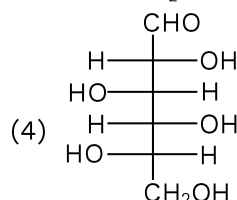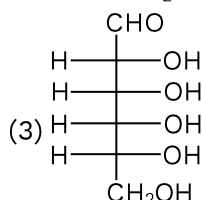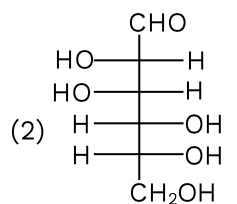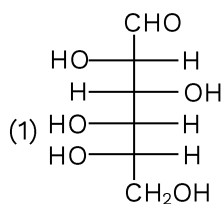# CHEMISTRY

**1.** Which of the following is the correct structure of L-Glucose



**Ans.** (1)

**Sol.** Structure based


**2.** How many structural isomer are there in $C_7H_{16}$

(1) 5           (2) 6           (3) 8           (4) 9

**Ans.** (4)

**Sol.** 9 structural isomers are possible of $C_7H_{16}$


**3.** Which of the following has the maximum dipole moment

(1) $NH_3$           (2) $NF_3$           (3) $PCl_5$           (4) $CH_4$

**Ans.** (1)

**Sol.** $NH_3$ has maximum dipole moment


**4.** Which of the following show only one oxidation state except it's elemental state

(1) Ti           (2) Sc           (3) Co           (4) Ni

**Ans.** (2)

**Sol.** Sc show only +3 oxidation state.


**5.** Number of species having $sp^3$ hybridised central atom

$NO_3^-$           $BCl_3$           $ClO_2^-$           $ClO_3^-$

**Ans.** (02.00)

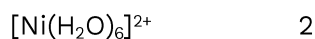**Sol.** Cl atom in $ClO_2^-$ and $ClO_3^-$ molecule is $sp^3$ hybridised.


**6.** Number of complexes having even number of unpaired electron in d-orbital.

$[Cu(H_2O)_6]^{2+}$ , $[Fe(H_2O)_6]^{3+}$ , $[Cr(H_2O)_6]^{2+}$ , $[Ni(H_2O)_6]^{2+}$

**Ans.** (02.00)

**Sol.** All are octahedral complex

| Complex | Number of unpaired electron |
|---|---|
| $[Cu(H_2O)_6]^{2+}$ | 1 |
| $[Fe(H_2O)_6]^{3+}$ | 5 |
| $[Cr(H_2O)_6]^{2+}$ | 4 |

$[Ni(H_2O)_6]^{2+}$         2

**7.** If emf of hydrogen electrode at 25°C is zero pure water then pressure of $H_2$ in bar

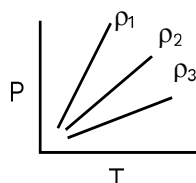(1) $10^{-14}$            (2) $10^{-7}$            (3) 1            (4) 0.5

**Ans.** (1)

**Sol.** $H^+ + e^- \longrightarrow \dfrac{1}{2} H_2$

$$\varepsilon = 0 - \frac{0.059}{1} \log \frac{\left(P_{H_2}\right)^{1/2}}{10^{-7}}$$

$$\frac{\left(P_{H_2}\right)^{1/2}}{10^{-7}} = 1$$

$$P_{H_2} = 10^{-14}$$

**8.** Pressure v/s temperature graph of an ideal gas of equal number of moles of different density is given below:



(1) $\rho_1 = \rho_2 = \rho_3$      (2) $\rho_1 > \rho_2 > \rho_3$      (3) $\rho_1 < \rho_2 < \rho_3$      (4) $\rho_1 > \rho_2 < \rho_3$

**Ans.** (2)

**Sol.** $P = \dfrac{R\rho}{M} T$

$\text{Slope} = \dfrac{R\rho}{M} \propto \rho$

$\rho_1 > \rho_2 > \rho_3$

**9.** Total number of species having single unpaired electron in NO, $\overline{C}N$ , $O_2^-, O_2^{2-}, O_2$

**Ans.** (02.00)

**Sol.**

| | | |
|---|---|---|
| NO | total $e^- = 15$ | Unpaired $e^- = 1$ |
| $CN^-$ | total $e^- = 14$ | Unpaired $e^- = 0$ |
| $O_2^-$ | total $e^- = 17$ | Unpaired $e^- = 1$ |
| $O_2^{2-}$ | total $e^- = 18$ | Unpaired $e^- = 0$ |
| $O_2$ | total $e^- = 16$ | Unpaired $e^- = 2$ |

**10.** Which of the following is the correct order of I$^{st}$ ionisation enthalpy?

(1) Be < B < O < F < N            (2) B < Be < O < N < F

(3) B < Be < N < F < O            (4) Be < B < N < F < O

**Ans.** (2)

**Sol.** Be  >  B  <  N  >  O  <  F

$2s^2$     $2p^1$     $2p^3$     $2p^4$     $2p^5 \rightarrow$ electronic configuration

Correct order

B< Be < O < N < F

**11.** For any reaction $K = \dfrac{K_1 K_2}{K_3}$ and $Ea_1 = 400, Ea_2 = 300, Ea_3 = 200$ hence $E_{overall}$?

    (1) 400            (2) 200            (3) 500            (4) 600

**Ans.** (3)

**Sol.** $E_{overall} = Ea_1 + Ea_2 - Ea_3$

          = 400 + 300 − 200 = 500


**12.** If weight of NaCl in 500ml aqueous solution is 5.85 gm hence calculate the molarity?

**Ans.** (00.20)

**Sol.** $\left[NH_3\right] = \dfrac{n}{v} = \dfrac{5.85 / 58.5}{0.5} = 0.2M$


**13.** 2M, 2ml solution of $KMnO_4$ is neutralised with 20 ml $H_2C_2O_4$. Calculate molarity of $H_2C_2O_4$

**Ans.** (00.50)

**Sol.** $MnO_4^-$          +         $C_2O_4^{2-}$       $\xrightarrow{H^+}$       $Mn^{2+}$   + $CO_2$

    $n_f = 5$                 $n_f = 2$

    $2 \times 5 \times 2 = M \times 2 \times 20$

    $M = 0.5 \ M$


**14.** De-Broglie wavelength of $e^-$ 4th orbit of H−Atom is $x\pi r_0$, where $r_0$ = bohr's Ist orbit radius of H-Atom x is____

**Ans.** (8)

**Sol.** $4\lambda = 2\pi r_4$

    $\lambda = \dfrac{2\pi}{4} r_0 \times 4^2$

    $= 8\pi r_0$


**15.** Among which of the following decreasing order of basic strength will be

    (i) $OH^-$            (ii) $H^-$            (iii) $HCOO^-$          (iv) $CH_3COO^-$

    (v) $-OR$

    (1) II > V > II > I > IV               (2) II > V > I > IV > III

    (3) III > VI > I > V > II             (4) V > I > VI > II > III

**Ans.** (2)

**Sol.** The order of basic strength is as follows :

    $H^- > -OR > OH^- > CH_3COO^- > HCOO^-$


**16.** What type of electrode is calomel?

    (1) redox electrode               (2) metal-metal insoluble salt-its anion

    (3) gas-ion                      (4) metal-metal ion
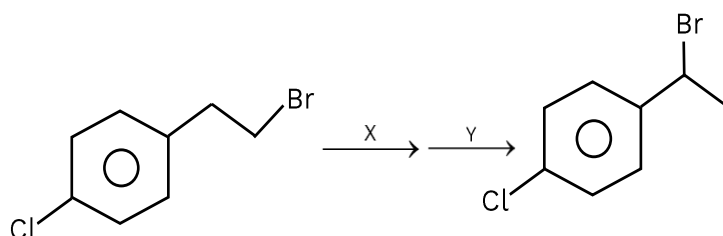
**Ans.** (2)

**Sol.** metal-metal insoluble salt-its anion.

**17.** Total number of elements which do not use all valence electrons in bonding as per their group number among them $\underline{O}$, S, $\underline{F}$, $\underline{N}$, Al, C, Si

**Ans.** (03.00)

**Sol.**

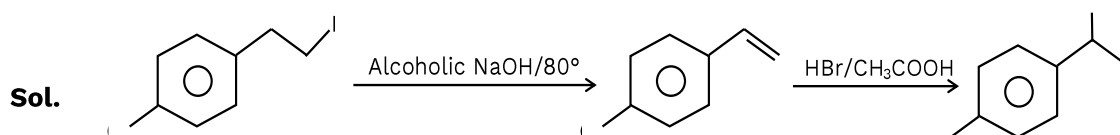| | Valance Electron |
|---|---|
| $\underline{O}$ | 6 |
| S | 6 |
| $\underline{F}$ | 7 |
| $\underline{N}$ | 5 |
| Al | 3 |
| C | 4 |
| Si | 4 |

**18.** Identify the suitable reagents X and Y for given below reaction respectively



(1) dil. NaOH/20° ; HBr/CH$_3$-COOH  (2) dil. NaOH/20° ; Br$_2$/CH$_3$-COOH

(3) Alcoholic NaOH/80° ; HBr/CH$_3$COOH  (4) Alcoholic NaOH/80° ; HBr/Peroxide

**Ans.** (3)

**Sol.**



**19.** Compare ligand strength of F$^-$, OH$^-$, SCN$^-$, CO

(1) CO > OH$^-$ > F$^-$ > SCN$^-$  (2) CO > F$^-$ > OH$^-$ > SCN$^-$

(3) SCN$^-$ > OH$^-$ > F$^-$ > CO  (4) F$^-$ > CO > OH$^-$ > SCN$^-$

**Ans.** (1)

**Sol.** SFL (Strong Field Ligand) > WFL (Weak Field Ligand)

C/N/P                    O/Halogens/S

**20.** Which of the following compound will not give the test of nitrogen by the help of lassaigne's extract?
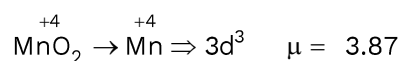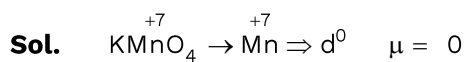
(1) Hydrazine  (2) Phenyl hydrazine

(3) Glycine  (4) Urea

**Ans.** (1)

**Sol.** Hydrazine (NH$_2$NH$_2$) does not contain carbon On fusion with Na metal, it cannot cannot form NaCN. So hydrazine does not show lassaigne's test.

**21.** $K_2MnO_4 \xrightarrow[\text{medium}]{\text{alkaline}} KMnO_4 + MnO_2$

Find the sum of spin only magnetic moment of central metal ion in both the products. (nearest integer)

**Ans.** (04.00)

**Sol.** $\overset{+7}{K}\overset{+7}{Mn}O_4 \rightarrow \overset{}{Mn} \Rightarrow d^0 \quad \mu = 0$

$\overset{+4}{Mn}\overset{+4}{O_2} \rightarrow \overset{}{Mn} \Rightarrow 3d^3 \quad \mu = 3.87$

nearest integer = 4


**22.** During the test of group IV $NH_4Cl$ is added with $NH_4OH$ why?

(1) to increase the concentration of $OH^-$ ion

(2) to decrease the concentration of $OH^-$ ion

(3) to increase the concentration of $H^+$ ion

(4) to decrease the concentration of $H^+$ ion

**Ans.** (2)

**Sol.** $NH_4Cl$ is added with $NH_4OH$ to decrease the concentration of $OH^-$ ion in order to avoid precipitation of further group elements.


**23.** **Statement–I:** $\alpha$-H is responsible for carbonyls giving aldol
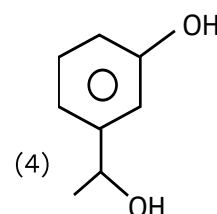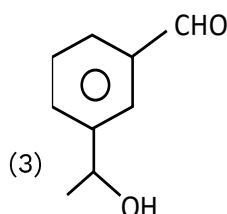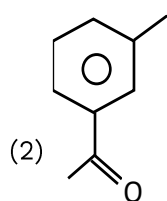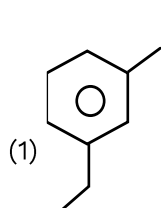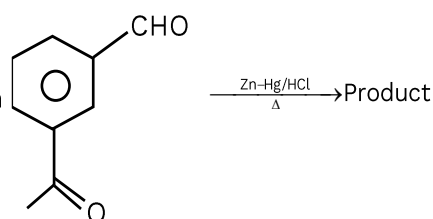
**Statement–II:** Benzaldehyde & ethanal show cross aldol

(1) Both statements are correct

(2) statements-I is correct and statement-II is incorrect

(3) statements-II is correct and statement-I is incorrect

(4) Both statements are incorrect

**Ans.** (1)

**Sol.** **Statement–I:** Aldol condensation is proceed through $\alpha$-hydrogen $\Rightarrow$ True

**Statement–II:** Ethanal have $\alpha$-hydrogen hence it shows cross aldol $\Rightarrow$ True


**24.** What is the correct product in below given reaction  $\xrightarrow[\Delta]{\text{Zn–Hg/HCl}}$ Product



**Ans.** (1)

**Sol.** Clemmensen Reduction is used to reduce aldehyde & ketone into its respective alkane.