44 YEARS OF EXCELLENCE

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JEE MAIN (APRIL) 2023 (11 -04-2023-FN)

Memory Based Question Paper
CHEMISTRY

CHEMISTRY

SECTION - A

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Choose the correct answer:

1. In a container at a constant temperature, arrange the RMS velocity of following

   Ne, Cl_2, UF_6

   (1) Ne > Cl_2 > UF_6 (2) Cl_2 > UF_6 > Ne

   (3) UF_6 > Ne > Cl_2 (4) UF_6 > Cl_2 > Ne

Answer (1)

Sol. $U_{rms} = \sqrt{\frac{3\,RT}{M_w}}$

$M_w\uparrow\ U_{rms}\downarrow$

2. Which of the following is correct order of first ionisation energy for

   Li, Be, C, B, N, O, F

   (1) B > N > O > Li > Be > F > C

   (2) N > F > O > C > B > Be > Li

   (3) F > O > N > C > B > Be > Li

   (4) F > N > O > C > Be > B > Li

Answer (4)

Sol. Option (4) is correct order

F > N > O > C > Be > B > Li

3. Match the columns

	Column-I		Column-II
(A)	ClO_2^-	(1)	Linear
(B)	N_3^-	(2)	Tetrahedral
(C)	NH_4^+	(3)	Bent
(D)	SF_4	(4)	See-Saw

   (1) A → 1; B → 2; C → 3; D → 4

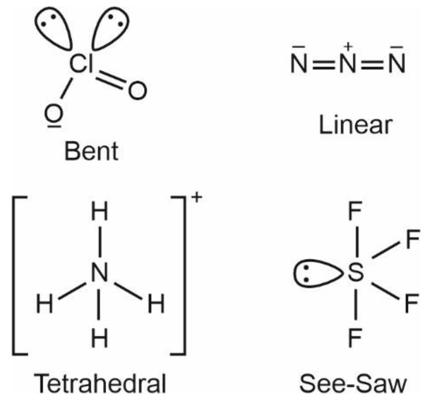
   (2) A → 3; B → 1; C → 2; D → 4

   (3) A → 4; B → 2; C → 1; D → 3

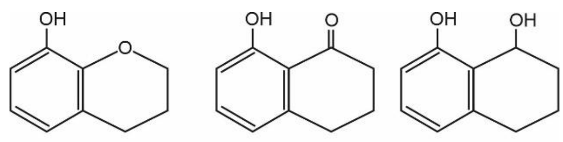
   (4) A → 3; B → 2; C → 1; D → 4

Answer (2)

Sol.



4. Increasing order of electrophilic aromatic substitution reaction



(A) (B) (C)

   (1) A < B < C (2) B < C < A

   (3) C < B < A (4) B < A < C

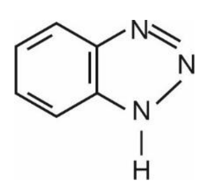
Answer (2)

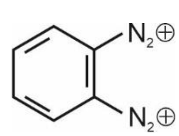
Sol. The reactivity of an aromatic compound towards electrophilic aromatic substitution (EAS) is decided by the kind of substituents bonded to it. Any substituent that increases the electron density of benzene makes it more reactive towards EAS. In compound(A), the O-atom directly bonded to benzene ring increases the electron density by +R. In compound(B), the carbonyl group decreases the electron density by –R. In compound(C), the electron density of benzene increases by +I effect.

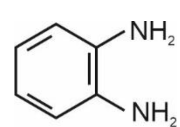
∴ The correct increasing order towards EAS is B < C < A

5. o-phenylenediamine $\xrightarrow{HNO_2}$

(1) 

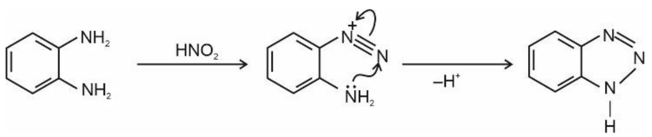
(2) 

(3) 

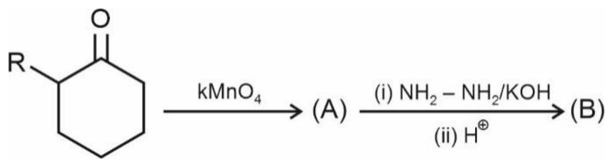
(4) 

Answer (2)

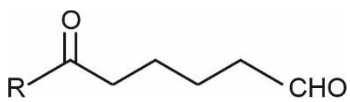
Sol.

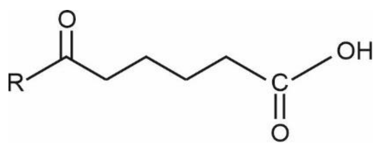


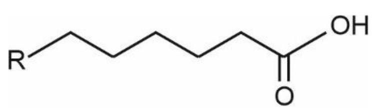
6. Consider the reaction sequence

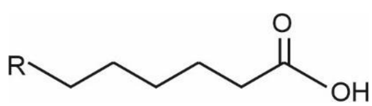


B is :

(1) 

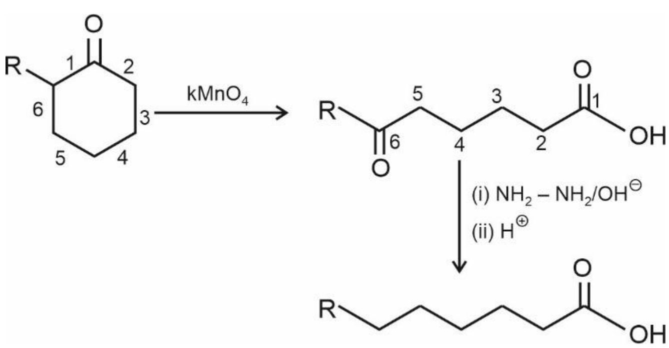
(2) 

(3) 

(4) 

Answer (4)

Sol.



7. Which of the following does not contain ambidentate ligand

(1) $C_2O_4^{2-}$, H_2O (2) $EDTA^{-4}$, NO_2^-

(3) NO_2^-, SCN^- (4) SCN^-, CN^-

Answer (1)

Sol. $C_2O_4^{--}$ is bidentate (chelate) ligand and H_2O is simple monodentate ligand.

8. Which of the following can be represented as meridional Isomer

(1) $[Pt(NH_3)_3Cl_3]^+$ (2) $[Pt(en)_3]^{4+}$

(3) $[Pt(en)_2Cl_2]^{2+}$ (4) $[Pt(en)_2(NH_3)_2]^{4+}$

Answer (1)

Sol. $[Ma_3b_3]$ exist as fac. & mer Isomer.

9. When ethene reacts with Ziegler–Natta and at 6–7 atm pressure it gives.

(1) Low density polythene

(2) Polyacrylonitrile

(3) Polyamide

(4) High density polythene

Answer (4)

Sol. Addition polymerisation of ethene at pressure 6–7 atm in the pressure of Ziegler–Natta catalyst gives high density polythene.

10. Identify the correct statement about the compound $GaAlCl_4$.

(1) Chlorine atom is bonded to both Ga and Al

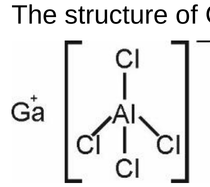
(2) Ga is cationic part and less electronegative than Al

(3) Chlorine atom forms co-ordinate bond with Ga

(4) Chlorine atom is bonded to Al

Answer (4)

Sol. The structure of $GaAlCl_4$ is



Chlorine atoms is bonded to Al only. Gallium is the cationic part but more electronegative than Al.

11. Match the column

Column - I	Column - II
(A) K^+ Ions	(P) Thermonuclear reactions
(B) KCl	(Q) Sodium-potassium pump
(C) Mg	(R) Absorbent of CO_2
(D) KOH	(S) Fertiliser

(1) $A \to Q$; $B \to S$; $C \to R$, $D \to P$

(2) $A \to P$; $B \to Q$; $C \to S$; $D \to R$

(3) $A \to Q$; $B \to S$; $C \to P$, $D \to R$

(4) $A \to P$; $B \to Q$; $C \to R$; $D \to S$

Answer (3)

Sol. K^+ : Sodium-potassium pump

KCl : Fertiliser

Mg : Used in thermonuclear reactions

KOH : Absorber of CO_2

12. Which type of copper is formed by the following reactions?

$2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$

$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

(1) Blister copper

(2) Copper crisp

(3) Reduced copper

(4) Copper slag

Answer (1)

Sol. The solidified copper obtained has blistered appearance due to the evolution of SO_2 and so it is called blister copper.

13. To 25 ml of 1 M $AgNO_3$, 1.05 M KI is added dropwise. In the colloidal sol formed, fixed and diffused layer consists of respectively:

($AgNO_3$ is in excess)

(1) $I^{\ominus}$ and $NO_3^{\ominus}$

(2) $Ag^{\oplus}$ and $NO_3^{\ominus}$

(3) $Ag^{\oplus}$ and $K^{\oplus}$

(4) $K^{\oplus}$ and $Ag^{\oplus}$

Answer (2)

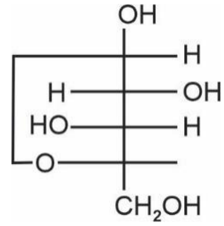
Sol. Fixed layer $\rightarrow Ag^{\oplus}$

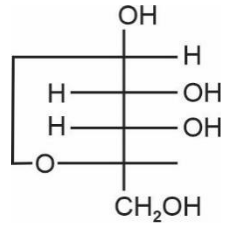
Diffused layer $\rightarrow NO_3^{\ominus}$

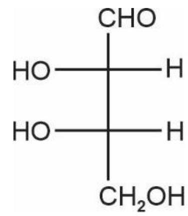
14. L-isomer of a tetrose (A) gives Schiff's test having two chiral carbons.

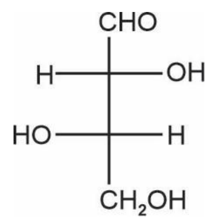
$$A \xrightarrow{\text{Conc. } HNO_3} \underset{\text{(Optically inactive)}}{X}$$

A is :

(1) 

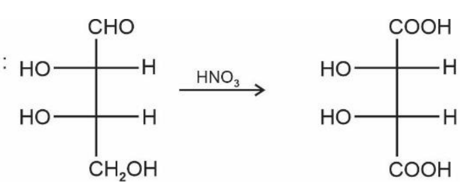
(2) 

(3) 

(4) 

Answer (3)

Sol.

A : 

(Optically inactive)

15. **Statement I (S I):** A water sample having BOD = 4 ppm is of good quality.

Statement II (S II): If the concentration of Zn and $NO_3^{\ominus}$ each is 5 ppm, then water is of good quality.

(1) Both S I and S II are correct

(2) S I is incorrect and S II is correct

(3) S I is correct and S II is incorrect

(4) Neither S I nor S II is correct

Answer (1)

Sol. Clean water has BOD less than 5 ppm

The maximum concentration of Zn = 5 ppm

Concentration of $NO_3^{\ominus}$ = 50 ppm

(as per international standards of drinking water)

16.

17.

18.

19.

20.

SECTION - B

Numerical Value Type Questions: This section contains 10 questions. In Section B, attempt any five questions out of 10. The answer to each question is a **NUMERICAL VALUE.** For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g., 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

21. Find spin only magnetic moment ratio for complexes $[Cr(CN)_6]^{-3}$ and $[Cr(H_2O)_6]^{+3}$

Answer (1)

Sol. Spin only magnet magnetic for $[Cr(CN)_6]^{-3}$ (d^3) = $\sqrt{15}$ B.M.

For $[Cr(H_2O)_6]^{+3}$ (d^3) = $\sqrt{15}$ B.M.

So ratio is 1 : 1

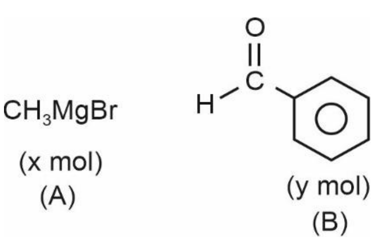
22. 25% of 250 g sugar solution and 40% of 500 g sugar solution are mixed then find out the mass percentage of sugar in solution

Answer (35.00)

Sol. Mass of Sugar = (.25 × 250) + (.40 × 500)

= 262.5 gm

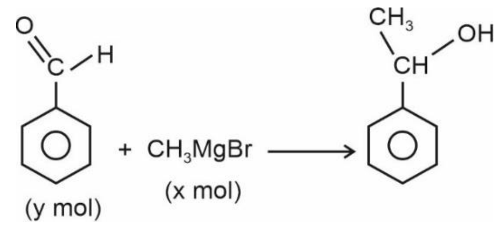
$$\%\left(\frac{w}{w}\right) = \frac{262.5}{750} \times 100 = 35\%$$

23. 

Value of $\frac{x}{y}$ when A & B completely react will be:

Answer (1)

Sol.



Hence value $\frac{x}{y} = 1$

24. Find the number of atoms per unit cell if edge length = 408 pm, density = 3 g/cm^3, Molecular mass = 40 (Nearest integer)

Answer (3)

Sol. $3 = \dfrac{Z \times 40}{6 \times 10^{23} \times (4.08)^3 \times 10^{-24}}$

$Z = \dfrac{3}{40} \times 6 \times 0.1 \times (4.08)^3$

$\simeq 3.056$

$\simeq 3$

25. Given

Electrode	Potential
Pb^{+2}/Pb	M
Pb^{+4}/Pb	N
Pb^{+2}/Pb^{+4}	?

Value of Pb^{+2}/Pb^{+4} is M–x N, then value of x is

Answer (2)

Sol. $E^{\circ}_{Pb^{+4}/Pb^{+2}} = \dfrac{4E^{\circ}_{Pb^{+4}/Pb} - 2E^{\circ}_{Pb^{+2}/Pb}}{2}$

$= \dfrac{4 \times N - 2M}{2}$

$= 2N - M$

$\therefore \quad E^{\circ}_{Pb^{+2}/Pb^{+4}} = M - 2N$

Hence x = 2