BSEH MARKING SCHEME

CLASS- XII Chemistry (March-2024) Code: B

- The answer points given in the marking scheme are not final. These are suggestive and indicative. If the examinee has given different, but appropriate answers, then he should be given appropriate marks.

| Q. No. | Answers | Marks |
|---|---|---|
| 1. | d) Molality | 1 |
| 2. | c) No reaction | 1 |
| 3. | c) mol $L^{-1}s^{-1}$ | 1 |
| 4. | a) La | 1 |
| 5. | b) cis-platin | 1 |
| 6. | b) Racemization | 1 |
| 7. | c) 4-Nitroanisole | 1 |
| 8. | b) β-D-Glucose | 1 |
| 9. | b) Vitamin C | 1 |
| 10. | Ideal solution | 1 |
| 11. | Rare earth | 1 |
| 12. | Cobalt | 1 |
| 13. | 51 | 1 |
| 14. | Tert-butyl Alcohols | 1 |
| 15. | Carbonyl Chloride | 1 |
| 16. | a) Both A and R are true, and R is the correct explanation of A | 1 |
| 17. | d) A is false but R is true | 1 |
| 18. | b) Both A and R are true, and R is not the correct explanation of A | |

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| 19. | The properties which depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution are called colligative properties.<br>(1 mark)<br>Examples: (1) relative lowering of vapour pressure of the solvent<br>(2) depression of freezing point of the solvent<br>(3) elevation of boiling point of the solvent<br>(4) osmotic pressure<br>(Any two, ½ mark each) | 2 |
| 20. | a) Fuel cell<br>(½ mark)<br>b) Lead storage<br>(½ mark)<br>c) Mercury cell<br>(½ mark)<br>d) Dry cell<br>(½ mark)<br>Or<br>Given<br>Production of Al from $Al_2O_3$ has a reaction as following:<br>$Al^{3+} + 3e^- \rightarrow Al$<br>(½ mark)<br>i.e. production of 1 mole of Al (27 g) from $Al_2O_3$ requires electricity = 3 F<br>or production of 1 g of Al from $Al_2O_3$ requires electricity = 3/27 F | 2 |

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| | (½ mark)<br>So, production of 40 g of Al from $Al_2O_3$ requires electricity = 40/9 F<br>= 4.44 F<br>(½ mark for answer, ½ mark for unit) | |
| 21. | concentration of reactants & pressure in case of gases, temperature, and catalyst.<br>(½ mark each) | 2 |
| 22. | In the first transition series, Cu exhibits +1 oxidation state very frequently.<br>(1 mark)<br>$2K_2Mno_4+2H_2O$<br>$2Cr_3+7H_2O+3T_2$<br>(1 mark) | 2 |
| 23. | tert-butyl bromide < sec-butyl bromide < isobutyl bromide < n-butyl bromide | 2 |

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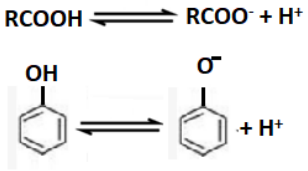
| 24. | The difference in the relative acidic strength if we compare the resonance hybrids of carboxylate ion and phenoxide ion<br>  <br><br>(1 mark)<br>The electron charge is more dispersed in compression to the phenol ion the release of $H^+$ ion from carboxylic acid is easier than phenol.<br>(1 mark)<br>Or<br>The nucleophile which has two different electron donor atoms and can attack through two different sites are called as ambident nucleophiles.<br>(1 mark)<br>For examples cyanide ion and nitrite ion represent ambident nucleophiles.<br>(1 mark) | 2 |
| 25. | i) p-nitroaniline, Aniline, p-toluidine<br>(1 mark)<br>ii) $NH_3$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$<br>(1 mark) | 2 |
| 26. | <table><tr><th>Positive Deviation NonIdeal Solutions</th><th>Negative Deviation Nonideal solutions</th></tr><tr><td>1. Those liquid-liquid solutions which has vapour pressure more than expectations from Raoults' law.</td><td>1. Those liquid-liquid solutions which has vapour pressure less than expectations from Raoults' law.</td></tr></table> | 3 |

| | | |
|---|---|---|
| | 2. The molecular interactions of solution is weaker than that of solute and solvent. | 2. The molecular interactions of solution is stronger than that of solute and solvent. |
| | 3. $\Delta V > 0$ | 3. $\Delta V < 0$ |
| | 4. $\Delta H > 0$ | 4. $\Delta H < 0$ |
| | 5. They form minimum boiling azeotrops. | 5. They form maximum boiling azeotrops. |
| | (Any three, 1 mark each) | |
| 27. | For a first order reaction:<br>$t = \frac{2.303}{k} log \frac{[R]}{[R]}$<br>(½ mark) Using this we get:<br>$t = \frac{2.303}{k} log \frac{100}{1}$ | 3 |

(½ mark)

$$t = \frac{2.303 \times 2}{k}$$

(½ mark)

Also

$$t = \frac{2.303}{k} log \frac{100}{10}$$

(½ mark)

$$t = \frac{2.303}{k}$$

(½ mark)

Now $\frac{t_{99}}{t_{90}} = \frac{\frac{2.303}{k} \times}{\frac{2.303}{k}}$

$$\frac{t}{t} = 2$$

(½ mark)

Or

Consider the reaction, R □ P is zero order reaction.

$$Rate = -\frac{d[R]}{dt} = k[R]$$

(½ mark)

$$\Rightarrow Rate = -\frac{d[R]}{dt} = k$$

$$\Rightarrow \quad d[R] = -kdt$$

Integrating both sides

$$[R] = -kt + I \qquad \text{.....Eq. 1}$$

Where I is the constant of integration

(½ mark)

At t = 0, the concentration of the reactant R = $[R]_0$ , where $[R]_0$ is initial concentration of the reactant.

(½ mark)

Substituting in above equation 1

$$[R] = -k \times 0 + I$$

$$[R] = I$$

(½ mark)

Substituting the value of I in the equation 1 $[R] = -kt + [R]$

(½ mark)

$$\Rightarrow \quad k = \frac{[R] - [R]}{t}$$

This is the integrated rate equation for a zero-order reaction.

(½ mark)

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| 28. | i) ability to adopt multiple oxidation states ii) ability to form complexes. iii) transition metals utilise outer d and s electrons for bonding. This has the effect of increasing the concentration of the reactants at the catalyst surface and also weakening of the bonds in the reacting molecules.<br>(1 mark each) | 3 |
| 29. | i) Freon-12 is used for aerosol propellants, refrigeration and air conditioning purposes.<br>ii) Carbon tetrachloride is used in the synthesis of chlorofluorocarbons and other chemicals, pharmaceutical manufacturing, and general solvent use.<br>iii) Iodoform can be used as antiseptic.<br>(1 mark each) | 3 |
| 30. | A: $CH_3CH_2CN$<br>B: $CH_3CH_2CH_2NH_2$<br>C: $CH_3CH_2CH_2OH$<br>(½ mark each)<br>A: $C_6H_5NH_2$<br>B: $C_6H_5N^{+2}Cl^-$<br>C: $C_6H_5OH$<br>(½ mark each)<br>Or<br>i) Ethylamine is capable of forming hydrogen bonds with water as it is soluble but in aniline the bulk carbon prevents the formation of effective hydrogen bonding and is not soluble.<br>(1 mark) | 3 |

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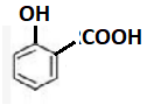
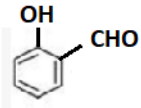
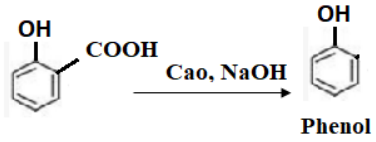
| | ii) A Friedel-Crafts reaction is carried out in the presence of $AlCl_3$. But $AlCl_3$ is acidic in nature, while aniline is a strong base. Thus, aniline reacts with $AlCl_3$ to form a salt and benzene ring is deactivated. Hence, aniline does not undergo the Friedel-Crafts reaction.<br>(1 mark)<br>iii) Gabriel phthalimide reaction gives pure primary amines without any contamination of secondary and tertiary amines. Therefore, it is preferred for synthesising primary amines.<br>(1 mark) | |
| 31. | (i) Dicholorocarbene, $CCl_2$<br>mark)<br>(ii)  Salicylic acid<br>(1 mark)<br>Or  <br>(iii)  <br>(1 mark)<br>(iv)  <br>(1 mark) | 4 |

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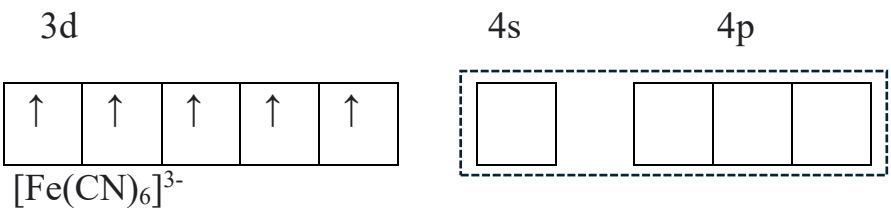
|---|---|---|
| 32. | (i) β-D-2-Deoxyribose (1 mark)<br>(ii) Cytosine, uracil (1 mark)<br>(iii) Hydrogen bonds (1 mark)<br>(iv) RNA (1 mark) | 4 |
| 33. | 2Cr(a) + 3Fe3+ (aq) === 2Cr3+ 3Fe(s)<br>E = E° - $\frac{0.059}{6}\log\frac{(0.01)^2}{(0.01)^3}$ (1 mark)<br>E° = 0.261 V<br>E = 0.261 - $\frac{0.059}{6}\log 10^{-2}$ (1 mark)<br>= 0.261 - $\frac{0.059}{6} \times (-2)$<br>= 0.261 + 0.0197 = 0.2807 V (1 mark)<br>(Deduct ½ mark for no or incorrect unit)<br>'A' will prevent iron from corrosion.<br>(1 mark)<br>So, we can cost the iron surface with metal A because it has more negative E° value.<br>(1 mark)<br>Or<br>$\Lambda m = \frac{k \times 1000}{C}$<br>$C = 0.001\ M, k = 3.905 \times 10^{-5} S\ cm^{-1}$<br>$\therefore\ \Lambda_m = \frac{3.905\times10^{-5}\times1000}{0.001}$ (1mark)<br>= 39.05 S $cm^2$ $mol^{-1}$<br>$CH_2COOH$ === $CH_3COO^-$ + $H^+$<br>$\Lambda^\circ_m = \lambda^\circ CH_3COO^- + \lambda^\circ H^+$<br>= 40.9+349.6=390.5 S $cm^2$ $mol^{-1}$ (1mark)<br>Degree of dissociation α = $\frac{\Lambda_m}{\Lambda^\circ_m} = \frac{39.05}{390.5}$= 0.1 (1 mark)<br>(Deduct 1 mark for no or incorrect unit)<br>Electrochemical cell is a device used for the production of electricity from energy released during spontaneous chemical reaction. Electrochemical cell converts chemical energy into electrical energy. (1mark)<br>If E°cell (external) > E°cell the cell starts acting as an electrolytic cell. In this case, electrical energy is used to carry out non-spontaneous chemical reaction.<br>(1 mark) | 5 |

34. (i) $[Fe(CN)_6]^{3-}$ : Oxidation state of Fe = +3 (1 mark)

Fe(III) $3d^5\ 4s^o$ (1 mark)

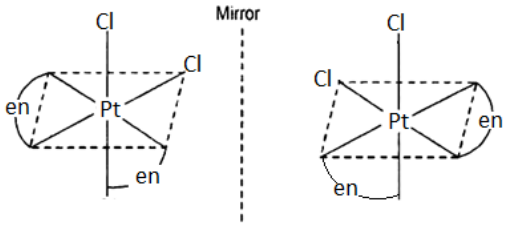
Hybridisation:




$d^2sp^3$ hybridisation (1 mark)

Hybridisation: - $d^2sp^3$ : Magnetic character: - Paramagnetic. Spin type: - Low spin complex.

(1 mark)



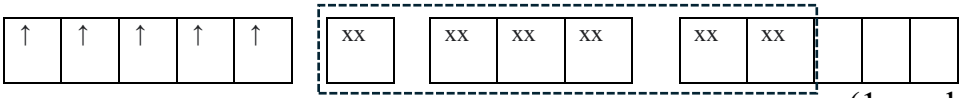

(1 mark)

Dextru laevo

Or

(i) In $[CoF_6]^{3-}$ the Co(III) ion has $3d^6$ electronic configuration. In the formation of the complex, it involves $sp^3d^2$ hybridisation using outer d-orbitals. It is therefore paramagnetic having 4 unpaired electrons.

(1+1 mark)




(1 mark)

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| | (ii) Dibromidobis (ethylenediamins) cobalt(III) ion.<br>(1 mark)<br>(iii) It ionizes as : $[Co(NH_3)_6]Cl_3$ $[Co(NH_3)_6]^{3+} + 3Cl$<br>$\therefore$ 4 ions are produced. (1 mark)<br>(Deduct 1 mark for no or incorrect Hybridisation) | |
| 35. | (a) (i) $CH_3CH_2CHO \xrightarrow[\text{dry HCl}]{2\ CH_3OH} CH_3CH_2CH(OCH_3)_2$<br>(ii) $CH_3CH_2CHO \xrightarrow{\text{dil NaOH}} CH_3CH_2CH(OH)CH(CH_3)CHO$<br>(iii) $CH_3CH_2CHO \xrightarrow[KOH]{H_2N\text{-}NH} CH_3CH_2CH_3$<br>(1+1+1 mark)<br>(b) (i) $CH_3COOH < HCOOH < FCH_2COOH < NO_2 - CH_2COOH$<br>(II) Acetophenone < Benzaldehyde < Acetone < Acetaldehyde<br>(1+1 mark)<br>Or<br>Organic compound A is an ester as on acid hydrolysis it gives a mixture of an acid and an alcohol.<br>(½ mark)<br>Oxidation of alcohol (C) gives acid (B). Hence, the number of carbon atoms in (B) and (C) are the same.<br>(½ mark) | 5 |

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|---|---|---|
| | Ester (compound A) has eight C atoms. Hence, both carboxylic acid (B) and alcohol (C) must contain 4 C atoms each.<br>(½ mark)<br>Dehydration of alcohol C gives but-1-ene. Hence, C must be a straight chain alcohol, i.e butan-1-ol.<br>(½ mark)<br>Reactions:<br>$CH_3CH_2CH_2COOCH_2CH_2CH_2CH_3 + \xrightarrow{\text{dil. } H_2SO_4}$<br>$CH_3CH_2CH_2COOH + CH_3CH_2CH_2CH_2OH$<br>(1 mark)<br>$CH_3CH_2CH_2CH_2OH \xrightarrow{\text{Dehydratio}} CH_3CH_2CH = CH_2$<br>(1 mark)<br>$CH_3CH_2CH_2CH_2OH \xrightarrow{CrO3/CH3COOH} CH_3CH_2CH_2COOH$<br>(1 mark) | |