

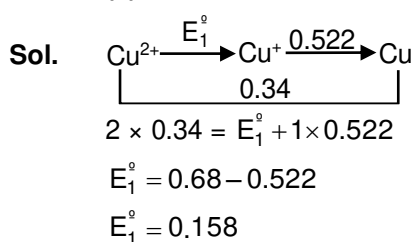
## PART : CHEMISTRY

### SECTION – 1 : (Maximum Marks : 80)

This section contains **20 multiple choice questions**. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which **Only One** is correct.

1.  $E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{V}$   
 $E^{\circ}_{\text{Cu}^+/\text{Cu}} = 0.522\text{V}$   
 $E^{\circ}_{\text{Cu}^{2+}/\text{Cu}^+} = ?$   
 (1) 0.158V                      (2) -0.158 V                      (3) 0.182 V                      (4) -0.182 V

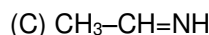
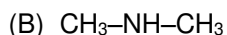
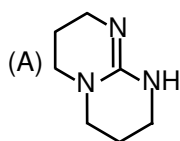
Ans. (1)



2. Correct order of electron gain enthalpy (kJ/mole) of F, Cl, Br, I  
 (1) -296, -325, -333, -349  
 (2) -333, -349, -325, -296  
 (3) -349, -333, -325, -296  
 (4) -325, -333, -349, -296

Ans. (2)

3. Arrange the following in order of their  $\text{p}K_b$  value

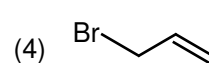
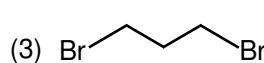
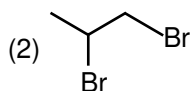
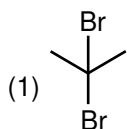


- (1)  $A > B > C$                       (2)  $B > A > C$                       (3)  $C > B > A$                       (4)  $B > C > A$

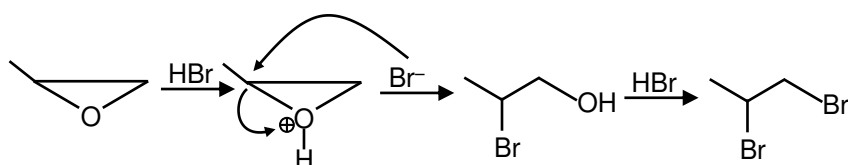
Ans. (3)

Sol. Option "A" represent Guanadine, the conjugate acid of which is resonance stabilised. The option 'B' is aliphatic amine, here the 'N' is  $\text{sp}^3$  whereas in option 'C' the 'N' is  $\text{sp}^2$ , hence B is more basic than C.

4. 1-Methylethylene oxide  $\xrightarrow[\text{HBr}]{\text{excess}}$  X, Product 'X' will be –



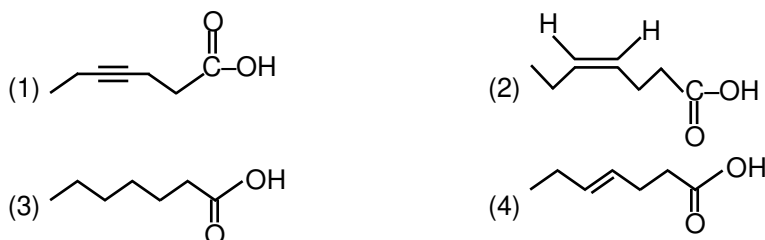
Ans. (2)



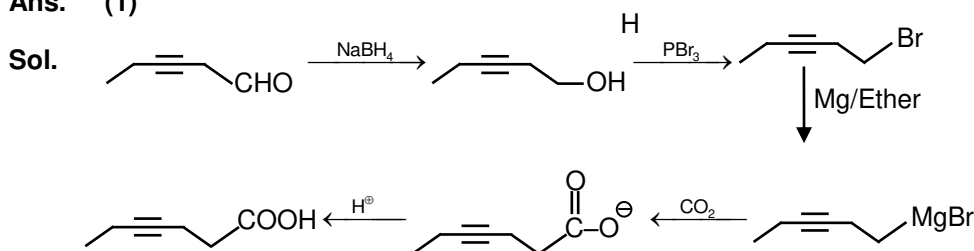
5. Correct order of Intermolecular forces  
 (1) Dipole – Dipole > Ion – Ion > Dipole – Ion  
 (2) Ion– Ion > Dipole – Dipole > Dipole – Ion  
 (3) Dipole – Ion > Dipole – Dipole > Ion – Ion  
 (4) Ion – Ion > Dipole – Ion > Dipole – Dipole

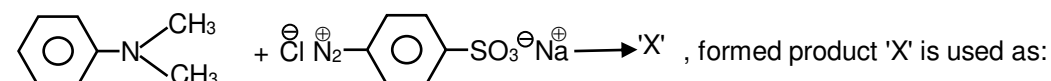
Ans. (4)

6. Hex-3-ynal  $\xrightarrow{(1) \text{NaBH}_4}$   $\xrightarrow{(2) \text{PBr}_3}$   $\xrightarrow{(3) \text{Mg/Ether}}$   $\xrightarrow{(4) \text{CO}_2}$   $\xrightarrow{(5) \text{H}^+}$  (X), formed product X will be:

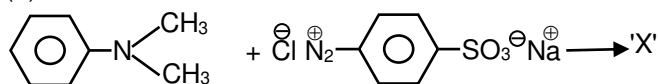


Ans. (1)

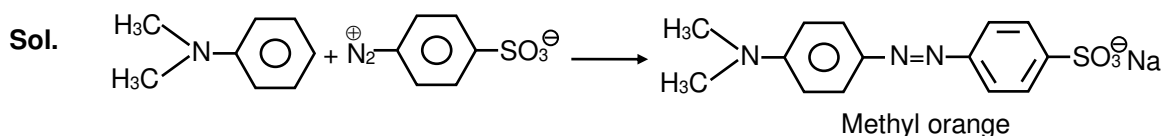


7.  , formed product 'X' is used as:

- (1) Lab test of Phenol  
 (2) Acid base titration indicator  
 (3) Food colouring  
 (4) It can be used as an alternative to detect amino acid in place of ninhydrin

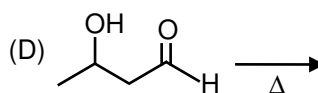
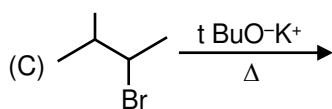
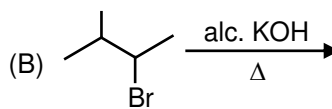
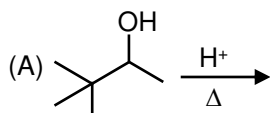


Ans. (2)



Methyl orange is used as an indicator in acid base titration.

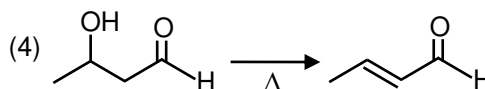
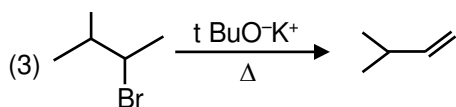
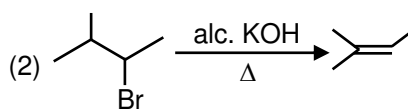
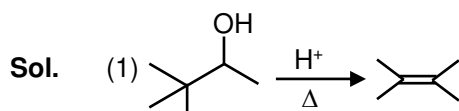
8. In which of the following Saytzeff product will not be formed as major product



(1) Only C (2) Only B

(3) A, C & D (4) B & D

Ans. (1)



9. Match the column

**Column-I**

- (A) Thiamine  
(B) Riboflavin  
(C) Pyridoxine  
(D) Ascorbic acid

**Column-II**

- (P) Scurvy  
(Q) Beri Beri  
(R) Cheilosis  
(S) Convulsions

- (1) A → Q    B → R    C → P    D → S  
(2) A → Q    B → R    C → S    D → P  
(3) A → R    B → Q    C → S    D → P  
(4) A → R    B → Q    C → P    D → S

Ans. (2)

Sol.

Vitamins	Deficiency Diseases
Vitamin B <sub>1</sub> (Thiamine)	Beri Beri
Vitamin B <sub>2</sub> (Riboflavin)	Cheilosis
Vitamin B <sub>6</sub> (Pyridoxine)	Convulsions
Vitamin C (Ascorbic acid)	Scurvy

10. Atomic radius of Ag is similar to

- (1) Cu                      (2) Hg                      (3) Au                      (4) Ni

Ans. (3)

11. Correct IUPAC name of  $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{CH}_3\text{NH}_2)]\text{Cl}$  is:

- (1) Bis(amine)chlorido(methylamine)platinum(II) chloride  
(2) Diamminechlorido(methylamine)platinum(II) chloride  
(3) Diamminechlorido(aminomethyl)platinum(II) chloride  
(4) Chloridobis(amine)methylamineplatinum(II) chloride

Ans. (2)

12. Vapour pressure of pure CS<sub>2</sub> and CH<sub>3</sub>COCH<sub>3</sub> are 512 mm of Hg and 312 mm of Hg respectively. Total vapour pressure of mixture is 600 mm of Hg then find incorrect statement:

(1)  $\left[ \frac{A - A}{B - B} \right] > A - B$

(2) Does not obey Raoult's law

(3) Endothermic solution

(4) after adding 100 ml of each, then net volume is less than 200 ml

(1)  $\left[ \frac{A - A}{B - B} \right] > A - B$

**Ans.** (4)

**Sol.** Above mixture of liquids show positive deviation from Raoult's Law

13. Purest form of commercial iron is:

(1) Wrought iron

(2) Cast iron

(3) Pig iron

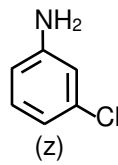
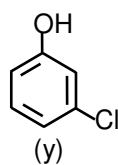
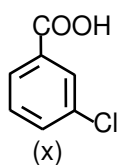
(4) Iron scrap + pig iron

**Ans.** (1)

**Sol.** Purest form is wrought iron.

(Wrought iron)

14.



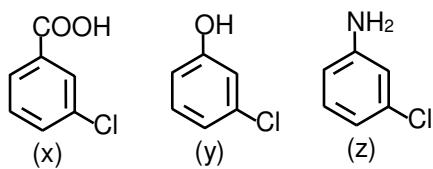
Mixture of above three organic compound was subjected to aq NaHCO<sub>3</sub> and followed by dil NaOH. compounds which will be soluble in given solvent will be :

(1) x in aq NaHCO<sub>3</sub> and y in dil. NaOH.

(2) x in aq NaHCO<sub>3</sub> and z in dil. NaOH.

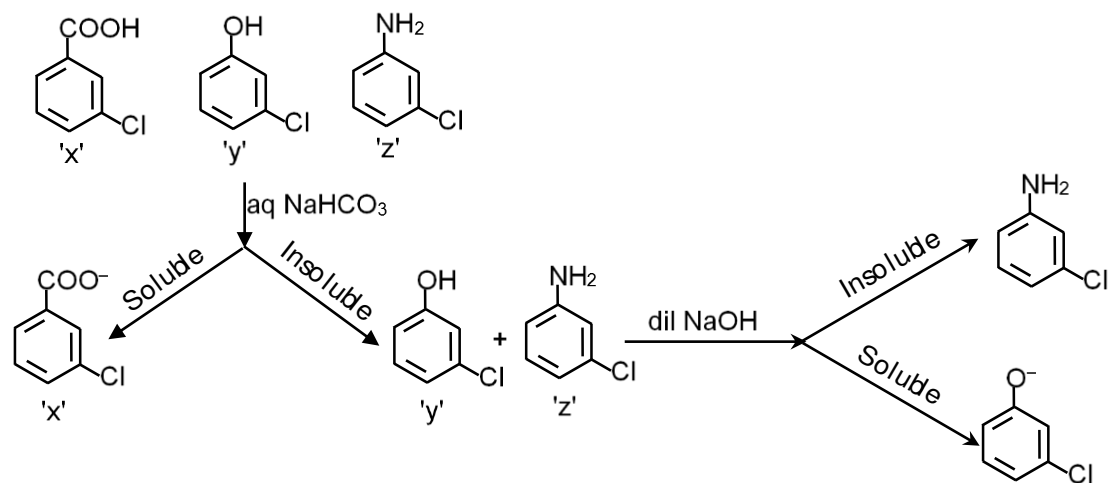
(3) y in aq NaHCO<sub>3</sub> and x in dil. NaOH.

(4) y is aq NaHCO<sub>3</sub> and z in dil. NaOH.



Ans. (1)

Sol.



15. Which theory can explain bonding of Ni(CO)<sub>4</sub>:

(1) MOT

(2) CFT

(3) VBT

(4) werner's theory

Ans. (1)

16.  $n = 5, m_s = +\frac{1}{2}$  How many orbitals are possible:

(1) 25

(2) 30

(3) 50

(4) 35

Ans. (1)

17. In zeolites & synthetic resin method which will be more efficient in removing permanent hardness of water :
- (1) Synthetic resin method as it exchange only cation.
  - (2) Zeolite resin method as it exchange only cation.
  - (3) Synthetic resin method as it exchange only anion.
  - (4) Synthetic resin is harmful for nature.

**Ans. (1)**

18. Oxidation state of potassium in  $K_2O$ ,  $K_2O_2$  &  $KO_2$  are respectively –

**Ans. (1)** (1) +1, +1, +1                      (2) +1, +2, +4                      (3) +1, +2, +2                      (4) +1, +4, +2

19. Decreasing order of dipole moment in  $CHCl_3$ ,  $CCl_4$  &  $CH_4$  is –

(1)  $CHCl_3 > CCl_4 = CH_4$     (2)  $CHCl_3 > CCl_4 > CH_4$   
(3)  $CCl_4 > CHCl_3 > CH_4$     (4)  $CCl_4 = CH_4 > CHCl_3$

**Ans. (1)**

**Sol.**  $\mu_{CCl_4} = \mu_{CH_4} = 0$  but  $\mu_{CHCl_3} \neq 0$

20. Amongst the following which is not a postulate of Dalton's atomic theory

- (1) Matter is formed of indivisible atoms
- (2) Under identical conditions of pressure and temperature gases combines and give gaseous products in simple volume ratio.
- (3) During chemical reactions atoms remains conserved and only pass through rearrangement
- (4) Some atoms have same properties including atomic mass

**Ans. (2)**

**Sol.** Refer Notes

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**SECTION – 2 : (Maximum Marks : 20)**

- ❖ This section contains **FIVE (05)** questions. The answer to each question is **NUMERICAL VALUE** with two digit integer and decimal upto one digit.
- ❖ If the numerical value has more than two decimal places **truncate/round-off** the value upto **TWO** decimal places.
  - Full Marks : **+4** If **ONLY** the correct option is chosen.
  - Zero Marks : **0** In all other cases

21. Half life of  ${}_{90}\text{Sr}$  is 6.93 years. In a child body 1  $\mu\text{g}$  of  ${}_{90}\text{Sr}$  dopped in place of calcium, how many years will it take to reduce its concentration by 90% (Assume no involvement of Sr in metabolism).

**Ans. 23.03**

**Sol.** 
$$\frac{t_{90\%}}{t_{50\%}} = \frac{\ln \frac{100}{10}}{\ln 2} = \frac{\ln 10}{0.693}$$
$$t_{90\%} = \frac{6.93}{0.693} \times \ln 10 = 10 \ln 10 = 23.03 \text{ Years}$$

22. Each of solution A and B of 100 L containing 4 g NaOH and 9.8 g  $\text{H}_2\text{SO}_4$ . Find pH of solution which is obtain by mixing 40 L solution of A and 10 L solution of B.

**Ans. 10.60**

**Sol.** 
$$M_{\text{H}_2\text{SO}_4} \Rightarrow \frac{9.8}{98 \times 100} = 10^{-3}$$
$$M_{\text{NaOH}} \Rightarrow \frac{4}{40 \times 100} = 10^{-3}$$
$$= \frac{40 \times 10^{-3} - 10 \times 10^{-3} \times 2}{50} = \frac{20}{50} \times 10^{-3}$$
$$[\text{OH}^-] = \frac{2}{5} \times 10^{-3}$$
$$\text{pOH} = 3.397$$
$$\text{pH} = 10.603$$

23.  $A_{(l)} \longrightarrow 2B_{(g)}$   
 $\Delta U = 2.1 \text{ kcal}, \Delta S = 20 \text{ cal/k}, T = 300 \text{ K}.$   
 Find  $\Delta G$  (in kcal)  
 $A_{(l)} \longrightarrow 2B_{(g)}$   
 $\Delta U = 2.1 \text{ kcal}, \Delta S = 20 \text{ cal/k}, T = 300 \text{ K}.$

**Ans.** -02.70 kcal

**Sol.**  $\Delta H = \Delta U + \Delta nRT$   
 $= 2.1 \times 10^3 + 2(2)(300)$   
 $= 2100 + 1200$   
 $= 3300 \text{ cal}$   
 $\Delta G = \Delta H - T\Delta S$   
 $= 3300 - (300)(20)$   
 $= 3300 - 6000$   
 $= -2700 \text{ cal} = -2.7 \text{ kcal}$

24.  $\text{Cl}_2$  on reaction with hot & conc.  $\text{NaOH}$  gives two chlorine having products X and Y. On treatment with  $\text{AgNO}_3$ , X gives precipitate. Determine average bond order of Cl and O bond in 'Y' ?

**Ans.** 01.67

**Sol.**  $3\text{Cl}_2 + 6\text{NaOH} \xrightarrow{\text{Hot \& conc.}} 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$   
(x) (Y)

$\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3$   
ppt.

Y is  $\text{NaClO}_3$   $\text{ClO}_3^-$  (bond order)  $= \frac{5}{3} = 1.67$

25. Number of chiral centers in chloramphenicol is :  
 ?

**Ans.** 02.00

