KENDRIYA VIDYALAYA SANGATHAN, DELHI REGION

Marking Scheme

HALF YEARLY EXAM (2022-23)

Class: XII: Subject: Chemistry (043)

Q1.Vanadium due to strong metallic bonding

Q2.Due to symmetry of molecule

Q3. $[Co(en)3]^{3+}$ due to formation of chelates.

Q4.increases

Q5.cell acting as an electrolytic cell

Q6.4-Bromo-4-methylpent-2ene

Q7.(c)

Q8.(b)

Q9.(a)

Q10.(a)

Q11.(a)

Q12.(b)

Q13.(b)

Q14.(a)

Q15.(a)

Q16.(e)

Q17.(c)

Q18.(b)

Q19.(b)

Q20(a)

Q21.$\Delta G^o = -nFE^o_{cell}$	**½ mark**
Putting values	**1/2mark**
.ΔG^o= -202650J/mol or -202.650Kj/mol	**1 mark**

Q22.(a)due to comparable energy of(n-1)d and ns ,all electrons participate in bonding. (1mark)

(b)Due to stable configuration (1 mark)

Q23(a)1-Bromobutane>2-Bromobutane>2-bromo-2-methylbutane

(b).1-bromo-3-methylbutane>2-bromo-3-methylbutane>2-bromo-2-methylbutane

OR

Q23(a) KCN is an ionic compound while AgCN is a covalent compound and C-C bond is stronger than C-N bond 1 mark

(b)Both the by product are escapable gases 1 mark

Q24.(i)2 M glucose solution is more concetrated and has less vapour p-ressure than 1 M glucose solution. It has therefore. Higher boiling point than 1 M solution 1 mark

(ii)Reverse osmosis takes place 1mark

Q25. 2 points 2 mark

OR

Q25 correct reason 2 mark

Q26.(i)[CoCl(H2O)(NH3)4]Cl2

(ii) [NiCl4]2−

(b)dichloridobisethane1,2-diaminechromium(II)chloride

OR

(a)t_{2g}^3 e_g^1 1 mark

(b)correct definition with example 1 mark

(c)Correct definition 1 mark

Q27.Given : M_2 = 92 g mol^{-1} w_1 = 500g 1mark

ΔT_b = 100.42°C − 100°C = 0.42°C

K_b = 0.512 K kg mol^{-1}

Substituting above values in the formula 1 mark

$$\Delta T_b = \frac{1000\, K_b\, w_2}{w_1 \times M_2}$$

$$\therefore \quad w_2 = \frac{w_1\, M_2\, \Delta T_b}{1000\, K_b} = \frac{500 \times 92 \times 0.42}{1000 \times 0.512}$$

$$= \frac{19320}{512} = 37.73 \text{ g}$$

1 mark

OR

Q27 $K_2SO_4 \rightarrow 2K^+ + SO_4^{2-}$

One mole of K_2SO_4 will give 3 mole particles and therefore, the value of 'i' is 3.

Osmotic pressure, $\pi = iCRT$

$W_B = 2.5 \times 10^{-2}$ g, V = 2.0 L, M_B = 174 g/mol

R = 0.821 L atm mol^{-1} K^{-1}

$$\therefore \pi = 5.27 \times 10^{-3} \text{ atm}$$

Q28.(i)3 **1 mark**

(ii)d^2sp^3 ,octahedral **½ + 1/2**

(iii)paramagnetic **1 mark**

Q29.

$$E^0_{cell} = E^0\,H^+/H_2 \rightarrow E^0\,Fe^{2+}/Fe$$

$$\Rightarrow E^0_{cell} = 0-(-0.44) = 0.44V$$

The Nernst equation for the cell reaction at 25^0 C will be

$$E_{cell} = E^0_{cell} - \frac{0.0591}{2}\log\frac{[Fe^{2+}]}{[H^+]^{2+}}$$

$$= 0.44 - \frac{0.059}{2}\log\frac{0.001}{(0.01)^2}$$

. **3 mark**

=0.41045 V

Q30.Correct formula **1mark**

Correct values **1 mark**

T =0.0383 second **1 mark**

Q31.(a) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$

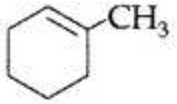
$2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$

$Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$ 2 mark

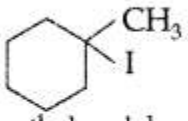
changes to chromate ion

Q31(b). $4H_2S\ (aq) + Cr_2O_7^{2-}\ (aq) + 6H^+\ (aq) \rightarrow 4S\ (s) + 2Cr^{2+}\ (aq) + 7H_2O$ 1 mark

Q32.(a)

(*i*)  + HI $\xrightarrow{\text{Mark.addn.}}$

1-Methyl-1-cyclohexene



1-Iodo-1-methyl cyclohexane

(*ii*) $CH_3CH_2CH = CH_2 + HBr \xrightarrow{\text{Mark.addn.}}$

1-Butene

$CH_3—CH_2\underset{\displaystyle Br}{\underset{|}{C}}H—CH_3$

2-Bromobutane

2+ 1 mark

(b)2-bromo propane is treated with alc. KOH, it forms propene which on further reaction with hydrogen bromide in presence of peroxide forms 1-bromo propane.

Q33.(i)Due to ability of oxygen to form multiple bond

(ii)copper

(iii)alloy of lanthanoid with iron,uset in bullets

(iv)Cerium

(v)$Mn^{2+} + 4H_2O$ 1 mark each

OR

Q33.(i)This is because although second ionization enthalpy of copper is large but Δ_{hyd} (hydration enthalpy) for $Cu^{2+}(aq)$ is much more negative than that for $Cu^{+}(aq)$ and hence it more than compensates for the second ionization enthalpy of copper. Therefore, many copper (I)

compounds are unstable in aqueous solution and undergo disproportionation **1 mark**

(ii)Due to unpaired electron in d orbital and so undergoes d-d transition. **1 mark**

(iii)Due to lanthanoid contraction **1 mark**

(iv)similarity **1 mark**

Difference **1 mark**

Q34.(i)4 times **1 mark**

(ii)2 **1 mark**

(iii)

$$\log\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 \times T_2}\right]$$

$$\Rightarrow \quad \log\frac{2}{1} = \frac{E_a}{2.303 \times 8.314}\left[\frac{305 - 295}{295 \times 305}\right]$$

$$\Rightarrow \quad 0.3010 = \frac{E_a}{19.14714}\left[\frac{10}{89975}\right]$$

$$\Rightarrow \quad E_a = \frac{0.3010 \times 19.147 \times 89975}{10}$$

Ea=51854.8J/mol **3 mark**

OR

Q34.(a) (i)4 times **2 mark**

(ii)1/4times

(b)Define **1 mark**

(c) correct equation **1 mark**

(d) lowers the activation energy **1 mark**

Q35(a)correct definition **1mark**

(b) $\Lambda_m = \frac{k \times 1000}{c}$ S cm^2 mol^{-1}

$k = \frac{1}{R}\left(\frac{l}{A}\right)$

$k = \frac{1}{200} \times 1$ S cm^{-1}

$k = \frac{1}{200}$ S cm^{-1}

$\Lambda_m = \frac{1 \times 1000}{200 \times 0.01}$ S cm^2 mol^{-1}

Λ_m = 500 S cm^2 mol^{-1} **2 mark**

(c)correct statement,2 F **2 mark**

Q35.(a) definition **1 mark**

(b) reactions **1+1 mark**

(c) $\Lambda^\circ_m(HAc) = \lambda^\circ_{H^+} + \lambda^\circ_{Ac^-}$

$= \lambda^\circ_{CH_3COOH} = \lambda^\circ_{H^+} + \lambda^\circ_{CH_3COO^-}$

= 349.6 S cm^2 mol^{-1} + 40.9 S cm^2 mol^{-1}

= 390.5 S cm^2 mol^{-1} **1 mark**

$$\alpha = \frac{\Lambda_m}{\Lambda_m^0} = \frac{39.05\,cm^2\,mol^{-1}}{390.05\,cm^2\,mol^{-1}} = 0.1$$

1mark

Q36.3d^3, proper explanation **2 mark**

Q37.correct explanation **2 mark**