Sample Paper- 03 **Class 12th NEET (2024)**

CHEMISTRY

ANSWER KEY

1.	(4)	26.	(2)
2.	(4)	27.	(1)
3.	(4)	28.	(4)
4.	(1)	29.	(4)
5.	(1)	30.	(4)
6.	(2)	31.	(4)
7.	(4)	32.	(3)
8.	(4)	33.	(2)
9.	(2)	34.	(3)
10.	(3)	35.	(3)
11.	(2)	36.	(4)
12.	(1)	37.	(1)
13.	(2)	38.	(1)
14.	(1)	39.	(1)
15.	(2)	40.	(3)
16.	(1)	41.	(2)
17.	(3)	42.	(1)
18.	(2)	43.	(2)
19.	(4)	44.	(2)
20.	(1)	45.	(1)
21.	(3)	46.	(4)
22.	(2)	47.	(2)
23.	(4)	48.	(4)
24.	(1)	49.	(4)
25.	(1)	50.	(4)

HINTS AND SOLUTION

1. (4)

$$CH_3COOH \xrightarrow{NH_3/\Delta} \underset{(X)}{CH_3CONH_2} \xrightarrow{Br_2/NaOH} \underset{(Y)}{CH_3NH_2}$$

2. (4)

It is given that for a certain reaction of order n, the half change

$$t_{1/2} = \frac{2-\sqrt{2}}{K} C_0^{1/2}$$

$$t_{1/2} \propto C_0^{1-n}$$

$$\therefore \quad 1-n = \frac{1}{2}$$

$$\therefore \quad n = \frac{1}{2} = 0.5$$

3. (4)

When $k_1 = k_2$

$10^{15}e^{-2000/T} = 10^{14}e^{-1000/T}$

$10 = e^{1000/T}$

$$2.303\log 10 = \frac{1000}{T}$$

[T = 434.2 K]

4. (1)

Conceptual

5. (1)

In pure methanol, molecules are hydrogen bonded. On adding acetone its molecule gets in between the host molecule and break some of the hydrogen bond between them. Therefore, the intermolecular attractive forces between the solute-solvent molecules are weaker than those between the solute-solute and solvent-solvent molecule.

6. (2)

Statement I: $[Cr(H_2O)_6]^{3+}$ is an inner orbital complex. **(Incorrect)**

Statement II: H_2O is a strong field ligand generally. **(Incorrect)**

7. (4)

Conceptual

8. (4)

E°_{cell} = SRP of cathode – SRP of anode

$D/D^{2+} \,||\, A/A^-$

$E^\circ_{cell} = 0.96 - (-1.12)$

$= 2.08$ V

9. (2)

$$\frac{K}{A} \times 100 = 10^{-2}$$

$$\frac{K}{A} = 10^{-4}$$

$$\frac{K}{A} = e^{\frac{-E_a}{RT}}$$

$$10^{-4} = e^{\frac{-E_a}{RT}}$$

Taking log on both sides;

$$\ln 10^{-4} = \frac{-E_a}{RT}$$

$$-4 \times 2.303 \log_{10} 10 = \frac{-E_a}{RT}$$

$$E_a = 4 \times 2.303 \times 600 \times 8.314$$

$$E_a = 45.95 \text{ kJ/mol}$$

10. (3)

Only Au^{3+}, Ag^+ and Cu^{2+} will deposit at cathode. Li will not deposit at cathode because SRP of water is –0.8274 V so after Cu^{2+}, H_2 will evolve at cathode.

11. (2)

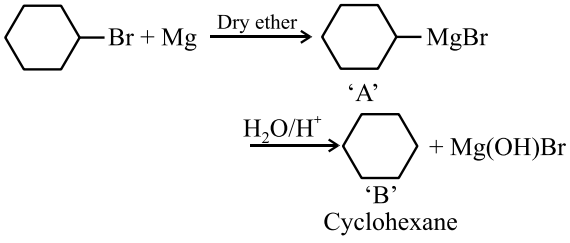
Cannizzaro reaction

12. (1)

p-Methylaniline > m-Methylaniline > Aniline > o-Methylaniline

(I) [$pK_b = 9.21$] (II) [$pK_b = 9.34$] (III) [$pK_b = 9.38$] (IV) [$pK_b = 9.58$]

13. (2)



14. (1)

Molecular mass of solute

$$= \frac{1000.K_b.W_2}{W_1.\Delta T} = \frac{1000 \times 0.51 \times 18}{150 \times 0.34} = 180$$

15. (2)

Stability order: $[Co(ox)_3]^{3-}$ > $[Co(H_2O)_6]^{3+}$ > $[Co(ONO)_6]^{3-}$ > $[CoF_6]^{3-}$

For a given metal cation and fixed co-ordination number, 5 or 6 membered chelated complex is found to be more stable than a complex with monodentate ligands.

16. (1)

Statement I: Mn_2O_7 is acidic in nature. **(Correct)**

Statement II: $KMnO_4$ is purple in colour due to charge transfer. **(Correct)**

17. (3)

Tollens' test, also known as silver-mirror test, is a qualitative laboratory test used to distinguish an aldehyde.

Fehling's reagent is an aqueous solution of copper sulphate, sodium hydroxide, and potassium sodium tartrate, used to distinguish aliphatic aldehydes from aromatic aldehydes.

Glucose reduces both Tollen's reagent as well as Fehling's reagent. In Tollen's test it gives Ag mirror ppt and with Fehling's reagent it gives reddish brown ppt of cuprous oxide.

18. (2)

According to VSEPR theory,

l.p. – l.p. > l.p. – b.p. > b.p. – b.p.

NH_2^- has 2 lone pairs, NH_3 has 1 lone pair & NH_4^+ does not have any lone pair.

19. (4)

$$M = \frac{x \times d \times 10}{m_B}$$

$$d = \frac{M \times m_B}{x \times 10} = \frac{3.6 \times 98}{29 \times 10} \approx 1.22\,g\,mL^{-1}$$

20. (1)

Statement I: Helium and neon have smallest atomic size among all the elements of group 18 (**True**).

Statement II: Noble gases have highest ionization energies in their respective periods. **(True)**

21. (3)

Assertion (A): In Hunsdiecker reaction, alkyl chloride is formed in poor yield. **(True)**

Reason (R): In this reaction, carbanion is formed as an intermediate. **(False)**

22. (2)

Transition metals are less reactive relative to I and II group due to higher ionization potential and high melting point (due to greater number of bonding electrons).

23. (4)

Erbium with atomic number 68, electronic configuration [Xe] $4f^{12}\,6s^2$ belongs to lanthanides.

∴ Erbium is not an actinide.

24. (1)

Assertion (A): Phenol does not react with $NaHCO_3$. **(True)**

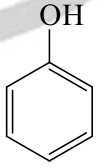
Reason (R): Phenol is less acidic than H_2CO_3. **(True)**

25. (1)

Acidified potassium dichromate $K_2Cr_2O_7$, oxidises ferrous sulphate $FeSO_4$(Fe = +2) to ferric sulphate $Fe_2(SO_4)_3$, (Fe = +3), while potassium dichromate is reduced to chromic sulphate from Cr^{6+} to Cr^{3+}

$$K_2Cr_2O_7 + 6FeSO_4 + 7H_2SO_4 \xrightarrow[\text{Ferrous sulphate}]{} \underset{\text{Chromic sulphate}}{K_2SO_4 + Cr_2(SO_4)_3} + \underset{\text{Ferric sulphate}}{Fe_2(SO_4)_3} + 7H_2O$$

26. (2)



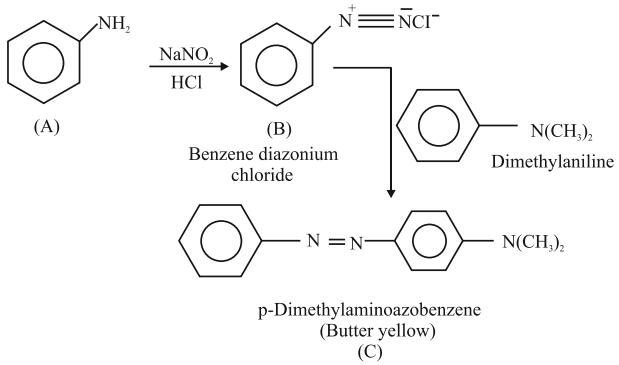
is a phenol, not an alcohol.

27. (1)

The decreasing order of the reducing character is: HI > HBr > HCl > HF.

The stability of hydrogen halides decreases on moving from HF to HI, the reducing property increases on moving down the group. Thus, HI is the strongest reducing agent while HF is the weakest.

28. **(4)**



29. **(4)**

Basic strength order of amines in gaseous phase is directly proportional to +I effect.

30. **(4)**

Among the halogens F, Cl, Br and I, F has the highest electronegativity. In CH_3F due to less distance between F and C, dipole moment decreases.

Dipole moment order is:

$CH_3Cl > CH_3F > CH_3Br > CH_3I$

31. **(4)**

For enantiomers

$\Rightarrow$ presence of chirality is necessary.

32. **(3)**

Conceptual

33. **(2)**

$$CH_3 - CO - CH_2CH_3 \xrightarrow{\text{conc. } HNO_3} 2\,CH_3 - COOH$$

34. **(3)**

$$CH_3 - \overset{\overset{O}{\|}}{C} - CH_3 \xrightarrow[I_2]{NaOH} CH_3 - COO^-Na^+ + CHI_3$$

35. **(3)**

Both geometrical and ionization isomerism.

36. **(4)**

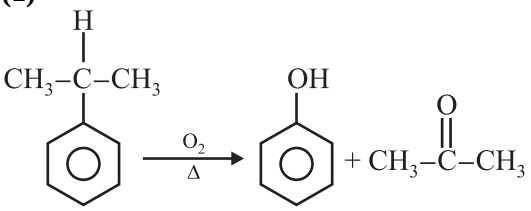
Conceptual

37. **(1)**

$O^- - \ddot{N} = O$

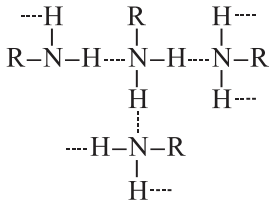
O-donor and N-donor

38. **(1)**



39. **(1)**

Due to the large extent of H-bonding, primary amines have highest melting & boiling points.



40. **(3)**

Basic strength depends upon the availability of lone pair.

In compound 2, the lone pair of N is not involved in conjugation with the aromatic ring making it fully available for donation, hence it is most basic.

In compound 3, the lone pair of N is in conjugation with the ring making the ring aromatic, making it unavailable for donation, hence it is least basic.

41. **(2)**

The final product is phthalimide in which 5 pi bonds are present.

42. **(1)**

pK_a of acidic amino acid is in between 1 to 3.

43. **(2)**

Sucrose is a disaccharide which is made up of two monosaccharides, i.e., Glucose and Fructose.

44. **(2)**

Cannizzaro reaction	NaOH
Stephen's reaction	$SnCl_2$/HCl
Clemmensen reduction	Zn/Hg-conc. HCl
Rosenmund's method	$\frac{Pd/BaSO_4}{\text{Boiling xylene}}$

45. **(1)**

$KMnO_4$ on treatment with conc. H_2SO_4 gives following reaction:

$$KMnO_4 + H_2SO_4 \rightarrow H_2O + K_2SO_4 + Mn_2O_7\,(X)$$

X on heating gives following product.

$$Mn_2O_7\,(X) \xrightarrow{\text{Heat}} MnO_2\,(Y)$$

46. **(4)**
Glucose does not react with $NaHSO_3$.

47. **(2)**
The correct boiling point order is:
$H_2O > HF > NH_3$

48. **(4)**
- Ammonolysis is the process in which alkyl halide react with ammonia to form amines. This reaction gives all different types of amines ranging from primary amine to quaternary ammonium salt.
- Gabriel phthalimide is the process in which purest form of 1° amine is obtained by reacting phthalimide with a strong base & alkyl halide.
- In Hoffman-bromamide reaction an amide is treated with Br_2 in presence of NaOH where degradation of amide takes place leading to the formation of primary amine.
- The carbylamine reaction, also known as Hofmann's isocyanide test is a chemical test for the detection of primary amine, in which the amine is heated with alc. KOH and $CHCl_3$. If a primary amine is present, the isocyanide (carbylamine) is formed which has a foul smell.

49. **(4)**
Alanine is an amino acid with one amino and one carboxylic group. It is a hydrophobic amino acid, also the alpha carbon of the alanine is optically active.

50. **(4)**
In solid state, PBr_5 exist as: $[PBr_4]^+ [Br]^-$