a protein linked to one another is called its primary structure.	**2** **1** **1**
25.	a)  b) 	**1** **1**
26.	P_1^0 = 3.165KPa W_2 = 5g W_1=95 g	

	M_2=60 gmol^{-1} M_1=18gmol^{-1} $P_1^0 - P_1/P_1^0 = n_2/n_1$ $P_1^0 - P_1/P_1^0 = W_2 x M_1/M_2 x W_1$ 3.165-P_1 = 0.05 P_1= 3.115KPa	1 1 1
27.	a) A - C_6H_5CN, B - C_6H_5COOH b) NH_2 group is o, p directing, therefore o, p products are formed. in the strongly acidic medium, aniline is protonated to form the anilinium ion which is meta directing. That is why besides the ortho and para derivatives, significant amount of meta derivative is also formed. c) Carbylamine test $CH_3NH_2 + CHCl_3 + 3\ KOH \rightarrow CH_3NC + 3H_2O + 3KCl$ (foul smelling) whereas $(CH_3)_2NH$ will not. **OR** Hinsberg's test $CH_3NH_2 + C_6H_5SO_2Cl \rightarrow C_6H_5SO_2NHCH_3 + HCl$ (soluble in alkali) whereas $(CH_3)_2NH$ forms a product insoluble in alkali. d) Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one and hydrogen of another molecule. This intermolecular association is more in primary amines than in secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it. Tertiary amines do not have intermolecular association due to the absence of hydrogen atom available for hydrogen bond formation.	½ ½ 1 1 1
28.	a) $CH_3CH_2CH_2OH$ b) CH_3CHO c) 	1 1 1
29.	(i) Tetrachloridonickelate (II)ion (ii) $Ni^{2+} = 3d^8 4s^0$	1 1

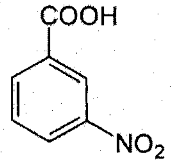
	 (iii) Tetrahedral geometry	1
30.	a) (i) Halogen atom attached to Benzene is ortho and para directing. Due to resonance, the electron density at ortho and para positions increases. The halogen atom has the tendency to withdraw electrons due to which electron density on Benzene decreases and the ring gets deactivated. (ii) More energy is required to overcome the attractions between the haloalkanes molecule and break the hydrogen bonds between the water molecules. Less energy is released when new attractions are setup between the haloalkanes and water molecules. b) $CH_3CH_2Cl + AgNO_2 \longrightarrow CH_3CH_2NO_2 + AgCl$ **OR** a) 1-Bromopentane. No branching, more surface area, stronger van der Waals forces. b) 2-Bromopentane. Presence of chiral carbon c) 2-Bromo-2-methylbutane. More substituted alkene is obtained (Zaitsev rule)	1 1 1 1 1 1
31.	a. Proteins are very large molecules composed of basic units called amino acids linked through peptide bonds. b. Modifications that occur in protein structures are called denaturation Coagulation is the process of aggregation of smaller molecules into larger molecules leading to deposition. c. Lowering the pH, increases the rate of denaturation of protein. OR	1 1 2

	c. Higher temperature, increases the rate of denaturation of protein.	2
32.	a) The elevation in boiling point when one mole of non-volatile solute is added to one kilogram of solvent. b) The vapour pressure of the solvent decreases c) $m = \Delta T_b/K_b$ $= 0.6/5.03 = 0.12\ molkg^{-1}$ OR c) $M_2 = \frac{K_b \times W_2 \times 1000}{\Delta T_b \times W_1}$ $M_2 = \frac{5.03 \times 3 \times 1000}{0.6 \times 100} = 251.5$	1 1 1 1 1 1
33.	a) $\Delta G^\theta = -nFE^\theta_{cell}$ $\Delta G^\theta = -6 \times 96500 \times 2.02$ $\Delta G^\theta = -1169580\ Jmol^{-1}$ $E^\theta_{cell} = \frac{0.059}{n} \log Kc$ $\log Kc = \frac{2.02 \times 6}{0.059}$ $\log Kc = 205.42$ b) $Cu^{2+} + e^- \rightarrow Cu^+$ So, 1 mol of Cu^{2+} requires 1 F 5 moles of Cu^{2+} require 5 F $Q = I \times t$ $t = \frac{Q}{I}$ $t = \frac{5 \times 96500}{10}$ $= 48250\ s$ **OR** a) $\Lambda_m = \frac{k}{c} \times 1000$ $\Lambda_m = \frac{0.0012126}{0.02} \times 1000$ $= 60.63\ Scm^2mol^{-1}$ Degree of dissociation (α) = $60.63\ Scm^2mol^{-1} / 404.2\ Scm^2mol^{-1}$ $= 0.15$ b) (i) The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte. (ii) Limiting molar conductivity of an electrolyte can be represented	 1 ½ 1 ½ ½ ½ 1 ½ ½ 1 1 1 1

as the sum of the individual contributions of the anion and cation of the electrolyte.

34. a)

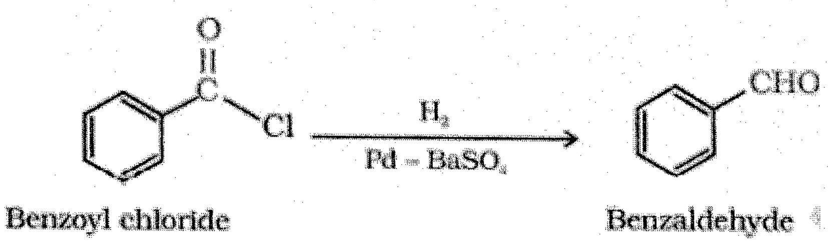
(i) 3-Nitrobenzoic acid **1**



(ii) $CH_3CH_2CH=NNHCONH_2$ **1**

(iii) $CH_3CH_2CH=CHCH_2CHO$ **1**

b) (i) Acyl chloride (acid chloride) is hydrogenated over catalyst, palladium on barium sulphate. This reaction is called Rosenmund reduction. **1**



(ii) Carboxylic acids having an α-hydrogen are halogenated at the α-position on treatment with chlorine or bromine in the presence of small amount of red phosphorus to give α-halocarboxylic acids. The reaction is known as Hell-Volhard-Zelinsky reaction. **1**

$$R\text{-}CH_2\text{-}COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2\text{/Red phosphorus}} R\text{-}CH(X)\text{-}COOH$$

X = Cl, Br

OR

a) $CH_3CH(CH_3)COOH < CH_3CH_2COOH < CH_3CH(Br)COOH < CH_3C(Br_2)COOH$ **1**

b)

$$CH_3CH{=}CH_2 \xrightarrow{H_2O/H^+} CH_3CH(OH)CH_3 \xrightarrow{CrO_3} CH_3COCH_3$$ **1**

c)

$$CH_3-CH=C(CH_3)-CH_3$$ **1**

2-MethylBut-2-ene (A)

	CH_3CHO (B) Ethanal CH_3COCH_3 (C) Propanone	**1** **1**
35.	a) (i) This is due to their ability to adopt multiple oxidation states and to form complexes. (ii) The almost identical radii of Zr (160 pm) and Hf (159 pm), a consequence of the lanthanoid contraction, account for their occurrence together in nature and for the difficulty faced in their separation. b) (i) Ti^{4+} is the most stable, completely filled orbitals, stable configuration Ti^{4+} - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$ (ii) Ti^{4+}, no unpaired electrons, no d-d transition (iii) Mn^{3+}, 4 unpaired electrons.	 **1** **1** **1** **1** **1**