CBSE MODEL PAPER -1 (SOLUTIONS) : 2020-21

CHEMISTRY

SECTION A

1. (i) (c)

(ii) (a)

(iii) (a) or (c)

(iv) (b)

2. (i) (a) or (b)

(ii) (c)

(iii) (a)

(iv) (d)

3. (b) or (b)

4. (c) or (b)

5. (a) or (a)

6. One mark may be awarded to any option

7. (c) or (a)

8. (b)

9. (d)

10. (c)

11. (c)

12. (d)

13. (d)

14. (a)

15. (c)

16. (d) or (i / (ii)

SECTION B

17. Due to lowering of vapour pressure of solution. Because it depends on molality / number of solute particles.

OR

Due to osmosis. / Due to inward movement of water molecules. Yes, osmosis is directly proportional to temperature of solvent.

18.

	Order	Molecularity
i.	Sum of powers to which, the concentration terms are raised in a rate law	The number of reacting species colliding simultaneously in an elementary step.
ii.	May also be zero/ fraction/negative	It is always a positive whole number.

(or any other difference.)

OR

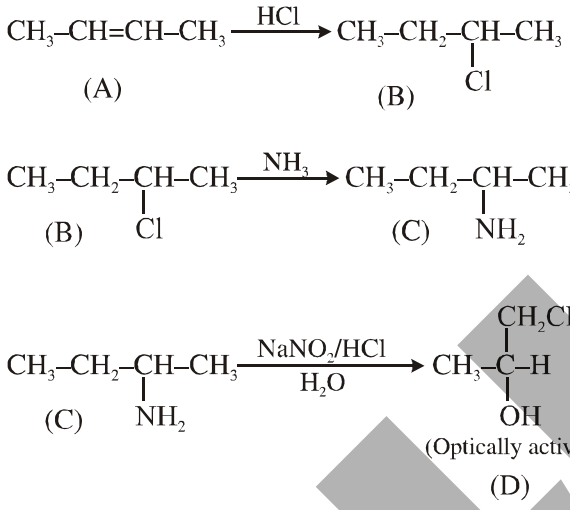
(a) Due to decrease in concentration of reactants with time .

(b) Due to more surface area.

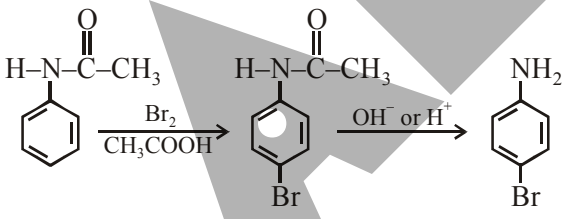
19. (a) Because solute particle size is extremely small.

(b) Due to coagulation of blood.

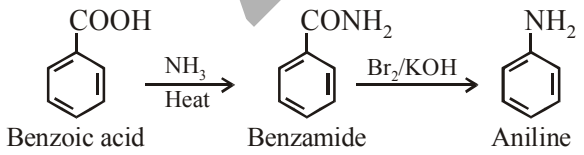
20. On the basis of structure of 'A' reactions can be explained as follows :



21. (a)



(b)



22. π = CRT (Volume of solution = 100 mL)

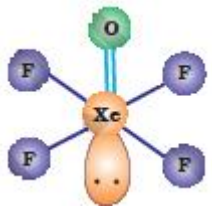
$$\pi = \frac{n}{v}RT$$

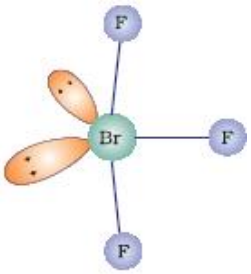
$$\pi = \frac{5}{60}$$

π = 20.5 atm. (1/2 mark may be deducted for no or incorrect unit)

OR

- For a solution of volatile liquids, the partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in solution.
- If we compare the equations for Raoult¡¦s law and Henry's law, it can be seen that the partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution.

23. (a) 

(b) 

24. (a) $K_2[Zn(OH)_4]$

(b) $[Pt(NH_3)_6]Cl_4$

25. (a) $(CH_3)_3C\text{-}OH$ / tertiary butyl alcohol is formed.

(b) $C_6H_5COCH_3$ / acetophenone is formed (or correct chemical equation)

SECTION C

26. Given that Crystal density = 8.55 g cm^{-3} for Bcc, n = 2 , M_w of niobium = 93

$\because$ Crystal density $= \frac{n \times M_w}{V \times N_A}$

$\therefore$ $V = \frac{2 \times 93}{8.55 \times 6.023 \times 10^{23}} = 3.6 \times 10^{-23}\ cm^3$ or $a^3 = 36 \times 10^{-24}\ cm^3$

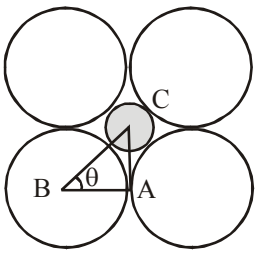
$\therefore$ $a = 3.3 \times 10^{-8}$ cm

for Bcc $4r = \sqrt{3}\, a$

$\therefore$ $r = \frac{1.732 \times 3.3 \times 10^{-8}}{4} = 1.43 \times 10^{-8}$ cm. = 14.32 nm

OR

In the triangle ABC



$\cos 45^\circ = \frac{R}{R+r} = \frac{1}{\sqrt{2}}$

$1 + \frac{r}{R} = \sqrt{2}$ or $\frac{r}{R} = 0.414$

27. $k = \frac{0.693}{t_{\frac{1}{2}}} = \frac{0.693}{2\,min}$

$0.3465\ min^{-1}$

$$t_{\frac{1}{2}} = \frac{2.303}{K}\log\frac{[A]_0}{[A]}$$

$$= \frac{2.303}{0.3465}\log\frac{100}{10}$$

$$t = \frac{2.303}{0.3465\,min^{-1}} \times \log 10 \quad = \frac{2.303}{0.3465} \times 1$$

= 6.6 min (deduct half mark if no or incorrect unit)

OR

Rate = k [A] $[B]^2$

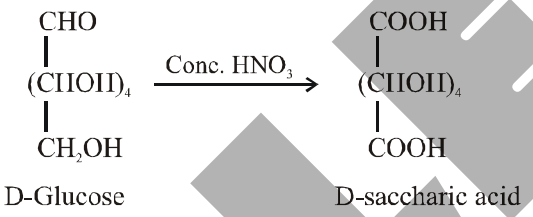
(i) Rate = k [A] $[3B]^2$ = 9k [A]$[B]^2$

So the rate increases by nine times.

(ii) Rate = k [2A] $[2B]^2$ = 8k [A] $[B]^2$

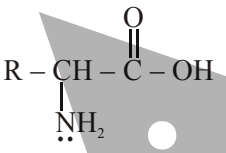
So the rate becomes eight times.

28. (a)



D-Glucose D-saccharic acid

(b) The amino acids contains both acidic –COOH group & basic –NH2 (amino) group in their structure, due to which they can exist both as acid & base, this nature is called Amphoteric nature



(α-amino acid)

(c) In α-helix, a polypeptide chain form by all possible hydrogen bonds by twisting into a right handed helical structure with –NH group of each amino acid.

In β-pleated all peptide chains are stretched out to nearly extensions & then laid side by side which are held together by intomolecular hydrogen bonding.

29. (i) A → CH_3CHO, B → $CH_3 – CH = N – OH$

(ii) A → CH_3COOH, B → CH_3COCl

(iii) A → C_6H_5COONa, B → C_6H_6

30. (a) In test tube (iii), containing sulphur powder.

$$3S + 2H_2SO_4 \xrightarrow{Heat} 3SO_2 + 2H_2O$$

(b) In test tube (i), containing cane sugar.

$$C_{12}H_{22}O_{11} + H_2SO_4 \xrightarrow{\Delta} 12C + 11H_2O$$

(c) In test tube (ii), containing copper turnings

$$Cu + 2H_2SO_4 \xrightarrow{\Delta} CuSO_4 + SO_2 + 2H_2O$$

SECTION D

31. (a)

(i) $Cu^{+1}(3d^{10})$ compounds are white because of absence of unpaired electrons while Cu^{+2} $(3d^9)$ compounds are coloured due to unpaired e- / shows d-d transition.

(ii) E° value for Mn^{3+} / Mn^{2+} couple is much more positive than that for Fe^{3+} / Fe^{2+}, due to the Mn^{2+} have higher stability than M^{3+} due to half filled d^5 configuration.

(iii) due to completely filled d-orbitals in their ground state as well as in oxidized state.

(b) Co = $[Ar]4s^2 3d^7$, Co^{+2} = [Ar] $3d^7$

$$\mu = \sqrt{n(n+2)}$$

$$= \sqrt{3(3+2)} = \sqrt{15} = 3.92 \text{ B.M.}$$

OR

(a)

Lanthanoids	**Actinoids**
(1) most of them are not radioactive	All are radioactive
(2) don't show a wide range of oxidation stat	Show a wide range of oxidation state
(3) Most of their ions are colourless	Most of their ions are coloured

(or any other correct differences)

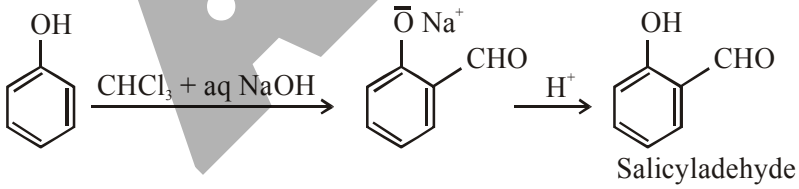
(b) (i) Sc^{+3}, because of absence of unpaired electron.

(ii) Cr, because of presence of strong intermetallic bonding than Cu.

32. (a) Tert-butyl alcohol,

because it forms more stable 3° carbocation than 1° carbocation

(b) (i)

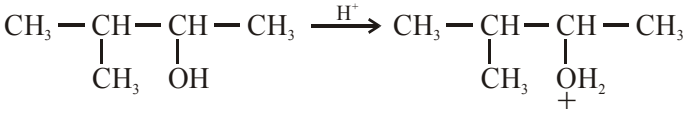


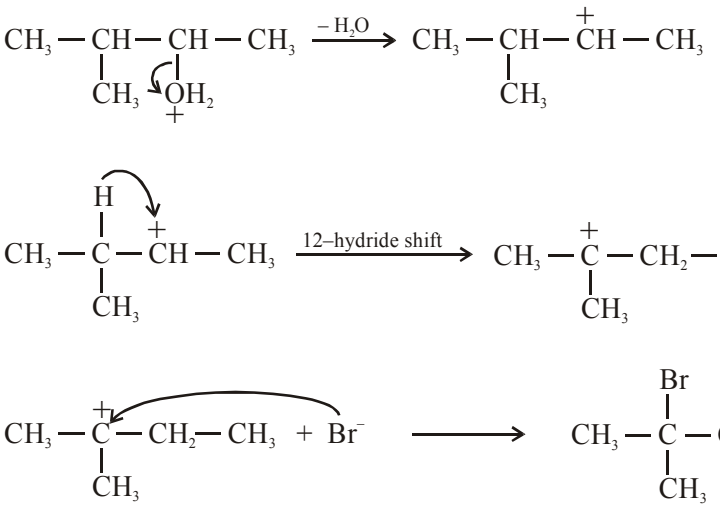
Salicyladehyde

(ii) $(CH_3)_3CCl + NaOH_{(aq.)} \longrightarrow (CH_3)_3COH \xrightarrow{Na} (CH_3)_3CONa \xrightarrow{C_2H_5Cl} (CH_3)_3COC_2H_5$

(iii) $CH_3CH = CH_2 \xrightarrow[(ii)\,H_2O_2/OH^-]{(i)\,B_2H_6} CH_3CH_2CH_2OH$ (or by any other suitable method)

OR

(a) 



(b) (i) $K_2Cr_2O_7 + H_2SO_4$ / $Na_2Cr_2O_7 + H_2SO_4$

(ii) Br_2 in CH_3COOH

(iii) Br_2 aq. / Bromine water

33. (a) (i) Silver wire at 30°C because as temperature decreases, resistance decreases so conduction increases.

(ii) 0.1 M CH_3COOH, because on dilution degree of ionization increases hence conduction increases.

(iii) KCl solution at 50°C, because at high temperature mobility of ions increases and hence conductance increases

(b) E^0 cell = $E^0_C - E^0_A$

= 0.34 – (–0.76) = 1.10V

$\Delta G° = -nFE^0 = -2 \times 1.10 \times 96500$

= –212300 J/mol or –212.3 kJ/mol

OR

(a). E^0cell = $E^0_C - E^0_A$

= 0.80 – (–0.76) = 1.56 V

$$E \text{ cell} = E^0\text{cell} - \frac{0.059}{n}\log\frac{[Zn^{2+}]}{[Ag^+]^2} = 1.56 - \frac{0.059}{2}\log 10^3 = 1.47 \text{ V}$$

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