Sample Paper- 04

NEET XII (2024)

CHEMISTRY

Answer Key

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

Hints & Solutions

1. **(3)**

Statement I: $KMnO_4$ is oxidising agent in neutral, acidic and in basic medium **(true)**.

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

2. **(2)**

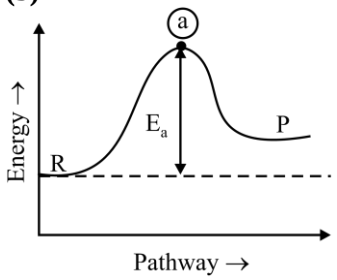
Oxidising agent $\propto E^{\circ}_{SRP}$

So, MnO_4^- is the strongest oxidising agent.

3. **(1)**

$$-\left[\frac{dc}{dt}\right]=\left[\frac{-dn}{dt}\right]\frac{1}{V}=-\frac{1}{RT}\frac{dp}{dt}$$

4. **(3)**



- Energy of product is higher than that of reactant.
- At point (a) the reactant possesses enough energy for the reaction to take place.
- This used up energy must be less than E_a for an endothermic reaction.

$E_a - H$ = used energy

$\therefore$ $E_a > H$

5. **(4)**

An unripe mango placed in a concentrated salt solution to prepare pickle shrivels because it loses water due to osmosis. The concentrated salt solution is the hypertonic solution.

6. **(3)**

- When $E_{cell} = 0$, this is condition in equilibrium and here potential at anode.
- When $E_{cell} > E_{ext}$, the reaction of the electrochemical cell will proceed till E_{cell} is equal to E_{ext}.
- $E_{ext} > E_{cell}$, the reaction will start in the opposite direction. This means that now the electrochemical cell will convert the electrical energy supplied by the external cell to chemical energy which is the property of an electrolytic cell. So, electrochemical cell behaves like an electrolytic cell.
- When $E_{cell} = E_{ext}$ in this case, the cell reaction stops and no current will flow through the circuit.

7. **(2)**

On cooling a sugar solution of 1 M to –1°C only water freezes and ice separates out. On cooling, the solubility decreases and ice separates out.

8. **(3)**

Statement I: Boiling point of water at higher altitude is lower than 100°C. **(True).**

Statement II: Boiling point is a colligative property. **(False).**

9. **(4)**

Assertion (A): Order and molecularity of a reaction are always equal. **(False).**

Reason (R): Complex reactions takes place in two or more steps and fastest step determine the molecularity of reaction. **(False).**

10. **(1)**

$$P_{(g)} = K_H X_{(g)}$$

$$P_{(g)} = K_H \frac{n_{H_2S}}{n_{H_2S} + n_{H_2O}}$$

$$1\,atm = K_H \frac{0.195}{0.195 + \frac{1000}{18}}$$

$$K_H = \frac{55.745}{0.195} = 285.9\ atm$$

11. **(3)**

$$\log -\frac{d[A]}{dt} = \log \frac{d[B]}{dt} + 0.3010$$

$$-\frac{d[A]}{dt} = 2\frac{d[B]}{dt}$$

$$\frac{1}{2} \times \frac{-d[A]}{dt} = \frac{d[B]}{dt}$$

$$2A \rightarrow B$$

$$2C_2H_4 \rightarrow C_4H_8$$

12. **(1)**

Assertion (A): Glycine is the only amino acid which is optically inactive. **(True).**

Reason (R): Glycine has no chiral carbon. **(True).**

13. **(3)**

As I^- is taken with smaller alkyl group. (S_N2 Mechanism)

14. **(4)**
Informative

15. **(1)**

Nitrogen does not have empty d-orbitals. Hence, it is unable to form more than 4 bonds.

16. **(1)**
Oxidation number of Cr in CrO_5 is +6 for Fe is 0 in $Fe(CO)_5$ and Fe is in +2 in ferrocyanide complex, Mn in the given compound is +3.

17. **(3)**
Glucose reacts with 5 molecules of acetic anhydride to form glucose pentaacetate.

18. **(3)**
$H_2O_2 \rightarrow O_2 + 2H^+ + 2e^-$
1 mole H_2O_2 = 2 moles e^-
$= 2 \times 96500\ C = 193000\ C = 1.93 \times 10^5\ C$

19. **(1)**
$\pi = CRT$
We know that $\pi_1 = C_1RT_1$ and $\pi_2 = C_2RT_2 (T_1 = T_2)$

$C = \frac{n}{V}$ (number of moles per litre)

$V = 1\ L$

$\therefore \quad \frac{\pi_1}{C_1} = \frac{\pi_2}{C_2}$

$C_2 = \frac{\pi_2}{\pi_1} C_1 = \frac{1.52 \times 36}{4.98 \times 180} = 0.061\ M$

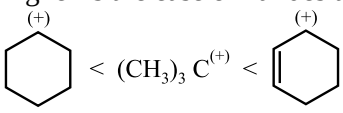
20. **(2)**
Zn and Hg do not show variable valency like transition elements because their d-orbitals are complete and their electronic configurations are:

$Zn\ (30) \quad \Rightarrow 3d^{10}4s^2$

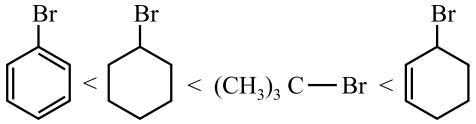
$Hg\ (48) \quad \Rightarrow 4d^{10}5s^2$

The variable valency is shown by those elements which have got incompletely filled 'd' orbitals.

21. **(4)**
Cyclic and tertiary halides undergo hydrolysis by S_N1 mechanism and involve formation of carbocation intermediate. Greater the stability, higher is the ease of halides to undergo hydrolysis.



$\therefore$ The increasing order is:



22. **(1)**

(a) $[Fe(H_2O)_6]Cl_2, Fe^{2+} \rightarrow 3d^6 \rightarrow (t_{2g})^4(e_g)^2$

C.F.S.E. $= 4 \times (-0.4\Delta_o) + 2 \times 0.6\Delta_o = -0.4\Delta_o$

(b) $K_2[NiCl_4], Ni^{2+} \rightarrow 3d^8 \rightarrow (e_g)^4(t_{2g})^4$

C.F.S.E. $= 4 \times (-0.6\Delta_t) + 4 \times (0.4\Delta_t) = -0.8\Delta_t$

23. **(3)**
The rate constant for first order reaction does not depends on initial concentration of reactants.

24. **(2)**
Assertion (A): 1°, 2° and 3° amines are separated by Hinsberg's reagent. **(True).**
Reason (R): Hinsberg's reagent is $C_6H_5SO_2Cl$. **(True).**

25. **(3)**
Lawrencium-103 is an actinide present in 5f series of f-block elements.
The outermost configuration = $[Rn]\ 5f^{14}\ 6d^1\ 7s^{2.}$

26. **(3)**
Magnetic moment = $\sqrt{n(n+2)}$

$Cr^{3+} — 3d^3 = \sqrt{3 \times 5} = \sqrt{15}$

$Fe^{2+} — 3d^6 = \sqrt{4 \times 6} = \sqrt{24}$

$Ni^{2+} — 3d^8 = \sqrt{2 \times 4} = \sqrt{8}$

$Mn^{2+} — 3d^5 = \sqrt{5 \times 7} = \sqrt{35}$

27. **(4)**
First synthetic element is Tc (Z = 43).

28. **(1)**

$E = E^o - \frac{0.0591}{2} \log[H^+]^2$

$= 1.30 + 0.0591 \times 3 = 1.48V$

29. **(4)**

$Zn(s) \longrightarrow Zn^{2+} + 2e^-$ (Anodic process)

$2Ag^+ + 2e^- \longrightarrow 2Ag(s)$ (Cathodic process)

$$Zn(s) + 2Ag^{+} \rightleftharpoons 2Ag(s) + Zn^{2+}$$

$$Q = \frac{[Zn^{2+}]}{[Ag^{+}]^2} = \frac{0.01}{(1.25)^2} = 6.4 \times 10^{-3}$$

30. (1)

The order of acidity of oxides of chlorine is:

Cl_2O (I) < Cl_2O_3 (II) < Cl_2O_5 (III) < Cl_2O_7 (IV)

31. (1)

The azeotropic mixture of water and nitric acid boil at T > 359 K.

32. (2)

S_N1 reactivity ∝ stability of carbocation

33. (3)

[B.P ∝ Straight chain]

$$\left[B.P \propto \frac{1}{\text{Branched chain}} \right]$$

34. (4)

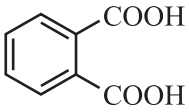
$$CH_3 - CH = CH_2 \xrightarrow[(2)\, H_2O_2, OH^-]{(1)\; B_2H_6,\ THF} CH_3 - CH_2 - CH_2OH$$

35. (3)

$$CH_2 = CH - CH_2 - C \equiv N \xrightarrow[(ii)\, H_2O]{(i)\ DIBAL\text{-}H}$$

$$CH_2 = CH - CH_2 - CHO \xrightarrow[KOH]{NH_2 - NH_2} CH_2 = CH - CH_2 - CH_3$$

36. (2)



[Benzene 1, 2 dicarboxylic acid]

37. (3)

$$E \propto \frac{1}{\lambda}$$

$$CFSE \propto \frac{1}{\lambda}$$

Order of CFSE = III > II > I

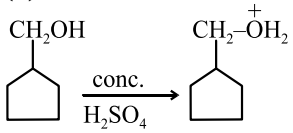
λ = I > II > III

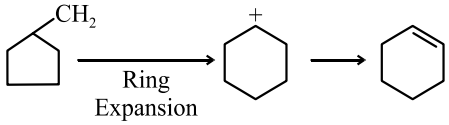
38. (2)

Magnitude of CFSE ∝ Strength of ligand.

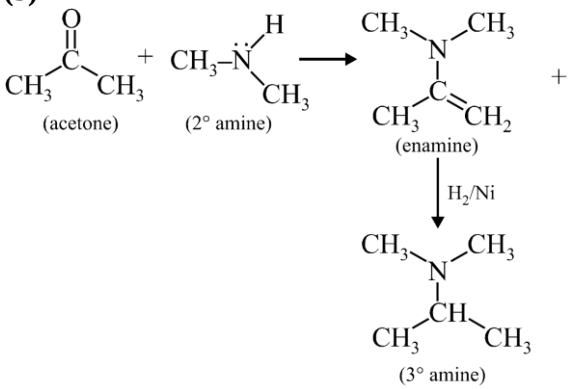
Ligand strength = CN^- > NO_2^- > NH_3 > F^-

39. (1)

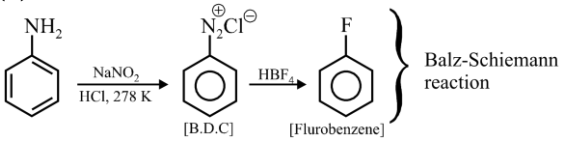




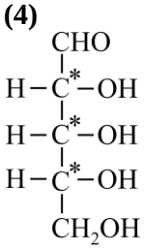
40. (3)



41. (4)



42. (4)



No. of asymmetric carbon atoms = 3

Here, no. of chiral centres is 3. Total number of stereoisomers = 2^3 = 8.

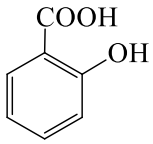
43. (1)

List-I	List-II
Monohydric phenol	Picric acid
Dihydric phenol	Resorcinol
Trihydric phenol	Pyrogallol
Aromatic alcohol	Benzyl alcohol

44. (4)

Dehydration of alcohols ∝ Stability of carbocation

45. **(3)**



is most acidic due to ortho effect.

46. **(1)**

$$R - COOH \xrightarrow{LiAlH_4} R - CH_2 - OH$$

47. **(1)**

Primary aliphatic amines react with nitrous acid to give nitrogen gas which is seen as bubbles.

$$\underset{\text{Primary amine}}{RNH_2} + HONO \longrightarrow \underset{\text{Alcohol}}{ROH} + H_2O + N_2$$

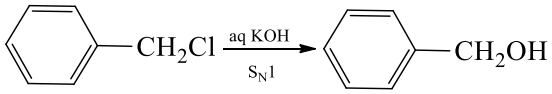
Secondary amines react with nitrous acid to form a yellow oily nitroso amine

$$\underset{2^o \text{ amine}}{R_2NH} + HONO \longrightarrow \underset{\substack{\text{Nitroso amine} \\ \text{(yellow oil)}}}{R_2N-NO} + H_2O$$

Tertiary amines react with nitrous acid to form soluble nitrite salts.

$$R_3N + HONO \longrightarrow R_3NH^+ ONO^-$$

48. **(1)**



49. **(3)**

Most viscous liquid is glycerol among the given compounds due to extensive H-bonding.

50. **(4)**

Chromyl chloride test is given by ionic chlorides only. $HgCl_2$ and LiCl are covalent in nature.