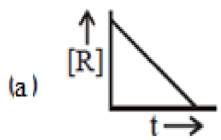
ANNEXURE –C

DAV PUBLIC SCHOOLS, ODISHA ZONE

HY : 2023-24

CLASS : XII , SUBJECT : CHEMISTRY

MARKING SCHEME(SET-1)

QSTNO	Value Points	Marks Allotted	PAGE NO. OF NCERT /TEXT BOOK
1	b) $H_2O + C_4H_9OH$	1	45
2		1	84
3	c) lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals	1	311
4	a) But-3-en-2-ol	1	289
5	a) 0.005 $molL^{-1}s^{-1}$		
6	c) Nearly same atomic size	1	213
7	c) becomes one-fourth	1	100
8	c) 8,000 cm^{-1}	1	252
9	c) 3	1	226
10	a) or d)1-Methylcyclohexene	1	206
11	a) Cr > Mn > V > Ti	1	221
12	c) phenol and acetone	1	332
13	b) Both A and R are true but R is not the correct explanation of A.	1	46
14	a) Both A and R are true and R is the correct explanation of A.	1	210
15	b) Both A and R are true but R is not the correct explanation of A.	1	101
16	b) Both A and R are true but R is not the correct explanation of A.	1	295
17	For hydrogen electrode, $H^+ + e^- \rightarrow \frac{1}{2}H_2$, **Applying Nernst equation,** $E_{H^+,\frac{1}{2}H_2} = E^\circ_{H^+/\frac{1}{2}H_2} - \frac{0.0591}{n}\log\frac{1}{[H^+]}$ $= 0 - \frac{0.0591}{1}\log\frac{1}{10^{-10}}$ $\left\{\begin{matrix} pH = 10 \\ \Rightarrow [H^+] = 10^{-10} M \end{matrix}\right\}$ $= -0.0591 \times 10$ $= -0.591 V$	½ ½ ½ ½	70

<table>
<tr><td>18</td><td>a) $6\,Fe^{2+} + Cr_2O_7^{2-} + 14\,H^+ \rightarrow 2\,Cr^{3+} + 6\,Fe^{3+} + 7\,H_2O$
b) $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$</td><td>1
1</td><td>226</td></tr>
<tr><td>19</td><td>A= CH_3CH_2OH, B= CH_3CH_2F, C= CH_3CH_3, D= $CH_2{=}CH_2$</td><td>½ x 4</td><td>299-310</td></tr>
<tr><td>20</td><td>a)
<table>
<tr><th>compounds</th><th>Tests/reagents</th><th>observation</th></tr>
<tr><td>phenol</td><td rowspan="2">Neutral $FeCl_3$ solution</td><td>Violet colour solution</td></tr>
<tr><td>ethanol</td><td>No such obs.</td></tr>
</table>
b)
<table>
<tr><th>compounds</th><th>Tests/reagents</th><th>observation</th></tr>
<tr><td>tert-butyl alcohol</td><td rowspan="2">Lucas test (conc.HCl+anh.$ZnCl_2$)</td><td>Turbidity occurs immediately.</td></tr>
<tr><td>n- butyl alcohol</td><td>No such obs.</td></tr>
</table></td><td>½ +½

½ +½</td><td>341

338</td></tr>
<tr><td>21</td><td>a) The enthalpies of atomization of a transition metal are high because they have a large number of unpaired electrons resulting strong inter atomic metallic bonding.
b) Weak inter atomic metallic bonding due to absence of unpaired electron.
OR
a) In Comparison to Fe^{2+}, Cr^{2+} is a stronger reducing agent because in formation of Cr^{3+} from Cr^{2+} changes is from $d^4 \rightarrow d^3$. In d^3 electronic configuration t_{2g} orbitals are half filled . But in Fe^{2+} to Fe^{3+} Changes is d^6 to d^5
b) Atomic number (Z)=27, it is Co with configuration $3d^7, 4s^2$
In Co^{2+}, the configuration is $3d^7$. Now, Number of unpaired electrons =3
magnetic moment, $\mu = \sqrt{n(n+2)} = \sqrt{3(3+2)} = 3.87$ BM</td><td>1
1

1
1</td><td>218</td></tr>
<tr><td>22</td><td>a) It states that “the partial pressure of the gas in vapour phase (p) is proportional to the mole fraction of the gas (x) in the solution”.
b) Since number of paricles decreases, hence van't Hoff factor (i) will decrease and freezing point of the solution will increase.
c) Molality is considered better for expressing the concentration as compared to molarity because the molarity changes as volume of the solution changes with temperature but molality does not.</td><td>1
1
1</td><td>46
58
37</td></tr>
<tr><td>23</td><td>a)
$$\underset{6F}{Al_2O_3 + 6e^-} \longrightarrow \underset{(2\times 27)\,g}{2Al} + 3O^{2-}$$
To produce 54 g of Al, charge needed = 6F
To produce 40 g of Al, charge needed $= \frac{(40\,g)}{(54\,g)} \times (6F) = \mathbf{4{\cdot}44F.}$

b) At anode=Br_2, at cathode=Cu

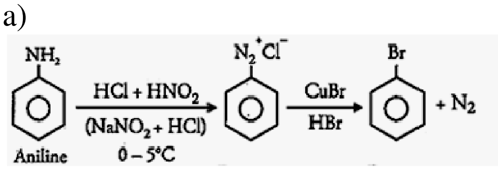
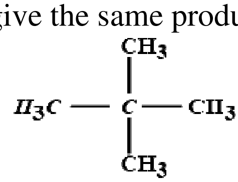
c) Λ^o for NaBr is calculated by the following expression.
Λ^o NaBr $= \lambda^0 NaCl + \lambda^0 KBr - \lambda^0 KCl$
$= 126 + 152 - 150 = 128\ Scm^2mol^{-1}$</td><td>1

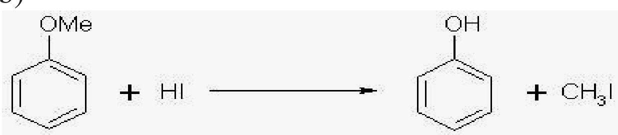
½ +½

1</td><td>94

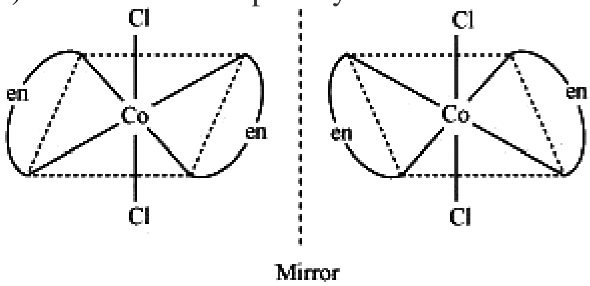
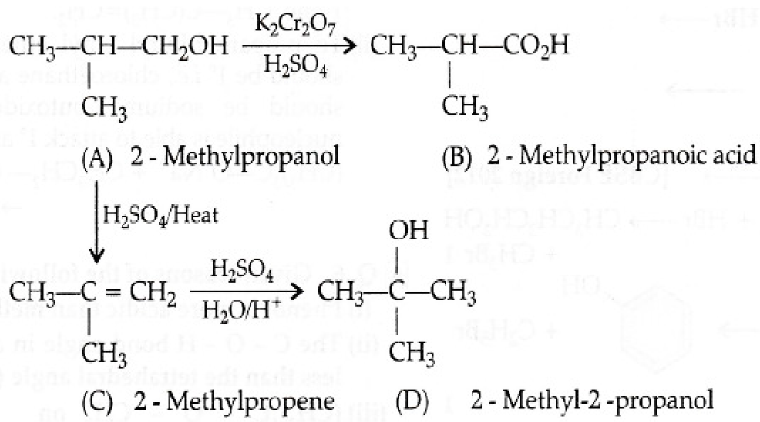
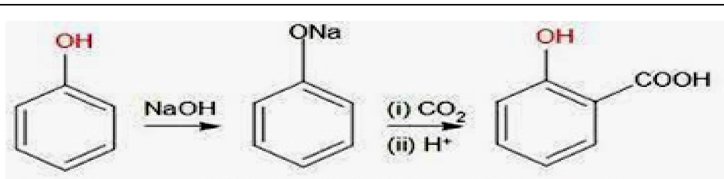
87

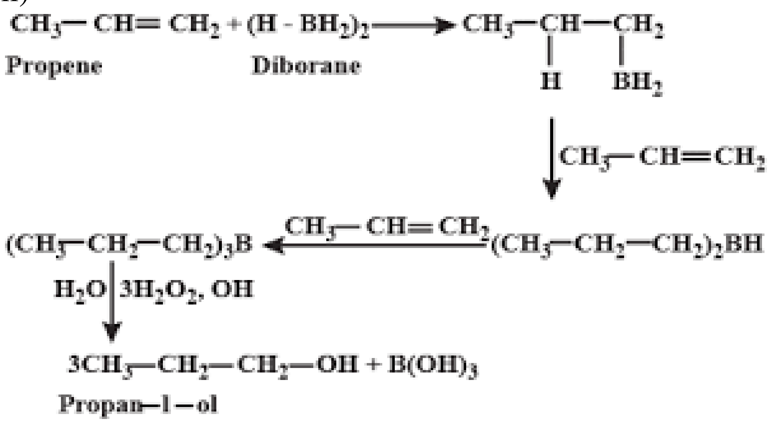
83</td></tr>
</table>

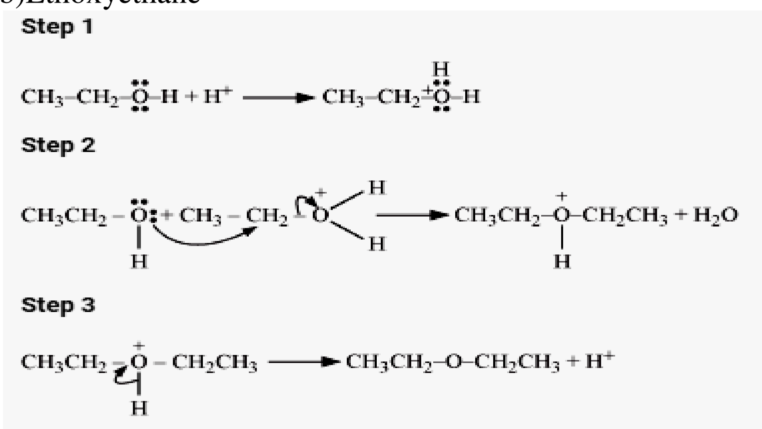
24	a) [$Co(NH_3)_5(CO_3)$]Cl b) Heating removes the water molecule from the coordination sphere. As a result, there is no crystal field splitting. Hence no colour is observed. c) $t_{2g}^4 e_g^2$	1 1 1	249 259
25	$k = \frac{2.303}{t}\log\frac{[R_0]}{[R]}$, $t_{1/2} = 3$ hrs, $t = 8$ hrs, $\frac{[R]}{[R_0]} = ?$ $t_{1/2} = 3.0$ hrs, $\therefore\ k = \frac{0.693}{t_{1/2}} = \frac{0.693}{3} = 0.231\ \text{hr}^{-1}$ Hence, $0.231 = \frac{2.303}{8}\log\frac{[R_0]}{[R]}$ or, $\log\frac{[R_0]}{[R]} = 0.8024$ or, $\frac{[R_0]}{[R]} = \text{Antilog}\ (0.8024) = 6.345$ or, $\frac{[R]}{[R_0]} = \frac{1}{6.345} = 0.158$	½ ½ ½ ½ ½ ½	122
26	**Any three** a)  b) As all the hydrogen atoms are equivalent and replacement of any hydrogen will give the same product.  (Neopentane) c) In haloarenes, NO_2 group present at o/p position results in the stabilisation of resulting carbanion by-R and - I effects and therefore increases the reactivity of haloarenes towards nucleophilic substitution reactions. d) 2, 2-Bis (4-chlorophenyl)-1,1,1-trichloroethane	1 1 1 1	206 301 313 318
27	a) $CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$(any other suitable example) b) $-\frac{dx}{dt} = k[A][B]^2$ c) 1	1 1 1	102

28	$A = \pi r^2 = 3.14 \times (0.5)^2\ cm^2 = 0.785\ cm^2$ $\rho\ (\text{resistivity}) = \frac{R \times A}{l} = \frac{5.55 \times 10^3\ \Omega \times 0.785\ cm^2}{50\ cm} = 87.135\ \Omega\ cm.$ $\kappa = \frac{1}{\rho} = \frac{1}{87.135\ \Omega\ cm} = 0.01148\ S\ cm^{-1}$ $\Lambda_m = \frac{\kappa \times 1000}{M} = \frac{0.01148 \times 1000}{0.05\ M} = 229.6\ S\ cm^2\ mol^{-1}$	1 1 1	242
29	a) inversion of configuration b)  c) But-2-ene  **OR** a) 1-Bromopentane will be more reactive as it least crowded for an S_N2 reaction. b) 2 -Bromopentane has a chiral carbon. Therefore, it is optically active	1 1 1+1 1 1	171-174
30	a) The overall reaction is $Pb\ (s) + PbO_2(s) + 4H^+\ (aq) + 2SO_4^{2-}(aq) \longrightarrow 2PbSO_4\ (s) + 2H_2O(l)$ **OR** Due to the porous casing, a substance in the cell leaks out, corrodes the metal and the lifetime of the cell is reduced. On the other hand, the mercury cell does not involve any ion in the solution during the reactions to change its lifetime. b) The galvanic cells in which the energy of combustion of fuels is directly converted into electrical energy are called fuel cells. One of the reactants is fuel such as hydrogen or methanol. The reactants are not placed within the cell but they are continuously supplied to the electrodes from the reservoir. **Advantages** High efficiency, non polluting (**any one**) c) $E^0_{cell} = E^0_{cathode} - E^0_{anode} = E^o_{Ag} - E^o_{Zn} = 0.344 - (-0.76) = 1.104\ V$ $\Delta G^0 = -nF E^0_{cell} = -2 \times 96500 \times 1.104 = -213072\ J = -213\ kJ$	1 1 ½ ½ 1 1	88,89
31	a) i) The bonds between chloroform molecules and molecules of acetone are dipole-dipole interactions but on mixing, the chloroform and acetone molecules, they start forming hydrogen bonds which are stronger bonds resulting in the release of energy. This gives rise to an increase in temperature. ii) To avoid bends, as well as, the toxic effects of high concentrations of nitrogen	1 1	43,45, 54

	in the blood, the tanks used by scuba divers are filled with air diluted with helium. iii) The magnitude of osmotic pressure is large even for very dilute solution and it can be measured at room temperature.(any other suitable reason) b) $M_B = \frac{K_f \times W_B \times 1000}{\Delta T_f \times W_A}$ $M_B = \frac{3.83\ K\ kg\ mol^{-1} \times 2.56 \times 1000\ g\ kg^{-1}}{100\ g \times 0.383\ K} = 256\ g\ mol^{-1}$ Now, molecular mass of $S_x = x \times 32 = 256$ $x = \frac{256}{32} = 8$ Therefore, formula of sulphur = S_8	1 ½ ½ ½ ½	
	OR a) i)**Beaker 1**:Hypotonic solution, **Beaker 2**:Hypertonic solution ii)In beaker 3 the size of potato cube remains the same because of isotonic solution which has the same concentration of solutes as that of potato cells. So water is neither lost or gained by the potato cells. b) $\Delta T_f = 0-(-0.068) = 0.068K$ $\Delta T_f = i \times K_f \times m$ $0.068 = i \times 1.86 \times 0.01$ So, i=3.6559 Again, $\alpha = \frac{i-1}{n-1}$ for $AlCl_3 \rightleftharpoons Al^{3+} + 3Cl^-$; n=1+3=4 $\alpha = \frac{3.6559-1}{4-1} = 0.8833$ % of dissociation = 88.33% c) The freezing point of water decreases, due to which the snow on the road starts to melt and clears the road.	½+½ 1 ½ ½ ½ ½ 1	51,54
32	**Any five:** a) **Hybridization:** d^2sp^3, **Magnetic character:** Diamagnetic b) $[Cr(H_2O)_5Cl]Cl_2.H_2O$ c) No, ionization isomers are possible by exchange of ligand with counter ion only and not by exchange of central metal ion. d) In both $[NiCl_4]^{2-}$ and $[Ni(CN)_4]^{2-}$,Ni is in +2 oxidation state with configuration $3d^8$ and it contains two unpaired electrons. In $[NiCl_4]^{2-}$ due to presence of weak ligand Cl^- no pairing takes place and hence it is paramagnetic whereas in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand and pairing occurs and	½+½ 1 ½+½ 1	244, 249, 252

	hence it becomes diamagnetic. e) $[Co(NH_3)_6]Cl_3 > [Cr(NH_3)_5Cl]Cl_2 > [Co(NH_3)_4Cl_2]Cl > [Co(NH_3)_3Cl_3]$ f) Trans isomer is optically inactive as it has a plane of symmetry.  g) The central atom is an electron pair acceptor so it is a Lewis acid.	 1 ½ +½ 1	
33	a)  A = $CH_3-CH(CH_3)-CH_2OH$ B = $CH_3-CH(CH_3)-CO_2H$ C = $CH_3-C(CH_3)=CH_2$ D = $CH_3-C(OH)(CH_3)-CH_3$ b) The commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it a colour) and pyridine (a foul smelling liquid). It is known as denaturation of alcohol.	½ ½ 1 ½x4=2 1	210-216
	OR		
	a) i) 	1	200, 213, 215

<table>
<tr><td></td><td>ii)


b)Ethoxyethane

</td><td>1

½

½

1

1</td><td></td></tr>
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