MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – JANUARY 2026

(HELD ON SATURDAY 24th JANUARY 2026) **TIME : 9:00 AM TO 12:00 NOON**

CHEMISTRY

TEST PAPER WITH SOLUTION

SECTION-A

1. x & y are the number of moles of electrons involved respectively during oxidation of I^- to I_2 & S^{2-} to S by acidified $K_2Cr_2O_7$.

The value of x+y is ?

Ans. **(12)**

Sol. $Cr_2O_7^{2-} + 14H^+ + 6I^- \rightarrow 2Cr^{3+} + 3I_2 + 7H_2O$

no. of moles e^- involved = x = 6

$Cr_2O_7^{2-} + 3S^{2-} + 14H^+ \rightarrow +S + 2Cr^{3+} + 7H_2O$

No. of moles e^- involved = y = 6

Sum of x + y = 6 + 6 = 12

2. 4 kg of water is heated from 4°C of 20°C at constant pressure 10^5 Pa so that density changes from 1000 kg/m^3 to 998 kg/m^3. Then find ΔU (in Joules) given C_S of H_2O= 4.2 Joule/gm.K :

(1) 268799.2 Joule (2) 368900 Joule

(3) 168400 Joule (4) 578876.8 Joule

Ans. **(1)**

Sol. $q = mc_s\,\Delta T$

$q = 4000 \times 4.2\,(20 - 4)$

$q = 268800$

$w = -P_{ext}\,(V_2 - V_1)$

$w = -10^5\left(\frac{4}{998} - \frac{4}{1000}\right)$

$w = -0.8$ Joule

$\Delta U = q + w$

$\Delta U = 268800 - 0.8$

$\Delta U = 268799.2$ Joule

3. Two solutes, 0.3 gm of A (Mw = 60 gm/mol) & 0.9 gm of B (Mw = 180 gm/mol) are dissolved in 100 ml solution. Find osmotic pressure of solution at 300 K (in atm) (R = 0.082 atm-L/mol-K)

(1) 1.23 (2) 2.46

(3) 4.92 (4) 3.69

Ans. **(2)**

Sol. $\pi = (C_1 + C_2)$

$= \left(\frac{0.3\times1000}{60\times100} + \frac{0.9\times1000}{180\times100}\right)\times0.082\times300$

= 2.46 atm

4. For a reaction at 300K, on addition of catalyst, activation energy of reaction lowered by 10 kJ. Then calculate the value of $\log\frac{K_{catalysed}}{K_{uncatalysed}}$

(1) 1.74 (2) 0.174

(3) 17.4 (4) 4.48

Ans. **(1)**

Sol. $\frac{K_{catalyst}}{K_{uncatalyst}} = e^{\frac{\Delta E_a}{RT}}$

$\ln\frac{K_{catalyst}}{K_{uncatalyst}} = \frac{\Delta E_a}{RT}$

$\log\frac{K_{catalyst}}{K_{uncatalyst}} = \frac{\Delta E_a}{2.303RT}$

$= \frac{10\times1000}{2.303\times8.314\times300}$

$\log\frac{K_{catalyst}}{K_{uncatalyst}} = 1.74$

5. Line corresponding to lyman series are L_1, L_2, L_3, L_4….., among these L_1 line corresponds to lowest energy. Similarly lines corresponding to balmer series are B_1, B_2, B_3, B_4……, among these B_1 line corresponds to lowest energy

ΔE_L = Energy of 1st line of lyman series

ΔE_B = Energy of 1st line of balmer series

If $\Delta E_L = x.\Delta E_B$

Calculate $(x \times 10^{-1})$

Ans. **(54)**

Sol. $\Delta E_L = 13.6 \times Z^2\left(\frac{1}{1^2}-\frac{1}{2^2}\right) = 13.6Z^2 \times \frac{3}{4}$

$\Delta E_B = 13.6 \times Z^2 \times \left(\frac{1}{2^2}-\frac{1}{3^2}\right) = 13.6 \times Z^2 \times \frac{5}{4\times 9}$

$\frac{\Delta E_L}{\Delta E_B} = \frac{3}{5}\times 9 = \frac{27}{5} = x$

$= \left(\frac{27}{5}\times 10\right)\times 10^{-1}$

6.

List-I (Isothermal Process)		List-I (work done) ($V_f > V_i$)	
P.	Reversible expansion	1.	$w = 0$
Q.	Free expansion	2.	$w = -nRT\ \ln\frac{V_f}{V_i}$
R.	Irreversible expansion	3.	$w = -P_{ext}(V_f - V_i)$
S.	Irreversible Compression	4.	$w = -P_{ext}(V_i - V_f)$

Select the correct match

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

Ans. **(2)**

Sol. Theoritical

7. Electrolysis of aqueous solution of $CuSO_4$ is carried out, where 300 mg of copper is deposited (atomic mass of Cu = 63.54). After this 600 milli amp. current is further passed for 28 minutes. Calculate total volume of O_2 released (in ml).

(Given 1 mole of gas occupy 22.4 litre)

(Given $Cu^{+2}(aq) + 2e^- \longrightarrow Cu(s)$

$2H_2O(l) \longrightarrow O_2(g) + 4H^+(aq) + 4e^-$

Ans. **(111)**

Sol. Eq of Cu = Eq of O_2

$\frac{300\times 10^{-3}\times 2}{63.54} = n_{O_2}\times 4$

$2.36 \times 10^{-3} = n_{O_2}$

When current is further passed

$n_{O_2}\times 4 = \frac{600\times 28\times 60}{96500\times 1000}$

$n_{O_2} = 2.611 \times 10^{-3}$

Total O_2 released

$= [10^{-3}\times(2.36 + 2.611)]\times 22400$ ml

$= 111.35$ ml

8. W gm of non-volatile electrolyte solute is added in 100 ml pure water (P° = 640 mm Hg) showing vapour pressure of solution 600 mm Hg.

This solution have b.p. of 375 K.

Given K_b of $H_2O = 0.52\ \frac{K-kg}{mol}$,

Molar mass of solute = M

Select the correct option about mole fraction of solute (X_{solute}).

(1) $\frac{1.3}{8}\left(\frac{W}{M}\right)$ (2) $\frac{8}{1.3}\left(\frac{W}{M}\right)$

(3) $\frac{2.6}{16}\left(\frac{M}{W}\right)$ (4) $\frac{1.3}{8}\left(\frac{M}{W}\right)$

Ans. **(1)**

Sol. $\Delta T_b = i \times K_b \times m$

$$2 = i \times 0.52 \times \frac{\frac{W}{M}}{\frac{100}{1000}}$$

$$i \times \frac{W}{M} = 2 \times \frac{100}{1000} \times \frac{1}{.52}$$

$$i = \frac{1}{2.6} \times \frac{M}{W}$$

$$RLVP = \frac{P^\circ - P_S}{P^\circ} = i \times X_{solute}$$

$$\frac{640 - 600}{640} = i \times X_{solute}$$

$$\frac{1}{16} = \frac{1}{2.6} \times \frac{M}{W} \times X_{solute}$$

$$X_{solute} = \frac{1.3}{8} \times \frac{W}{M}$$

9. For a chemical reaction :

$A \rightarrow D$

Mechanism is

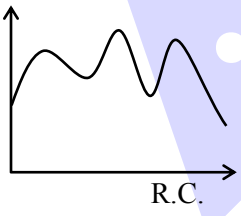
Step-1 : $A \rightarrow B$: ΔH = +ve

Step-2 : $B \rightarrow C$: ΔH = –ve

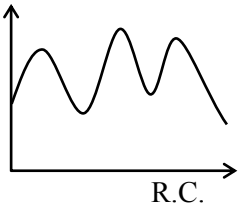
Step-3 : $C \rightarrow D$: ΔH = –ve

Select the correct energy plot

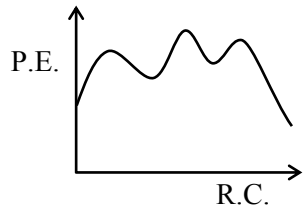
(1)



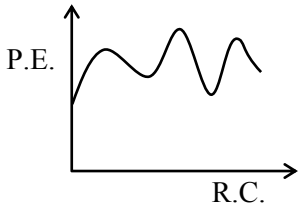
(2)



(3)



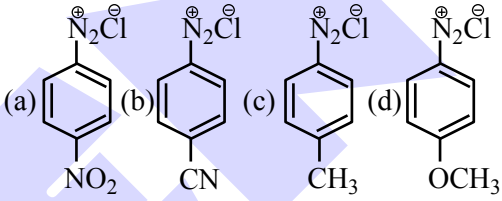
(4)



Ans. **(1)**

Sol. $\Delta H = E_{Product} - E_{Reactant}$

10. Correct order of stability is :



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

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

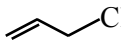
Ans. **(2)**

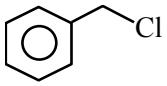
Sol. +M group or +I group increases stability (i.e. $–OCH_3$–CH3)

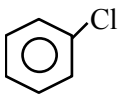
–M decreases stability (i.e. $–NO_2$ and –CN)

11. Match the List-I and List-II

(1)  (I) Vinyl chloride

(2)  (II) Allyl chloride

(3)  (III) Aryl chloride

(4)  (IV) Benzyl chloride

(1) A → I, B → II, C → III, D → IV

(2) A → I, B → II, C → IV, D → III

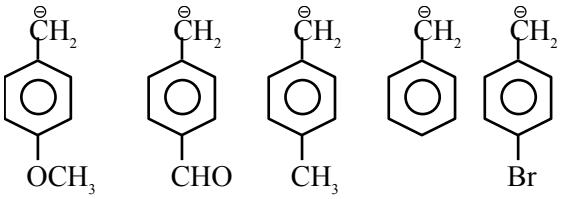
(3) A → III, B → II, C → I, D → IV

(4) A → III, B → II, C → IV, D → II

Ans. **(2)**

Sol. Common Names

12. The correct order of stability of given carbanions is



(1) a > b > c > d > e

(2) b > e > d > a > c

(3) a > c > d > e > b

(4) b > e > d > c > a

Ans. **(4)**

Sol. Electron withdrawing group increase the stability of carbanions.

13. 0.5 gm of unknown organic compound undergo Duma's method for estimation of nitrogen. Percentage of nitrogen gas collected over water at P = 715 mm and 27°C has volume = 70 ml. Calculate % N in the unknown organic compound. (aq. Tension = 15 mm)

Ans. **(14.65)**

Sol. $P_{N_2} = (715-15)\text{mm} = \frac{700}{760}\text{atm}$

$$V_{N_2} = 70\,\text{ml} = \frac{70}{1000}\text{l}$$

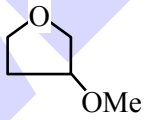
$$n_{N_2} = \frac{PV}{RT} = \frac{\left(\frac{700}{700}\right)\times\left(\frac{70}{1000}\right)}{0.821\times 300}$$

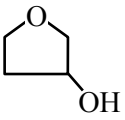
$$W_{N_2} = \frac{700}{700}\times\frac{\frac{70}{1000}}{0.821\times 300}\times 28$$

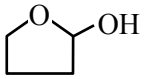
$$\%\,N = \frac{W_{N_2}}{0.5}\times 100 = \frac{700}{760}\times\frac{\frac{70/1000}{0.821\times 300}\times 28}{0.5}\times 100$$

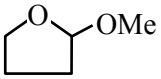
= 14.65%

14. Which of the following gives positive tollen's test ?

(1) 

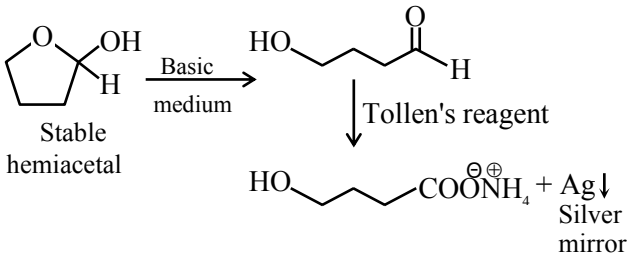
(2) 

(3) 

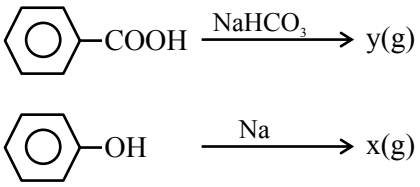
(4) 

Ans. **(3)**

Sol. In basic medium cyclic hemiacetal isomers to open hydroxyl aldehyde compound which easily gives positive tollen's test.



15.



Sum of molar mass of gas (x) & (y) is

(1) 44 (2) 88

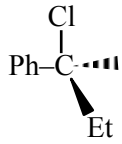
(3) 46 (4) 160

Ans. **(3)**

Sol. x = H_2 (gas), y = CO_2 (gas)

Sum of molar mass = 2 + 44 = 46

16. **Statement-1 :** CH_2=CH–Cl is having stronger C–Cl bond then CH_2–CH_2–Cl.

Statement-2 :  Me will rotate the plane polarised light after solvation.

(1) Both statements-I and II are correct

(2) Both statements-I and II are incorrect

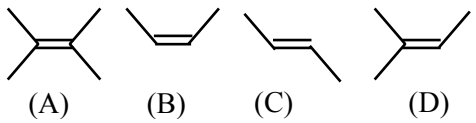
(3) Statement-I is correct and statement-II is incorrect

(4) Statement-I is incorrect and statement-II is correct.

Ans. **(1)**

Sol. Theory based

17. Correct stability order of alkene ::



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

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

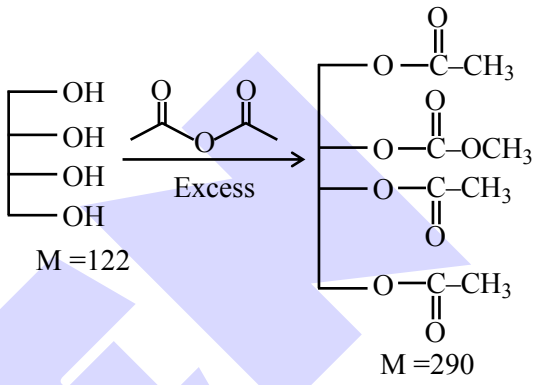
Ans. **(1)**

Sol. Hyperconjugation (+H) and inductive group (+I) increases the stability of alkenes.

18. Hydroxy compound (A) with molecular mass = 122 react with excess of acetic anhydride and gives compound (X) with molecular mass = 290, then find the no. of hydroxy groups in given compound (A).

Ans. **(42)**

Sol.



No. of OH groups = $\frac{290-122}{4} = 42$

19. **Statement-I** Among V_2O_5, $[TiF_6]^{3-}$, $[Fe(CN)_6]^{3-}$, $[CoF_6]^{3-}$ paramagnetic species are three in number.

Statement-II . Increasing number of unpaired electrons in the following.

$[Fe(CN)_6]^{4-} < [Fe(CN)_6]^{3-} < [Fe(H_2O)_6]^{2+}$

(1) Both statements are correct

(2) Statement-I is correct ; statement-II is incorrect

(3) Statement-I is incorrect statement-II is correct

(4) Both statements are incorrect

Ans. **(1)**

Sol. $[TiF_6]^{3-} \rightarrow$ 1 unpaired electron

$[Fe(CN)_6]^{3-} \rightarrow$ 1 unpaired electron

$[CoF_6]^{3-} \rightarrow$ 4 unpaired electron

$[Fe(H_2O)_6]^{2+} \rightarrow$ 4 unpaired electron

$[Fe(CN)_6]^{3-} \rightarrow$ 1 unpaired electron

$[Fe(CN)_6]^{4-} \rightarrow$ 0 unpaired electron

20.

	List-I Species	List-II Hybridization	List-III Shape
(A)	IF_3	sp^3	T-shape
(B)	IF_7	sp^3d^3	P.B.P
(C)	IF_5	sp^3d^2	square pyramidal
(D)	ClO_4^-	sp^2d	square planar

Select the correct match

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

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

Ans. **(1)**

Sol. $ClO_4^- \rightarrow sp^3 \rightarrow$ tetrahedral, so (D) is incorrect, all others are correct.

21. **Statement-I** $[Co(CO_3)_3]^{3-}$ has magnetic moment of 4.9 BM & hybridization is sp^3d^2

Statement-II $[Ni(CN)_4]^{2-}$, $[Cr(H_2O)_6]^{2+}$ and $[MnF_6]^{4-}$ have square planar, octahedral and octahedral geometry respectively and dsp^2, sp^3d^2, d^2sp^3 hybridization respectively and $\mu = 0$, 4.9 BM, 5.9 BM respectively.

(1) Both statements are correct

(2) Statement-I is correct & statement-II is incorrect

(3) Statement-I is incorrect & statement-II is correct

(4) Both statements are incorrect.

Ans. **(4)**

Sol. $[Co(CO_3)_3]^{3-}$ is d^2sp^3 hybridized

$[MnF_6]^{4-}$ is sp^3d^2 hybridized.

22. Select correct statements(s)

(A) NF_3 has more dipole moment than NH_3

(B) O_2^{2-} and F_2 both have same bond order

(C) In O_3 central oxygen atom has –1 formal charge

(D) In NO_2 all the atoms follow octet rule, so it is stable.

(E) BeH_2 is planar

(1) B, C (2) A, B, C (3) C, D, E (4) B, E

Ans. **(4)**

Sol. (1) dipole moment $NF_3 < NH_3$

(2) O_2^{2-}, F_2 both have B.O = 1

(3) In O_3 central oxygen atom has +1 formal charge

(4) In NO_2, octet of 'N' atom is not complete

(5) BeH_2 is linear, so planar

23. Salt (X) is soluble in water.

Salt (Y) is sparingly soluble in water.

Salt (Z) is soluble only in hot water.

X, Y, Z respectively are.

(1) AgCl, Hg_2Cl_2, $PbCl_2$

(2) $AlCl_3$, AgCl, $PbCl_2$

(3) $BaCl_2$, $PbCl_2$, Hg_2Cl_2

(4) $MgCl_2$, Hg_2Cl_2, $CaCl_2$

Ans. **(2)**

Sol. Theory based.

24. Select correct statements.

(I) Hybridisation of ClO_4^- is dsp^2

(II) $[Ni(CN)_4]^{2-}$ is tetrahedral

(III) $[Co(H_2O)_6]^{2+}$ has sp^3d^2 hybridisation

(IV) $[Mn(CN)_6]^{4-}$ has sp^3d^2 hybridisation

(1) II and III and (2) III only

(3) II, III and IV only (4) I, II, III and IV

Ans. **(2)**

Sol. (I) $ClO_4^- \rightarrow sp^3$

(II) $Ni^{2+} \rightarrow 3d^8 \rightarrow dsp^2$ (square planar)

(III) $Co^{2+} \rightarrow 3d^7 \rightarrow t_{2g}^{2,2,1}eg^{1,1} \rightarrow sp^3d^2$

(IV) $Mn^{2+}\ 3d^5 \rightarrow t_{2g}^{2,2,1}eg^{0,0} \rightarrow d^2sp^3$

25. **Statement-I** : K > Mg > Al > B metallic character order.

Statement-II : Ionic radius of any element is less than its atomic radius.

In the light of above statements, choose the most appropriate answer from the options given below :

(1) Both statements are true

(2) Statement I is false but statement II is true.

(3) Both statements are False.

(4) Statement I is true but statement II is false.

Ans. **(4)**

Sol. Statement-I : Correct

EN ↑ metallic character ↓

Metallic character : K > Mg > Al > B

EN : 0.8 < 1.2 < 1.5 < 2.0

Statement-II : Incorrect

Ionic size $M^+ < M < M^-$

Anionic radius > Atomic radius.

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