MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – JANUARY 2026

(HELD ON WEDNESDAY 21st JANUARY 2026) **TIME : 3:00 PM TO 6:00 PM**

CHEMISTRY

TEST PAPER WITH SOLUTION

SECTION-A

1. When 8.74 g MnO_2 is treated with HCl then what will be the weight of $Cl_2(g)$, obtained :

[Molar mass of MnO_2 = 87.4 g/mol]

(1) 7.1 g (2) 17.1 g

(3) 14.2 g (4) 3.55 g

Ans. **(1)**

Sol. $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

$\frac{8.74}{87.4}$ Excess

= 0.1 mole 0.1 mole

Wt. of Cl_2 obtained = 0.1 × 71 = 7.1 g

2. Calculate Bond Energy of C – H bond in CH_4.

Given : ΔH_f of $CH_4(g)$ = – x kJ/mol

ΔH_{sub} of carbon = y kJ/mol

B.E. of H – H = z kJ/mol.

(1) $\frac{x-y+z}{4}$ (2) $\frac{y+2z+x}{4}$

(3) $\frac{y-2z-x}{4}$ (4) $\frac{2y-z+x}{4}$

Ans. **(2)**

Sol. $C(s) + 2H_2(g) \rightarrow CH_4(g)$

$-x = (\Delta H_{sub}$ of carbon) + 2 × (B.E. of H – H)

–4 × (B.E. of C – H)

–x = y + 2z – 4 (B.E. of C – H)

B.E. of C – H = $\frac{y+2z+x}{4}$.

3. Following transition are made by an electron in a hydrogen like species. Find energy order of emitted photon :

(A) 1st line of Lyman Series

(B) 2nd line of Balmer Series

(C) 3rd line of Paschen Series

(D) 4th line of Brackett Series

(1) D > A > B > C (2) A > B > C > D

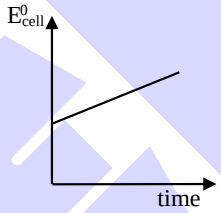
(C) B > C > D > A (4) A > C > B > D

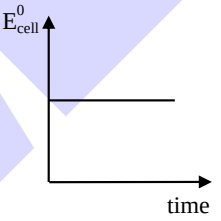
Ans. **(2)**

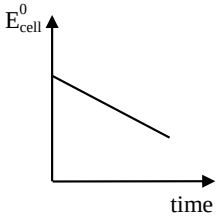
Sol. $\Delta E = 13.6Z^2\left(\frac{1}{n_1^2}-\frac{1}{n_2^2}\right)$

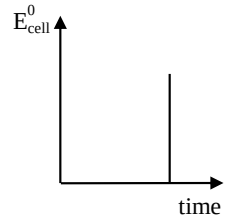
Series	n_1	n_2
1st line (Lyman)	1	2
2nd line (Balmer)	2	4
3rd line (Paschen)	3	6
4th line (Brackett)	4	8

4. For a Daniel cell, select correct variation of E^0_{cell} with time

(1) 

(2) 

(3) 

(4) 

Ans. **(2)**

Sol. E^0_{cell} remain constant with time.

5. $A_g \rightarrow B_g + C_g$

Initial pressure of A is 1 bar after 100 min. total pressure becomes 1.5 bar. Find value of rate constant of the reaction assuming first order reaction.

(1) 6.9×10^{-4} min^{-1} (2) 6.9×10^{-3} min^{-1}

(3) 6.9×10^{-5} min^{-1} (4) 6.9×10^{-2} min^{-1}

Ans. **(2)**

Sol. $A_g \rightarrow B_g + C_g$

1 – –

1–P P P

$P_{total} = 1 + P$

$1.5 = 1 + P$

$P = 0.5$

$K = \frac{1}{100} \ln \frac{1}{0.5}$

$= \frac{0.693}{100}$

$= 6.9 \times 10^{-3}$ min^{-1}

6. Statement-I : The correct order for radius is Al > Mg > Mg^{2+} > Al^{3+}

Statement-II : Atomic size always depends on electronegativity.

(1) Both statements I and II are correct.

(2) Both statements I and II are false.

(3) Statement I is correct and II is false.

(4) Statement I is false and II is correct.

Ans. **(2)**

Sol. Correct order of size is Mg > Al > Mg^{2+} > Al^{3+}

Atomic size depends mainly upon $Z_{effective}$ and shell number.

7. **Statement-I :** Bond dissociation energy order is : Cl_2 > Br_2 > F_2 > I_2

Statement-II : Bond dissociation energy is independent of bond order

(1) Both statements I and II are correct.

(2) Both statements I and II are false.

(3) Statement I is correct and II is false.

(4) Statement I is false and II is correct.

Ans. **(3)**

Sol. Bond energy order is Cl_2 > Br_2 > F_2 > I_2

Bond energy increases with increase in bond order.

8. NaCl(solid) + H_2SO_4(conc.) + $K_2Cr_2O_7$(s) → Product

(1) Product is CrO_2Cl_2 and oxidation state of Cr = +6

(2) Product is $Cr_2O_2Cl_2$ and oxidation state of Cr = +6

(3) Product is $Cr_2O_2Cl_2$ and oxidation state of Cr = +3

(4) Product is CrO_2Cl_2 and oxidation state of Cr = +3

Ans. **(1)**

Sol. Chromyl chloride test : Product is deep red vapours of CrO_2Cl_2 in which oxidation state of Cr is +6.

9. Which of following is correct order of bond length?

(1) C–H < C≡N < C=O < C–O

(2) C≡N < C–H < C–O < C=O

(3) C–H < C≡N < C–O < C=O

(4) C–O < C≡N < C=O < C–H

Ans. **(1)**

Sol. C–H 107 pm

C≡N 116 pm

C–O 143 pm

C=O 121 pm

Data based (From NCERT)

10. Statement-I : The correct order of electron affinity is Cl > Br > S > O

Statement-II : Correct order of ionic character is $PbCl_2$ < $PbCl_4$, UF_6 < UF_4 , $SnCl_4$ > $SnCl_2$

(1) Statement I is correct and statement II is incorrect.

(2) Both statement I and II are correct.

(3) Statement I is incorrect and statement II is correct.

(4) Both statement I and II are incorrect.

Ans. **(1)**

Sol. Generally on moving down the group electron affinity decreases and on moving across the period electron affinity increase.

In the periodic table Cl has maximum electron affinity.

11. Statement-I : Among $[Mn(H_2O)_6]^{2+}$ and $[Cr(H_2O)_6]^{2+}$, the more stable complex is $[Mn(H_2O)_6]^{2+}$.

Statement-II : Magnetic moment of $K_3[Fe(CN)_6]$ > $K_4[Fe(CN)_6]$.

(1) Statements I and II both are correct.

(2) Statement I is correct and Statement II is incorrect.

(3) Statement I is incorrect and statement II is correct.

(4) Both statements I and II are incorrect.

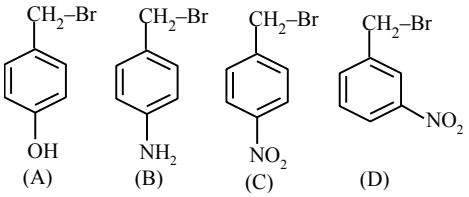
Ans. **(1)**

Sol. $[Mn(H_2O)_6]^{2+}$ is more stable than $[Cr(H_2O)_6]^{2+}$.

For : $K_3[Fe(CN)_6]$, $\mu = \sqrt{1(1+2)} = \sqrt{3}$ B.M.

For : $K_4[Fe(CN)_6]$, $\mu = \sqrt{0}$ B.M.

12. Rate of reaction of nucleophilic substitution with KCN in polar protic solvent



(1) A > B > C > D (2) B > A > C > D

(3) A > B > D > C (4) B > A > D > C

Ans. **(4)**

Sol. This is S_N1 reaction.

Rate of S_N1 reaction $\propto$ stability of carbocation

13. Match correctly from the reagents given in **Column-I** with the named reaction given in **Column-II.**

Column-I		Column-II	
(P)	$Pd\text{-}BaSO_4$	(1)	Etard reaction
(Q)	$CrO_2Cl_2 + CS_2$	(2)	Stephen's reduction
(R)	$SnCl_2$+HCl	(3)	Gattermann's Koch reaction
(S)	CO + HCl + $AlCl_3$ anhydrous	(4)	Rosenmund's reduction

	P	Q	R	S
(1)	1	4	2	3
(2)	3	2	4	1
(3)	4	1	2	3
(4)	1	3	4	2

Ans. **(3)**

Sol. 0

14. Match the **list-I** with **list-II**

list-I		list-II	
(P)	Cis-2-Butene, trans-2-butene	(1)	Functional isomers
(Q)	Diethyl ether, Butanol	(2)	Stereoisomers
(R)	1-Butene, 2-Butene	(3)	Position isomers
(S)	n-Pentane, Isopentane	(4)	Chain isomers

	P	Q	R	S
(1)	2	3	4	1
(2)	2	1	3	4
(3)	3	2	4	1
(4)	4	2	1	3

Ans. **(2)**

Sol. 0

15. Which of the following statement is/are correct?

(a) Nucleotide containing 1,4-linkage.

(b) Quaternary structure of protein is compact folded structure.

(c) During denaturation of protein secondary and tertiary structure destroyed and primary structure retained.

(d) Enthalpy of enzymatic hydrolysis of sucrose is greater than acid catalysed hydrolysis of sucrose.

(1) a, b, c (2) b, c

(3) a, d (4) b, c, d

Ans. **(2)**

Sol. 0

16. Find correct order of rate of reaction of CH_3Br with given nucleophiles $\left(\overset{\ominus}{Nu}\right)$

(1) $\overset{\ominus}{O}H > PhO^{\ominus} > HCOO^{\ominus} > ClO_4^{\ominus}$

(2) $PhO^{\ominus} > \overset{\ominus}{O}H > HCOO^{\ominus} > ClO_4^{\ominus}$

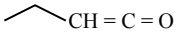
(3) $\overset{\ominus}{O}H > PhO^{\ominus} > ClO_4^{\ominus} > HCOO^{\ominus}$

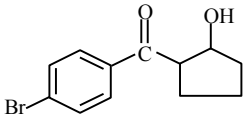
(4) $PhO^{\ominus} > \overset{\ominus}{O}H > ClO_4^{\ominus} > HCOO^{\ominus}$

Ans. **(1)**

Sol. Based on strength of nucleophile (More stable anion is less nucleophilic).

17. **Statement-1 :** There is $2sp^3$, 1 sp^2 and 1 sp hybridised carbon present in -



Statement-2 :  have two chiral centre.

(1) Statement-1 is incorrect but Statement-2 is correct

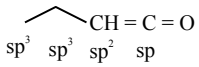
(2) Statement-1 is correct but Statement-2 is incorrect

(3) Both statements are correct.

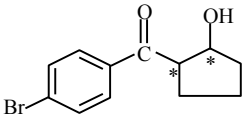
(4) Both statements are incorrect.

Ans. **(3)**

Sol. Both statements are correct.



So there are $2sp^3$, $1sp^2$ and 1sp hybridised carbon in the givne compound.



18. 1 gm of unknown organic compound produce 1.49 of $Mg_2P_2O_7$ determine % of P in unknown organic compound :

(1) 11.61 (2) 21.61

(3) 31.61 (4) 41.61

Ans. **(4)**

Sol. $$\% \text{ of } P = \frac{n_{Mg_2P_2O_7} \times 2 \times 31}{w_{(\text{unknown compound})}} \times 100$$

$$= \frac{\left(\frac{1.49}{222}\right) \times 2 \times 31}{1} \times 100$$

$$= 41.61\%$$

19. Calculate $E^{\circ}_{Cl^-/AgCl/Ag}$ (in millivolt)

Given : $\left(E^{\circ}_{Ag^+/Ag} = 0.79\,V\right)$, $\left(K_{SP(AgCl)} = 10^{-10}\right)$

$\frac{2.303\,RT}{F} = 0.059.$

(1) 100 (2) 200

(3) 300 (4) 400

Ans. **(2)**

Sol. $E^{o}_{Cl^-/AgCl/Ag} = E^{o}_{Ag^+/Ag} - \frac{0.059}{1}\log\frac{1}{K_{sp}}$

$= 0.79 - 0.059 \times \log 10^{10}$

$= 0.79 - 0.59$

$= 0.2$ volt

$= 200$ millivolt.

20. In following 4 molecules one is optically active and find the % of carbon in chiral compound

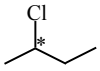
1-Chlorobutane, 2-Chloropropane

2-Chlorobutane, 1-Chloro-2, 2-Dimethyl propane

(1) 11.61 (2) 21.61

(3) 51.89 (4) 41.61

Ans. (3)

Sol.  2-Chlorobutane is optically active and chiral molecule

Molecular formula $\Rightarrow C_4H_9Cl$

Moler mass = 48 + 9 + 35.5 = 92.5

$\%OC = \frac{48}{92.5} \times 100 = 51.89\%$

21. For a living cell, osmotic pressure is 12 atm at 300 K, which is isotonic with NaCl(aq.) solution then strength of NaCl solution is _____ $\times 10^{-2}$ g/L.

[R = 0.08 L-atm/mol-K] :

Ans. (1462)

Sol. $\pi = iCRT$

$12 = 2 \times C \times 0.08 \times 300$

$C = \frac{1}{4}$ mole/L

$\text{Conc.} = \frac{1}{4} \times 58.5$ g/L

$= 14.625$ g/L

$= 1462.5 \times 10^{-2}$ g/L

22. Find concentration of X^{2-} at equilibrium in 0.1 M H_2X ? (in order of 10^{-15})

Given : $K_{a_1} = 2.5 \times 10^{-8}$, $K_{a_2} = 1 \times 10^{-13}$.

Ans. (100)

Sol. $H_2X \rightleftharpoons H^+ + HX^-$,

0.1–x x +y x–y

$2.5 \times 10^{-8} = \frac{(x+y)(x-y)}{0.1-x}$

$HX^- \rightleftharpoons H^+ + X^{2-}$,

x–y x +y y

$1 \times 10^{-13} = \frac{(x+y)(y)}{x-y}$

Approximate : $K_{a_1} >> K_{a_2} \Rightarrow$ So $x >> y$.

$x + y \approx x, x - y \approx x$

$10^{-13} = \frac{x.y}{x}$

$y = 10^{-13}$

$[X^{2-}] = 10^{-13}$

$[X^{2-}] = 100 \times 10^{-15}$

23. Elevation of Boiling point of a solution containing 15 gm solute in 150 gm solvent is 0.5ºC, and relative lowering in vapour pressure is $x \times 10^{-2}$ then find x (Assume dilute solution) Given molar mass of solvent = 300 gm/mole,

$K_b = 5$ K-kg/mole

Ans. (3)

Sol. $\Delta T_b = ik_bm$

$0.5 = 5 \times im$

$\frac{P_0 - P_s}{P_0} = \frac{im \times M_{solvent}}{1000} = 0.1 \times \frac{300}{1000} = 0.03$

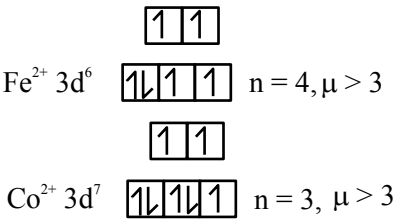
$= 3 \times 10^{-2}$

24. Among the following V^{3+} , Ti^{2+} , Ni^{2+} , Fe^{2+} , Co^{2+} for which spin only magnetic moment > 3, and which can form high spin octahedral complex. Find the sum of unpaired electrons in those complexes.

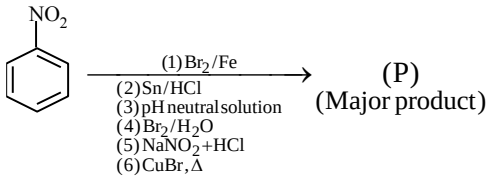
Ans. **(7)**

Sol. $V^{3+}\ 3d^3$, $Ti^{2+}\ 3d^2$, $Ni^{2+}\ 3d^8$, $Fe^{2+}\ 3d^6$, $Co^{2+}\ 3d^7$

Only Fe^{2+} and Co^{2+} can form high spin octahedral complex.

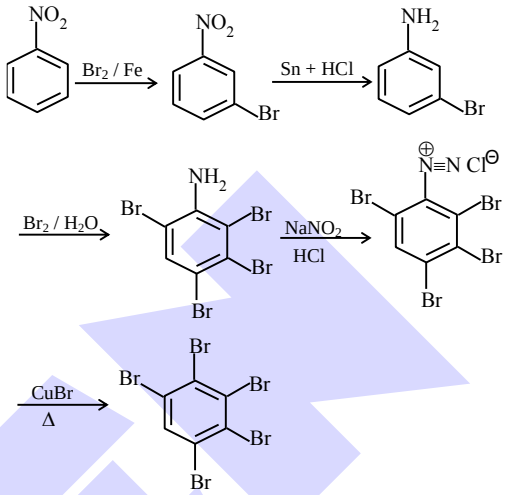


$\therefore$ Number of unpaired electrons = 4 + 3 = 7

25. 

Number of bromine atom in major product?

Ans. (5)

Sol. 

Number of Br atom in major product (P) = 5

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