PHYSICAL / INORGANIC CHEMISTRY

1. Same mass of 2 solutes X & Y are added to 2 samples of same amount of same solvent. If ratio of depression in freezing point ΔT_f is 4 : 1 respectively, ratio of molar mass of solutes X & Y is:

Ans. **1 : 4**

Sol. $\Delta T_{f(X)} : \Delta T_{f(Y)} = 4 : 1$

$n_X : n_Y = 4 : 1$

$\therefore M_X : M_Y = 1 : 4$

2. $5 \rightarrow 1$ transition in a H-atom sample. Maximum number of different spectral lines observed = ?

Ans. **10**

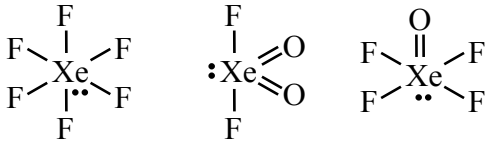
Sol. $\Delta n = 5 - 1 = 4$

$$\text{Max. lines} = \frac{\Delta n(\Delta n + 1)}{2} = \frac{4 \times 5}{2} = 10$$

3. Sum of lone pairs on central atom in XeF_6, XeO_2F_2 & $XeOF_4$ is :

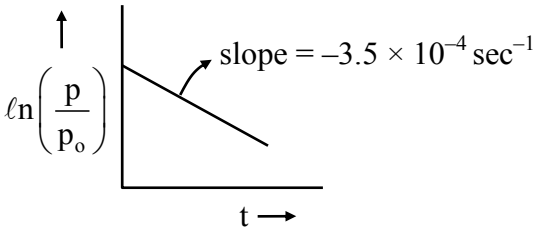
Ans. 3

Sol.



Sum = 1 + 1 + 1 = 3

4. $A(g) \longrightarrow$ products



Half life = ?

Ans. **1980 sec.**

Sol. $\ell n\left(\frac{p}{p_o}\right) = -kt$

$k = 3.5 \times 10^{-4}\ sec^{-1}$

$$t_{½} = \frac{0.693}{3.5 \times 10^{-4}} = \frac{6930}{3.5}$$

$= 1980$ sec.

5. Number of acidic oxides among following are

B_2O_3, NO, NO_2, N_2O, CO, P_4O_{10}, N_2O_5

Ans. **(4)** (Except NO, N_2O & CO)

Sol. Acidic oxide (B_2O_3, NO_2, P_4O_{10}, N_2O_5)

Neutral oxide [NO, N_2O, CO]

6. 56L N_2 is made to react with excess of H_2 to give 20L NH_3. Find volume of unused N_2(L).

Ans. **(46)**

Sol.

$N_2(g)$	+	$3H_2(g)$	$\longrightarrow$	$2NH_3$ (g)
56L		Excess		–
46L		–		20L

7. First ionisation energy order of Be, B, N & O is :

Ans. **B < Be < O < N**

Sol.

Be	B	N	O
$1s^2, 2s^2$	$1s^2, 2s^2, 2p^1$	$1s^2, 2s^2, 2p^3$	$1s^2, 2s^2, 2p^4$

IE	N > O [Due to Half filled configuration]
IE	Be > B [Due to penetration effect]
So order of IE	B < Be < O < N

8. Correct order of density of Be, Mg, Ca & Sr is :

Ans. **Ca < Mg < Be < Sr**

Sol. Be – 1.84 g/cm^3

Mg – 1.74 g/cm^3

Ca – 1.55 g/cm^3

Sr – 2.63 g/cm^3

9. At equivalence point of acid-base titration methyl orange exist in which form?

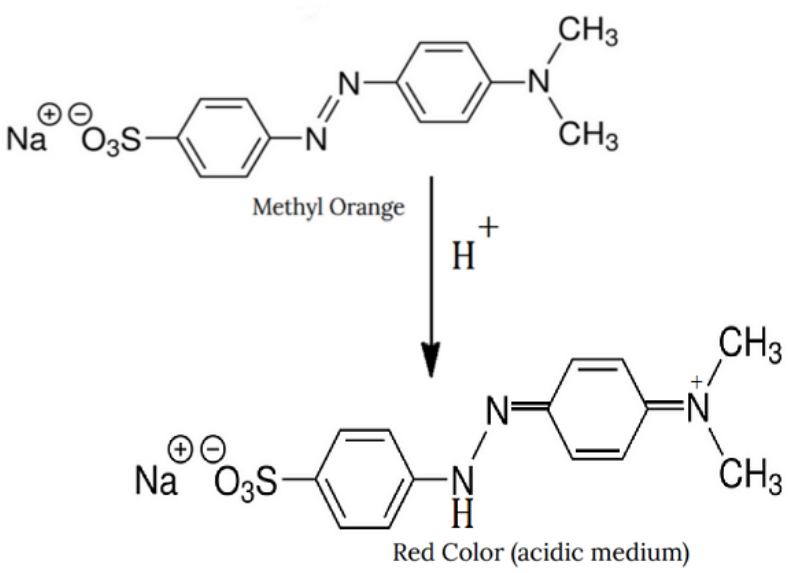
(1) Benzenoid form

(2) Quinonoid form

(3) Phenolic form

Ans. **(2)**

Sol.



10. Determine the ratio of molar conductivities of 2 solutions where solution I contains 10 mmole of NaCl in 20 ml solution & solution II contains 20 mmole NaCl in 80 ml solution.

(Assume conductivities of both solution as same)

Ans. **(2/1)**

Sol. $\Lambda_m = \frac{K \times 1000}{C}$

$$\frac{\Lambda_{m(solution)_I}}{\Lambda_{m(solution)_{II}}} = \frac{C_{(solution)_{II}}}{C_{(solution)_I}} = \frac{10/20}{20/80} = \frac{2}{1}$$

11. (A) Micelle formation is an endothermic process

(B) Micelle formation is an exothermic process

(C) Entropy change for micelle formation is negative

(D) Entropy change for micelle formation is positive

Option containing correct statements is :

(1) A & C (2) B & C (3) A & D (4) B & D

Ans. **(2)**

Sol. For micelle formation, $\Delta S = -ve$

$\Delta H = -ve$

12.

Column-I	**Column-II**
(A) $XeOF_4$	(P) sp^3, Pyramidal
(B) XeO_2F_2	(Q) sp^3d, see-saw
(C) XeO_3	(R) sp^3d^2, square pyramidal
(D) XeF_6	(S) sp^3d^3, distorted octahedral

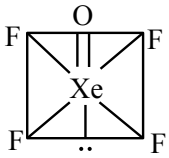
Ans. $A \rightarrow R$

$B \rightarrow Q$

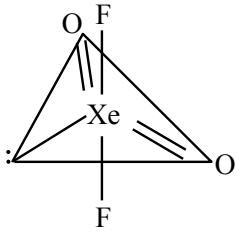
$C \rightarrow P$

$D \rightarrow S$

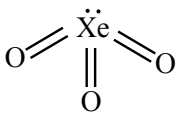
Sol.



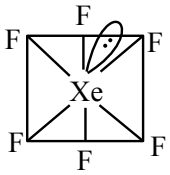
sp^3d^2 Square pyramidal



sp^3d See-saw



sp^3 Trigonal pyramidal



sp^3d^3 Distorted octahedral

13. $H_2C_2O_4 \rightleftharpoons H^+ + HC_2O_4^-$ Ka_1

$HC_2O_4^- \rightleftharpoons H^+ + C_2O_4^{2-}$ Ka_2

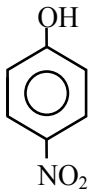
$H_2C_2O_4 \rightleftharpoons 2H^+ + C_2O_4^{2-}$ Ka_3

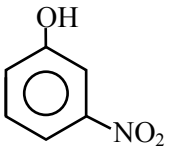
Relation between Ka_1, Ka_2 & Ka_3 is :

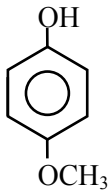
Sol. $Ka_3 = Ka_1 \times Ka_2$

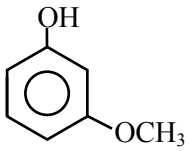
ORGANIC CHEMISTRY

1. Which of the following is correct decreasing order of acidic strength ?

(a) 

(b) 

(c) 

(d) 

(1) a > b > d > c (2) b > c > a > d (3) a > b > c > d (4) c > a > b > d

Ans. **(1)**

2. Match the column-I to column-II

	Column-I		**Column-II**
(A)	Nylon-6,6	(P)	Non-stick surface coating
(B)	Teflon	(Q)	Squeeze bottle, toys
(C)	High density polythene	(R)	Buckets dustbins, bottles
(D)	Low density polythene	(S)	Bristles for brushes

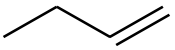
(1) A-P, B-Q, C-R, D-S (2) A-S, B-P, C-R, D-Q

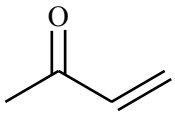
(3) A-R, B-S, C-Q, D-P (4) A-Q, B-R, C-S, D-P

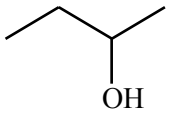
Ans. **(2)**

3. From the given scheme, identify C.

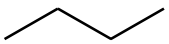
$CH_3–CH_2–CN \xrightarrow{CH_3MgBr} A \xrightarrow{H_3O^+} B \xrightarrow{Zn–Hg/HCl} C$

(A) $CH_3–CH_2–CH_2–CH_3$ (B) 

(C) 

(D) 

Ans. **(A)**

Sol. $CH_3–CH_2–C\equiv N \xrightarrow[(2)\ H_3O^+]{(1)\ CH_3MgBr} CH_3–CH_2–\underset{\underset{O}{\|}}{C}–CH_3 \xrightarrow{Zn–Hg/HCl}$ 

4. A compound which has linkage of C_1-α–D-glucose and C_2-β–D-fructose is :

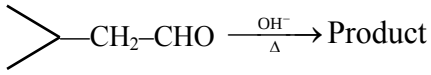
(1) Sucrose (2) Lactose (3) Galactose (4) Maltose

Ans. **(1)**

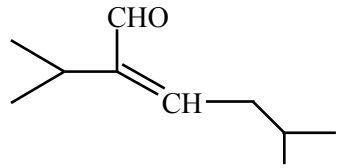
5. Some drugs do not bind to the enzyme's active site. These bond to a different site of enzyme which is called :

(1) Active site (2) Inactive site (3) Allosteric site (4) Competative site

Ans. **(3)**

6.  Product

Product would be :

(A) 

Ans. **(A)**

7. Match the column

(A) Sulphate	(P) Herbicide
(B) Fluorides	(Q) Pesticide
(C) Nicotine	(R) Bone Breaking
(D) Sodium arsenite	(S) laxative effect

Ans. **(A → S) (B→ R) (C→Q) (D→P)**

8. $C_5H_{12} \xrightarrow{Br_2/hv}$ Total number of monobromo products including stereochemistry are-

Ans. **(11)**