



## B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS  
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL



Class: 12

Date: 12.1.26

Time: 3 hours

Max Marks: 70

### MARKING SCHEME (SET-2)

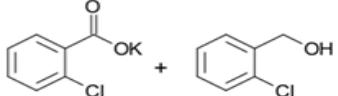
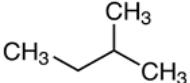
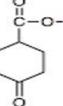
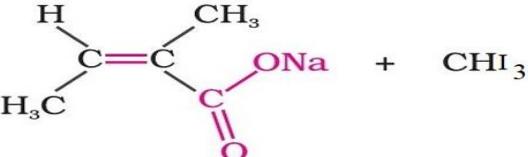
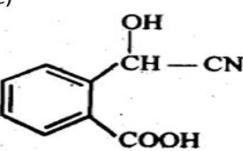
Q. No.	Questions	Marks
1.	(B) $271.6 \text{ S cm}^2 \text{ mol}^{-1}$	1
2.	(B) $\text{Fe}^{3+}$	1
3.	(B) 2	1
4.	(D) Variable oxidation states	1
5.	(C) $\text{Ar} < \text{CO}_2 < \text{CH}_4 < \text{HCHO}$	1
6.	(C) $t_{2g}^4 e_g^2$	1
7.	(A) I, II, and III	1
8.	(C) Vinyl halide	1
9.	(D) $(\text{CH}_3)_3\text{COH}$	1
10.	(A) Sandmeyer's reaction	1
11.	(D) only Z	1
12.	(C) D-glucose	1
13.	(D) Assertion is wrong, but reason is correct statement.	1
14.	(C) Assertion (A) is true, but Reason (R) is false.	1
15.	(A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.	1
16.	(A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.	1
17.	<p><b>Mechanism</b></p> <p><b>Step 1:</b> Formation of protonated alcohol.</p> <p></p> <p><b>Step 2:</b> Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.</p> <p></p> <p><b>Step 3:</b> Formation of ethene by elimination of a proton.</p> <p></p> <p style="text-align: center;"><b>“OR”</b></p>	2

	<p>a) Yes, it is correct. It is because after the removal of <math>H^+</math> ion the phenoxide ion formed is more stable than ethoxide ion.</p> <p>b) reaction of phenol with chloroform gives salicylaldehyde.</p>	1
18.	$K = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $= \frac{2.303}{40} \log \frac{[100]}{[70]}$ $= \frac{2.303}{40} \log \frac{10}{7} = \frac{2.303}{40} \times 0.1549$ $= 8.918 \times 10^{-3} \text{ min}^{-1}$ $t_{1/2} = \frac{0.693}{K}$ $t_{1/2} = \frac{0.693}{8.918 \times 10^{-3}}$ $= 77.7 \text{ min}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
19.	<p>(i) Square planar, diamagnetic</p> <p>(ii) <math>[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2</math> and No. of ions = 3</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
20.	<p>(a) Molecules of benzoic acid dimerise in benzene, the number of particles is reduced.</p> <p>(b) The intermolecular interactions between ethanol and acetone are weaker/ the escaping tendency of ethanol and acetone molecules increases on mixing / the vapour pressure increases.</p>	2
21.	<p>(a) Starch is made up of <math>\alpha</math>-D glucose units while cellulose is made up of <math>\beta</math>-D glucose units.</p> <p>(b) A glycosidic linkage is the bond that joins monosaccharides (simple sugars) together to form disaccharides and polysaccharides (carbohydrates), whereas a peptide bond is the amide linkage that joins amino acids to form peptides and proteins.</p> <p>(c) Amino acids linked with each other in a specific sequence is a primary structure while secondary structure refers to the shape in which a long polypeptide chain can exist.</p> <p>(Or any other one suitable difference).</p>	$1$ $1$ $1$
22.	$\Delta T_f = 2.8 \text{ } ^\circ\text{C} = 2.8 \text{ K}$ (temp. difference) <p><math>\Delta T_f = K_f \times w_B / M_B \times W_A (\text{kg})</math></p> $2.8 = 1.86 \times w_B / 62 \times 1$ $w_B = 2.8 \times 62 / 1.86$ $w_B = 93.33 \text{ g}$ (Deduct $\frac{1}{2}$ mark for incorrect unit or no unit)	$1$ $1$ $1$
23.	For the given cell,	



26.	<p>(a) Beside being a nucleophile, methoxide acts as a strong base. Thus, elimination reaction predominates over substitution to give alkene as the main product and not ether.</p> <p>(b) p-nitrophenol has higher boiling point than that of o-nitrophenol. This is due to intermolecular H-bonding in p-nitrophenol, whereas intramolecular H-bonding in o-nitrophenol.</p> <p>(c) It is due to the repulsion between the unshared electron pairs of oxygen.</p> <p style="text-align: right;">(Or any other suitable reason).</p>	1 1 1
27.	<p></p> <p>Name: N-Ethylbenzamide.</p> <ul style="list-style-type: none"> <li>• No, 'X' will not undergo the Hoffmann bromamide degradation reaction.</li> <li>• As it is a N-substituted amide.</li> </ul> <p style="text-align: center;"><b>“OR”</b></p> <p>(a) Hinsberg test (or any correct test)</p> <p>(b) <math>\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[\text{Pyridine}]{(\text{CH}_3\text{CO})_2\text{O}} \text{C}_6\text{H}_5\text{NHCOCH}_3</math></p> <p>Name of main product – N-phenylethanamide or Acetanilide</p> <p>(c) Iodobenzene</p>	1 1 1 1 1 1
28.	<p>(a) 3-Bromo-2-methylbutanoic acid</p> <p>(b) <math>\text{CH}_2\text{FCOOH}</math> is stronger acid as F shows –I effect.</p> <p>(c) Propane &lt; Propanal &lt; Propanol &lt; Propanoic acid</p>	1 1 1
29.	<p>(i) 8 mol <math>\text{AgCl}</math> will be formed Mass of 8 mol <math>\text{AgCl} = 143.5 \times 8 = 1148\text{g}</math></p> <p>(ii) Haemoglobin</p> <p style="text-align: center;"><b>“OR”</b></p> <p>(ii) The electronic configuration of Ni is <math>[\text{Ar}] 3\text{d}^8 4\text{s}^2</math> which shows that it can only form two types of complexes i.e. square planar (<math>\text{dsp}^2</math>) in presence of strong ligand and tetrahedral (<math>\text{sp}^3</math>) in presence of weak ligand. There are four empty orbitals in Ni while octahedral complexes require six empty orbitals.</p> <p>(iii) 3, 6</p>	1 1 1 1
30.	<p>a) Biofuel, provide energy, an instant source of energy, energy storage, cell wall formation. (any two) (or any other two suitable functions)</p> <p>(b) A carbohydrate that cannot be hydrolysed further to give a simpler unit of polyhydroxy aldehyde or ketone.</p> <p>(c) (i) Rickets (in children) / Osteomalacia (in adults).</p> <p style="text-align: center;"><b>“OR”</b></p> <p>(c) (ii) Insulin.</p>	2 1 1
31.	(i) $W = \frac{M_i t}{n F}$	1

	$w = \frac{58.7 \times 5 \times 20 \times 60}{2 \times 96500}$ $= 1.82 \text{ g}$	1 1
	(ii) Molar conductivity of a strong and weak electrolyte increases with dilution. The molar conductivity increases with decrease in concentration or on dilution. The molar conductivity of a weak electrolyte rises steeply at low concentration. The molar conductivity of a strong electrolyte decreases slightly with the increase in concentration. This is due to increase in mobility of ions and increase in ionisation of weak electrolyte	2
	<b>“OR”</b>	
	(a)	
	Given : $K = 4 \times 10^{-5} \text{ S/cm}$ , $M = 0.001 \text{ M}$ $\Lambda^{\circ}m = 390 \text{ S cm}^2/\text{mol}$ , $k = ?$	1
	Using the formula	
	$\Lambda_m^c = \frac{K \times 1000}{\text{Molarity}}$ $= \frac{4 \times 10^{-5} \text{ S cm}^{-1} \times 1000 \text{ cm}^3 \text{ L}^{-1}}{0.001 \text{ mol L}^{-1}}$ $= 40 \text{ S cm}^2 \text{ mol}^{-1}$ $\alpha = \frac{\Lambda_m^c}{\Lambda_m^{\circ}} = \frac{40}{390} = 0.1025$ $\text{CH}_3\text{-COOH} \rightleftharpoons \begin{matrix} \text{CH}_3\text{-COO}^- \\ \text{C} \\ \text{C}(1-\alpha) \end{matrix} + \begin{matrix} \text{H}^+ \\ 0 \\ \text{C}\alpha \end{matrix}$ $k_{\alpha} = \frac{[\text{CH}_3\text{-COO}^-][\text{H}^+]}{[\text{CH}_3\text{-COOH}]} = \frac{\text{C}\alpha \cdot \text{C}\alpha}{\text{C}(1-\alpha)} = \frac{\text{C}\alpha^2}{1-\alpha}$ $k = \frac{10^{-3} \times (0.1025 \times 10^{-1})^2}{1 - 0.1025} = \frac{10^{-5} \times 0.105}{0.8975}$ $\therefore k = 1.46 \times 10^{-6}$	1
	(b) Discharge reaction of lead storage battery:	1
	At anode : $\text{Pb(s)} + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{e}^-$	1
	At cathode: $\text{PbO}_2$ filled in lead grid gets reduced to $\text{Pb}^{2+}$ ions which combines with $\text{SO}_4^{2-}$ ions to form $\text{PbSO}_4(\text{s})$ .	1
	The reaction is $\text{PbO}_2(\text{s}) + 4\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + 2\text{e}^- \rightarrow \text{PbSO}_4(\text{s}) + 2\text{H}_2\text{O(l)}$	1
32.	(i.) This is because transition metals have strong metallic bonds and they have large number of unpaired electrons. (ii.) $\text{Cr}^{2+}$ is reducing as its configuration changes from $d^4$ to $d^3$ , the latter having more stable half-filled $t_{2g}$ level. On the other hand, the change from $\text{Mn}^{3+}$ to $\text{Mn}^{2+}$ results in extra stable $d^5$ configuration. (iii) This is due to comparable size of transition metals as they can fit in the same lattice (b) (i) $\text{MnO}_4^-(\text{aq}) + 5\text{Fe}^{2+}(\text{aq}) + 8\text{H}^+(\text{aq}) \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} + 5\text{Fe}^{3+}$	1 1 1 1

	<p>(ii) <math>Cr_2O_7^{2-}(aq) + 3C_2O_4^{2-}(aq) + 14H^+(aq) \rightarrow 2Cr^{+3} + 6CO_2 + 7H_2O</math></p> <p style="text-align: center;"><b>“OR”</b></p> <p>(A) This is due to lanthanoid contraction.</p> <p>(B) Oxygen and fluorine are highly electronegative elements.</p> <p>(C) This is because, Copper has high enthalpy of atomization and low enthalpy of hydration. Since the high energy to transform Cu(s) to Cu<sup>2+</sup>(aq) is not balanced by hydration enthalpy, therefore value for copper is positive(+0.34 V).</p> <p>(D) Reactions involved in the preparation of potassium permanganate from MnO<sub>2</sub></p> $2MnO_2 + 4 KOH + O_2 \longrightarrow 2 K_2MnO_4 \text{ (Dark green)} + 2H_2O$ $3 MnO_4^{2-} + 4H^+ \longrightarrow 2MnO_4^-(\text{Purple}) + MnO_2 + 2H_2O$	1 1 1 1 1 1
33.	<p>(a)</p> <p>(i) (A) The structures of expected products of Cannizarro reaction of 2-chlorobenzaldehyde-</p> <p></p> <p>(B) Product formed on Wolf-Kishner reduction of 2-methylbutanal is-</p> <p></p> <p>(ii)</p> <p>a) </p> <p>b) </p> <p>c) </p>	1 1 1 1 1 1 1 1 1

<p>(b) (i) (I)</p> $\text{CH}_3\text{COCH}_3 \xrightarrow[\text{Conc. HCl}]{\text{Zn-Hg}} \text{CH}_3\text{CH}_2\text{CH}_3$ <p>(II)</p> <p>(III)</p>	<p>1 1 1</p>
<p>ii) (i) Compound B gives Fehling's test, which means it is aldehyde also. It forms an iodoform, so compound B is acetaldehyde, among aldehydes.</p> <p>(ii) Compound C does not give Fehling's test but gives iodoform, so ketone must have a methyl group attached to carbonyl group.</p> <p>Reactions for ozonolysis and formation of iodoform from B and C are</p>	<p>1</p>

