CBSE MODEL PAPER -2 (SOLUTIONS) : 2020-21
CHEMISTRY

SECTION A

1. (i) (b)
(ii) (a)
(iii) (a) OR (b)
(iv) (d)

2. (i) (c)
(ii) (b)
(iii) (d) OR (a)
(iv) (a)

3. (d)

4. (a) OR (b)

5. (a) **OR** 1 Mark will be given if attempted / if written none of the answer is right / 4

6. (c)

7. (a) OR (c)

8. (c) **OR** (b)

9. (a)

10. (d)

11. (b)

12. (c)

13. (a) OR (a)

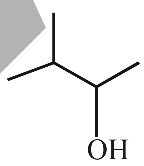
14. (c)

15. (a)

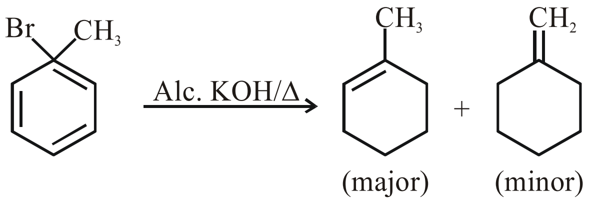
16. (c)

SECTION B

17. (a) The chiral molecule.



(b)



18. (i) $\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow{SOCl_2.\text{Pyridine}} \underset{\text{Chloroethane}}{CH_3CH_2Cl} \xrightarrow{Na-C\equiv CH} CH_3-CH_2-C\equiv CH$

(ii) $\underset{\text{Ethanol}}{CH_3-CH_2-OH} \xrightarrow{PCl_5} \underset{\text{Chloroethane}}{CH_3-CH_2-Cl} \xrightarrow{AgF} \underset{\text{Ethyl fluoride}}{CH_3-CH_2-F}$

OR

(i) $\underset{\text{Bromomethane}}{CH_3-Br} \xrightarrow{KCN\ (alc)} \underset{\text{Acetonitrile}}{CH_3-CN} \xrightarrow{CH_3-MgBr} CH_3-\underset{\underset{CH_3}{|}}{C}=NMgBr \xrightarrow[H_3O^+]{\text{Hydrolysis}} \underset{\text{Propanone}}{CH_3-\underset{\underset{CH_3}{|}}{C}=O}$

(ii) $\underset{\text{But-1-ene}}{CH_3CH_2CH=CH_2} \xrightarrow[\text{(Markovnikov addition)}]{HBr} \underset{\text{2-Bromobutane}}{CH_3CH_2\overset{\overset{Br}{|}}{C}HCH_3} \xrightarrow[-HBr]{KOH\ (alc).\Delta} \underset{\text{2-Butene}}{CH_3CH_2=CHCH_3}$

19. For isotonic solution

$$\pi_1 = \pi_2$$

Hence $$C_1 = C_2$$

$$\frac{w_1}{M_1} = \frac{w_2}{M_2}$$

$$\frac{15}{60} = \frac{w_2}{180}$$

$w_2 = 45$ gm

Hence glucose is 45% by weight present in aqueous solution.

OR

$\pi = CRT$ (Volume of solution = 100 mL)

$$\pi = \frac{n}{v}RT$$

$$\pi = \frac{5}{60} \times \frac{0.0821 \times 300}{0.1}$$

$\pi = 20.5$ atm

20. (a) Size of Ag+ ion is smaller than Na+ ion

(b) Due to presence of free electrons at interstitial sites, / metal excess defect

21. (i) Reverse osmosis occurs.

(ii) Solution shows positive deviation from Raoult's Law.

OR

The partial pressure of the gas in vapour phase (p) is directly proportional to the mole fraction of gas(x) in the solution.

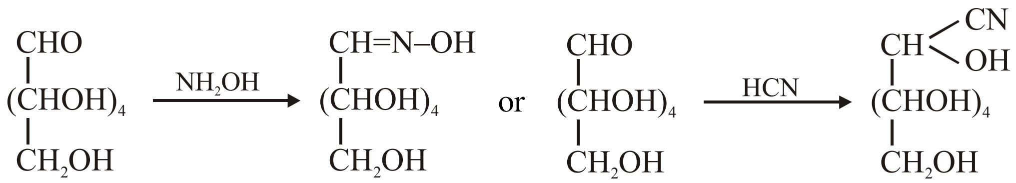
$$p = K_H.x$$

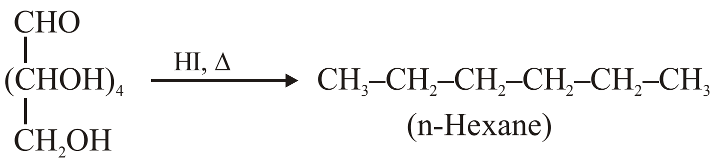
$$x = \frac{p}{K_H}$$

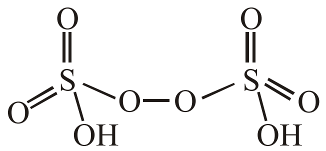
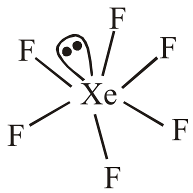
$$x = \frac{760}{1.25 \times 10^6} = 6.08 \times 10^{-4}$$

22. (i) Tetracyanidonickelate(II) / Tetracyanonickelate(II) dsp^2

(ii) Hexaaquairon(II) sp^3d^2

23. (i) 

(ii) 

24. (i)  (ii) 

25. Ligand which can ligate through two different atoms is called ambidentate ligand whereas di- or polydentate ligand uses its two or more donor atoms to bind a single metal ion. / a chelating ligand forms a more stable complex as compared to an ambidentate ligand. / chelating ligand forms a cyclic complex while ambidentate ligand forms a non-cyclic complex.

26. Atomic mass = 40g/mol

A = 400pm = 400×10^{-10} cm or 4×10^{-8} cm

$$d = \frac{z \times M}{a^3 \times N_A}$$

$$= \frac{4 \times 40}{(4 \times 10^{-8})^3 \times 6.023 \times 10^{23}}$$

$$d = \frac{160}{64 \times 6.023 \times 10^{-1}} = \frac{160}{6.4 \times 6.023}$$

= 4.18 gm/cc

1 mole of 'X' atom contains = 6.023×10^{23} atoms = 40 g

$$1 \text{ g contains} = \frac{6.023 \times 10^{23}}{40} \text{ atoms}$$

$$4 \text{ g contains} = \frac{6.023 \times 10^{23}}{40} \times 4 \text{ atoms} = 6.023 \times 10^{22} \text{ atoms}$$

$$\text{So, the no. of unit cells} = \frac{6.023 \times 10^{22}}{4} = 1.50 \times 10^{22} \text{ unit cell}$$

OR

n = given mass / molar mass

= 8.1 / 27 mol

Number of atoms = $\frac{8.1}{27} \times 6.022 \times 10^{23}$

Number of atoms in one unit cell = 4 (fcc)

Number of unit cells = $\left[\frac{8.1}{27} \times 6.022 \times 10^{23}\right] / 4$

$= 4.5 \times 10^{22}$

Or

27g of Al contains = 6.022×10^{23} atoms

8.1g of Al contains = $(6.022 \times 10^{23}/27) \times 8.1$

No. of units cells = total no of atoms / 4

$= \left[\frac{8.1}{27} \times 6.022 \times 10^{23}\right] / 4$

$= 4.5 \times 10^{22}$

27. $k = \frac{2.303}{t} \log \frac{[A]_0}{[A]} = \frac{2.303}{80} \log \frac{100}{60}$

$= \frac{2.303}{80} \times (1 - 0.7782) = 0.0064 \text{ min}^{-1}$

$t = \frac{2.303}{k} \log \frac{[A]_0}{[A]} = \frac{2.303}{0.0064} \log \frac{100}{10} = 360 \text{ min}$

28. (i) Aniline forms salt with $AlCl_3$, the Lewis acid.

(ii) Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide

(iii) Due to +I effect of alkyl group electron density on N atom increases.

OR

(i) $C_6H_5NH_2 < (CH_3)_2NH < CH_3NH_2$

(ii) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

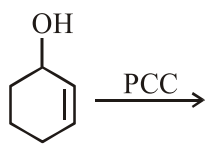
(iii) $(C_2H_5)_3N < (C_2H_5)_2NH < C_2H_5NH_2$

29. (i) Due to formation of pπ-pπ multiple bond in case of oxygen. while sulphur forms single covalent linkage.

(ii) due to weaker X–X' bonding than X–X bond.

(iii) low enthalpy of dissociation of F–F bond / high hydration enthalpy of F

30. Write the product(s) of the following reactions :

(i)


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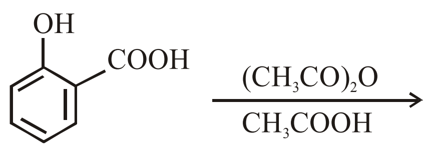
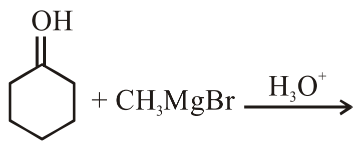


(iii)


31. (a) $R = \frac{\rho l}{A}$

$$\text{Resistivity} \rightarrow \rho = \frac{RA}{l} = \frac{5\times10^3\times0.625}{50} = 62.5\ \Omega$$

$$\text{Conductivity } K = \frac{1}{\rho} = \frac{1}{62.5} = 0.016\,\Omega^{-1}\,cm^{-1}$$

$$\text{Molar conductivity } \wedge_m = \frac{K\times1000}{C} = \frac{0.016\times1000}{0.05}$$

$$= 320\,\Omega^{-1}\,cm^2\,mol^{-1}$$

(b) At cathode: $Cu^{2+} + 2e^- \longrightarrow Cu$

Because $E^0_{Cu^{2+}/Cu} > E_{H^+/H_2} \longrightarrow Cu$

At anode: $H_2O \rightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-$

This reaction should occur at anode but due to over-potential of O_2, oxidation of Cl^- is preferred $2Cl^- \longrightarrow Cl_2 + 2e^-$

OR

(a) $E^0_{cell} = E^0_C - E^0_A = 0.80 - (-0.76) = 1.56\,V$

$$E\text{ cell} = E_{cell} = E^0_{cell} - \frac{0.059}{n}\log\frac{[Zn^{2+}]}{[Ag^+]^2}$$

$$= 1.56 - \frac{0.059}{2}\log10^3 = 1.47\,V$$

(b) Y, as molar conductivity increases with dilution due to increase in degree of dissociation.

32. (a) A = $CH_3COCH_2CH_3$

B = $CH_3CHOHCH_2CH_3$

C = $CH_3CH{=}CHCH_3$

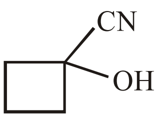
$$CH_3COCH_2CH_3 \xrightarrow{NaOH + I_2} CHI_3 + CH_3CH_2COONa$$

$$CH_3COCH_2CH_3 \xrightarrow{NaBH_4} CH_3CHOHCH_2CH_3$$

(b) i) Cleavage of C-H bond in propanal is easier than C-C bond in propanone.

ii) Due to resonance stabilization of conjugate base / enolate ion or structural representation.

OR

(a) (i) 

(ii) $H_3C-HC(OR)(OH)$

(b) (i) $H_3C - CH = CH - CH_2 - CHO$

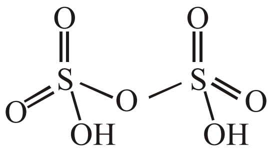
(ii) CH_3CHO

(c) On heating with NaOH + I_2, propanone gives yellow ppt. of CHI_3 while propanal doesn't. (Or any other suitable chemical test)

33. (a) (i) Because of decrease in electronegativity / increase in metallic character.

(ii) Due to decrease in bond dissociation enthalpy from HF to HI.

(iii) Sulphur is more stable in +6 oxidation state.

(b)


(c) $2XeF_2 + 2H_2O \longrightarrow 2Xe + 4HF + O_2$

OR

(a) (i) H_2Te, because of low bond dissociation enthalpy

(ii) H_2O, because of small size and high electronegativity of oxygen, bond pair–bond pair repulsion is more.

(iii) H_2O, because of high bond dissociation enthalpy.

(b) $S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

$Cl_2 + NaOH \longrightarrow NaCl + NaOCl + H_2O$

(Cold and dilute)