# MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – JANUARY 2026

**(HELD ON WEDNESDAY 28th JANUARY 2026)** **TIME : 9:00 AM TO 12:00 NOON**

## CHEMISTRY

## TEST PAPER WITH SOLUTION

**1.** For the 1st order decomposition reaction.

$$A \rightarrow P$$

The value of $\frac{t_{1/8}}{t_{1/10}} \times 10$ will be :-

$t_{1/8}$ = time at which concentration of A become 1/8 of initial concentration.

$t_{1/10}$ = time at which concentration of A becomes 1/10 of initial concentration.

(1) 3 (2) 6

(3) 9 (4) 0.9

**Ans.** **(3)**

**Sol.** $t = \frac{1}{k}\ln\frac{A_0}{A_t}$

$$t_{1/8} = \frac{1}{k}\ln\frac{A_0}{A_0/8} = \frac{1}{k}\ln 8$$

$$t_{1/10} = \frac{1}{k}\ln\frac{A_0}{A_0/10} = \frac{1}{k}\ln 10$$

$$\frac{t_{1/8}}{t_{1/10}} = \frac{\ln 8}{\ln 10} = \frac{\log 8}{\log 10}$$

$$\frac{t_{1/8}}{t_{1/10}} = \log 8 = 3\log 2 = 0.9$$

$$\frac{t_{1/8}}{t_{1/10}} \times 10 = 9$$

**2.** Calculate pH of 10 mM weak acid (HA) dissociated in water. Assume $\alpha$ to be negligible.

Given $pK_a = 4$

**Ans.** **(3)**

**Sol.** $pH = \frac{1}{2}\left[pK_a - \log c\right]$

$$pH = \frac{1}{2}\left[4 - \log 10^{-2}\right]$$

$pH = 3$

**3.** 500 ml, 1.2M KI is completely react with 0.2M, 500 ml $KMnO_4$ solution in basic medium. $I^-$ is oxidised to $I_2$. The liberated $I_2$ react with 0.1 M $Na_2S_2O_3$ solution. Then find volume (in L) of $Na_2S_2O_3$ solution required to completely react with liberated $I_2$.

**Ans.** **(3)**

**Sol.** gram eq of $KMnO_4$ = gram eq of $Na_2S_2O_3$

$$0.2 \times \frac{500}{1000} \times 3 = 0.1 \times V \times 1$$

$V = 3$ L

**4.**

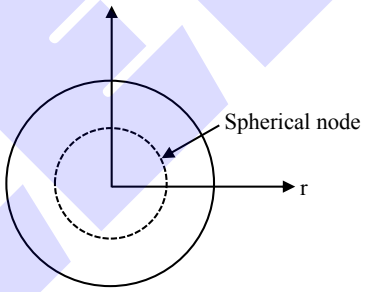
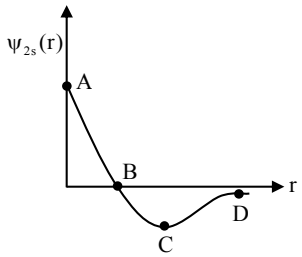



Figure-1

Spherical node shown in figure-1 is best represented by which point in figure-2.




(1) A (2) B

(3) C (4) D

**Ans.** **(2)**

**Sol.** At spherical node

$\psi_r = 0$

**5.** 1 gm of organic compound gave 1.32g $CO_2$, 0.53g of same compound gave 0.75g AgBr. If molecular formula of compound is $C_xH_yBr_z$ then calculate percentage of hydrogen in the given compound.

**Ans.** **(4)**

**Sol.** $\underset{1g}{C_xH_yBr_z} \rightarrow \underset{1.32g}{CO_2}$

$$\%C = \frac{1.32\times12}{44\times1}\times100 = 36\%$$

$\underset{0.53g}{C_xH_yBr_z} \rightarrow \underset{0.75g}{AgBr}$

$$\%Br = \frac{0.75\times80}{188\times0.53}\times100 = 60.2\%$$

$\%H = 100 - (36 + 60.2)$

$\%H \simeq 4\%$

**6.** There is a weak base 'B' having $pK_b$ = 5.691 of molarity 0.02M. When 0.02M HCl solution has been added, then pH of resultant buffer solution has been found to be 9. Take total volume of resultant buffer solution to be 100 ml. Find the value of 'x' & 'y', where 'x' is volume of HCl solution in ml & 'y' is volume of 'B' solution in ml.
Given log(5) = 0.691

(1)

| x | y |
|---|---|
| 14.29 | 85.71 |

(2)

| x | y |
|---|---|
| 15 | 85 |

(3)

| x | y |
|---|---|
| 20 | 80 |

(4)

| x | y |
|---|---|
| 40 | 60 |

**Ans.** **(1)**

**Sol.**

| | HCl | + B | → | $BH^+ + Cl^-$ |
|---|---|---|---|---|
| | 0.02M | 0.02M | | |
| | x ml | y ml | | |
| $t_f$ | 0 | 0.02y–0.02x | | 0.02x |

$$P^{OH} = P^{k_b} + \log\left[\frac{Salt}{Base}\right]$$

$$5 = 5.691 + \log\left[\frac{Salt}{Base}\right]$$

$$\frac{x}{y-x} = \frac{1}{5}$$

$6x = y$

$7x = 100$

$$x = \frac{100}{7}\text{ ml}$$

$$\&\quad y = \frac{600}{7}\text{ ml}$$

**7.** For an ideal gas undergo isothermal reversible process from 0.5Mpa, $20dm^3$ to 0.2Mpa at 600K.
Calculate correct option
[Given log5 = 0.6989, log2 = 0.3010]

(1) w = –3.9 kJ, ΔU= 0, q = 3.9 kJ

(2) w = –9.1 kJ, ΔU= 0, q = 9.1 kJ

(3) w = +9.1 kJ, ΔU= 0, q =– 9.1 kJ

(4) w = +3.9 kJ, ΔU= 0, q = –3.9 kJ

**Ans.** **(2)**

**Sol.** For isothermal reversible process = ΔU = 0

$$w_{iso} = -p_1v_1\ln\frac{P_1}{P_2}$$

$$w_{iso} = -0.5\times10^6\times20\times10^{-3}\ln\frac{0.5}{0.2}$$

w = –9.1 kJ

q = –w = 9.1 kJ

**8.** The wave number of three spectral line of H-atom are given. The correct set of spectral lines belonging to Balmer series?

(1) $\frac{5R}{36}, \frac{3R}{16}, \frac{21R}{100}$

(2) $\frac{3R}{4}, \frac{3R}{16}, \frac{7R}{144}$

(3) $\frac{7R}{144}, \frac{3R}{16}, \frac{16R}{255}$

(4) $\frac{5R}{36}, \frac{3R}{16}, \frac{21R}{24}$

**Ans.** **(1)**

**Sol.** Balmer series line $\Rightarrow \bar{\nu} = R_H z^2\left[\frac{1}{2^2} - \frac{1}{n^2}\right]$

$$\text{if } n = 3 \Rightarrow \bar{\nu} = R(1)^2\left[\frac{1}{2^2} - \frac{1}{3^2}\right] = \frac{5R}{36}$$

$$\text{if } n = 4 \Rightarrow \bar{\nu} = \frac{3R}{16}$$

$$\text{if } n = 5 \Rightarrow \bar{\nu} = \frac{21R}{100}$$

**9.** For the given cell reaction

$BH_4^- + ClO_3^- \longrightarrow Cl^- + H_2BO_3^-$

Cell emf 'E' is given as

$E = E^0 - \frac{RT}{nF}\ln(Q)$

Determine the value of 'n' in above equation

**Ans. (24)**

**Sol.** $3BH_4^- + 4ClO_3^- \longrightarrow 4Cl^- + 3H_2BO_3^- + 3H_2O$

n-factor = 8

moles = 3

$\therefore$ n = 3 × 8 = 24

**10.** 2 moles of liquid A and 3 moles of liquid B are mixed to from an ideal solution. The vapour pressure of ideal solution is 320 mm Hg. When 1 mole of A & 1 mole of B is further added then new vapour pressure of solution is 328.57 mm Hg. Find the vapour pressure of pure A $\left(P_A^\circ\right)$ & pure B $\left(P_B^\circ\right)$:

(1) $P_A^\circ = 200$ mm Hg, $P_B^\circ = 500$ mm Hg

(2) $P_A^\circ = 500$ mm Hg, $P_B^\circ = 200$ mm Hg

(3) $P_A^\circ = 300$ mm Hg, $P_B^\circ = 400$ mm Hg

(4) $P_A^\circ = 200$ mm Hg, $P_B^\circ = 300$ mm Hg

**Ans. (2)**

**Sol.** 2 moles of A + 3 moles of B

$\Downarrow$

$X_A = 2/5, X_B = 3/5$

$P_S = X_A P_A^\circ + X_B P_B^\circ$

$320 = P_A^\circ\left(\frac{2}{5}\right) + P_B^\circ\left(\frac{3}{5}\right)$

$2P_A^\circ + 3P_B^\circ = 1600 \ldots\ldots(I)$

Now 1 mole of A & 1 mole of B is added

$X_A' = \frac{3}{7}, X_B' = \frac{4}{7}$

$P_S' = 328.57 = P_A^\circ\left(\frac{3}{7}\right) + P_B^\circ\left(\frac{4}{7}\right)$

$3P_A^\circ + 4P_B^\circ = 2300 \ldots\ldots.(II)$

Now eq (I) × 3 – eq (II) × 2

$6P_A^\circ + 9P_B^\circ = 4800$

$6P_A^\circ + 8P_B^\circ = 4600$

$P_B^\circ = 200$ mm of Hg

$P_A^\circ = 500$ mm of Hg

**11.** In 4th period of periodic table the elements with the largest and smallest size respectively is :

(1) K and Br (2) Na and Cl

(3) K and Se (4) Rb and Br

**Ans. (1)**

**Sol.** In a period moving from left to right atomic size decreases.

**12.** **Statement-I** : Among $BF_4^-$, $SiF_4$, $SF_4$, and $XeF_4$, the bond lengths are not identical in two of these molecules.

**Statement-II** : Among $O_2^+, O_2^-, O_2^{2-}$ and $F_2$ the highest bond order is found in $O_2^-$.

(1) Statement I is true and statement II is false.

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

(3) Both statement are true.

(4) Both statement are false.

**Ans. (4)**

**Sol.** In $BF_4^-$, $SiF_4$ and $XeF_4$ all bond lengths are identical

| **Molecules** | | **B.O.** |
|---|---|---|
| $O_2^+$ | → | 2.5 |
| $O_2^-$ | → | 1.5 |
| $O_2^{2-}$ | → | 1 |
| $F_2$ | → | 1 |

**13.** **Statement-I** : Test for nitrite; sulphanilic acid and 1-napthylamine are used.

**Statement-II** : Acidified nitrite is di-azotized with sulphanilic acid and coupled with 1-napthylamine.

Select the correct statement.

(1) Both Statements are correct.

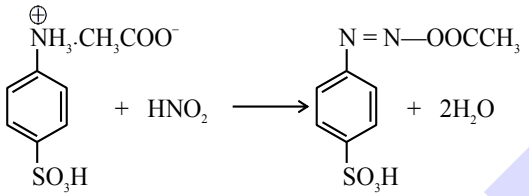
(2) Both Statements are incorrect.

(3) Statement I is correct but Statement II is incorrect.

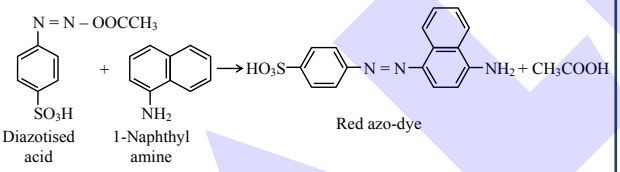
(4) Statement I is incorrect but Statement II is correct.

**Ans.** **(1)**

**Sol.** $NO_2^- + CH_3COOH \rightarrow HNO_2 + CH_3COO^-$




(Sulphanilic acid solution)




**14.** Select correct option :

(1) $[Ni(CN)_4]^{2-}$ and $[Ni(CO)_4]$ both are diamagnetic while $[NiCl_4]^{2-}$ is paramagnetic

(2) $[Ni(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$ both are diamagnetic while $[Ni(CO)_4]$ is paramagnetic

(3) $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ both are diamagnetic while $[Ni(CN)_4]^{2-}$ is paramagnetic

(4) Only $[Ni(CN)_4]^{2-}$ is diamagnetic while both $[NiCl^4]^{2-}$ and $[Ni(CO)_4]$ are paramagnetic

**Ans.** **(1)**

**Sol.** $[Ni(CN)_4]^{2-} \rightarrow 3d^8 \rightarrow$ diamagnetic $\rightarrow dsp^2$

$[Ni(CO)_4] \rightarrow 3d^{10} \rightarrow$ diamagnetic $\rightarrow sp^3$

$[NiCl_4]^{2-} \rightarrow 3d^8 \rightarrow e^{2,2}\ t_2^{2,1,1} \rightarrow sp^3 \rightarrow$ paramagnetic.

**15.** Determine the values of X, Y and Z for the following complexes and calculate the sum X + Y + Z.

X = number of geometrical isomers of $[Pt(NH_3)(Cl)(Br)(Py)]$

Y = Number of optically inactive isomers of $[Cr(en)_2Cl_2]^{+1}$

Z = Number of stereoisomers of $[Co(NH_3)_3(NO_3)_3]$

**Ans.** **(6)**

**Sol.** Here

X = 3 (Two cis + one trans isomers)

Y = 1 (trans isomer)

Z = 2 (Fac- mer isomer)

X+Y+Z = 3 + 1 + 2 = 6

**16.** **Statement-I** : Consider the following pairs of ions $(Sc^{3+}, Ti^{3+})$, $(Ti^{4+}, Ni^{2+})$ $(Cu^{2+}, Zn^{2+})$ and $(Cr^{3+}, Mn^{3+})$. Out of these pairs three pairs consist of ions that are both coloured :

**Statement-II :** Among the lanthanide ions $Eu^{2+}$, $Gd^{3+}$, $Ce^{4+}$ and $Tb^{4+}$, the ion $Tb^{4+}$ is the strongest reducing agent.

(1) Both statements are true

(2) Both statements are false

(3) Statement-I is true and statement-II is false

(4) Statement-I is false and statement-II is true.

**Ans.** **(2)**

**Sol.** $Sc^{3+}$, $Ti^{4+}$ and $Zn^{2+}$ are colourless

$Tb^{4+}$ cannot act as a reducing agent.

**17.** Choose the correct statements in respect of hydrides of group 15.

(A) Reducing power increases down the group

(B) Basic nature increases down the group

(C) Stability decreases down the group

(D) Boiling point decreases regularly down the group.

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

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

**Ans.** **(3)**

**Sol.** Boiling point order $PH_3 < AsH_3 < NH_3 < SbH_3 < BiH_3$

So D is wrong

Basic nature $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ So B is wrong.

**18.** In carius method of estimation of 'Br' 1.53 gm of an organic compound gave 1 gm AgBr. The % of Br in organic compound is

(At. mass of Ag and Br are 108 and 80 amu respectively)

(1) 35.23 (2) 43.53

(3) 27.81 (4) 22.71

**Ans.** **(3)**

**Sol.** $$\% \text{ Br } = \frac{\left(\frac{1gm}{188}\right)\times 80}{1.53}\times 100 = 27.81\%$$

**19.** $$Ph\text{–}CH{=}CH_2 \xrightarrow[(PhCOO)_2]{HBr} \text{Product}$$

Correct statement(s) regarding product :

(a) Ph–⟨ ⟩–Br is minor product

(b) Benzene is also form a bi product

(c) Reaction follow free radical mechanism

(d) In absence of peroxide carbocation mechanism is followed

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

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

**Ans.** **(3)**

**Sol.** It is a free addition reaction which follows Anti Markovnikov's rule.

**20.** Consider the following anions

$CH_3\text{–}\overset{\ominus}{C}H_2$ (i) $CH_2{=}\overset{\ominus}{C}H$ (ii) $HC{\equiv}\overset{\ominus}{C}$ (iii)

Correct stability order of given anions is

(1) III > II > I (2) II > III > I

(3) I > II > III (4) I > III > II

**Ans.** **(1)**

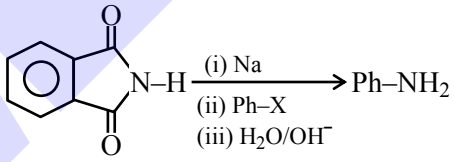
**Sol.** (I) $CH_3\text{–}\overset{\ominus}{C}H_2$ (II) $CH_2{=}\overset{\ominus}{C}H$ (III) $HC{\equiv}\overset{\ominus}{C}$

$\longrightarrow$

% S↑ ⇒ EN ↑⇒ Stability of $C^{\ominus}$↑

(III > II > I)

**21.** Which of the following reaction is correctly matched with their product ?

(1) 


(2) $CH_3CH_2\text{–}\underset{\underset{O}{\|}}{C}\text{–}NH_2 + Br_2 + 4KOH\ (alc.) \longrightarrow CH_3CH_2\text{–}NH_2 + 2KBr + K_2CO_3$

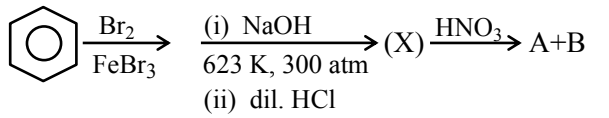
(3) $Ph\text{–}CH_2\text{–}NH_2 + CHCl_3 + KOH\ (alc.) \xrightarrow{\Delta} Ph\text{–}CH_2\text{–}N{\equiv}C \xrightarrow{(i)\ Sn+HCl} PhCH_2NH_2$

(4) $Ph\text{–}\underset{\underset{O}{\|}}{C}\text{–}NH_2 \xrightarrow{LiAlH_4} Ph\text{–}NH_2$

**Ans.** **(2)**

**Sol.** $CH_3CH_2\text{–}\underset{\underset{O}{\|}}{C}\text{–}NH_2 + Br_2 + 4KOH\ (alc.) \longrightarrow CH_3CH_2\text{–}NH_2 + 2KBr + K_2CO_3$

It is Hofmann bromide degradation.

**22.** 


The organic product (A) and (B) can be separated by :

(1) Steam distillation

(2) Fractional distillation

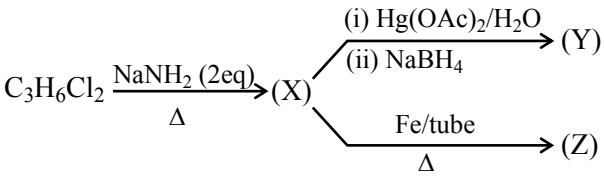
(3) Distillation under reduced pressure

(4) Azeotropic distillation

**Ans. (1)**

**Sol.** Product (X) is phenol.

Product (A) and (B) are ortho and para nitrophenol which are separated by Steam distillation.

**23.** 


**Statement-I :** Y gives yellow ppt. with $NaOH/I_2$.

**Statement-**II : Two types of H-atoms and one aromatic ring is present in Z and ratio of Z and X is 1 : 3.

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

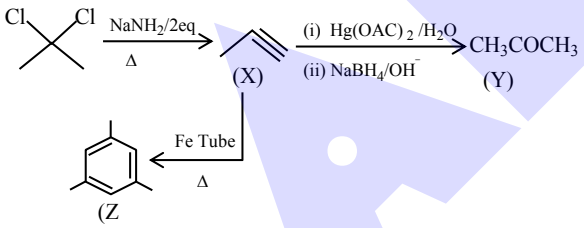
(2) Statement-I is incorrect and Statement-II is correct.

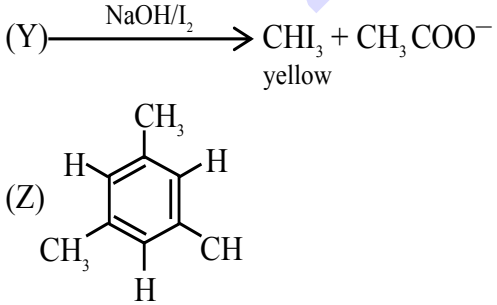
(3) Both Statements are correct.

(4) Both Statements are incorrect.

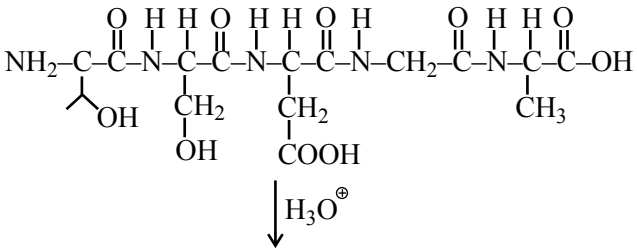
**Ans. (3)**

**Sol.**




**24.**




Find out the sequence of amino acids from N-terminal to C-terminal in given polypeptide chain.

(1) Thr-Ser-Asp-Gly-Ala (Essential A. Acid = Thr)

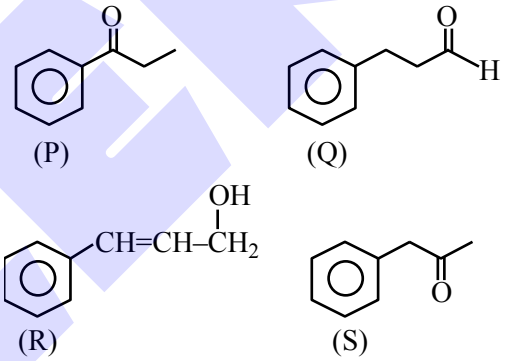
(2) Ser-Thr-Asp-Gly-Ala (Essential A. Acid =Thr)

(3) Ser-Asp-Thr-Gly-Ala (Essential A. Acid = Asp)

(4) Thr-Ser-Asp-Gly-Ala (Essential A. Acid = Gly)

**Ans. (1)**

**Sol.** Theory based

**25.** 


Select the correct statement.

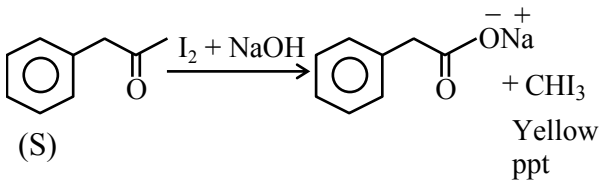
(1) Compound P, Q, R give +ve 2,4-DNP test

(2) Only compound S give yellow ppt with $NaOH + I_2$

(3) Compound Q and R gives Tollen's test

(4) Only compound P & S gives soothy flame

**Ans. (2)**

**Sol.** 


Others compounds P, Q, R do not give Iodoform test.

ALLEN

## For Class 12th Pass Students

# RISE. REPEAT.
# RANK UP IN JEE


## JOIN LEADER COURSE
**JEE (Main+Adv.) 2027**

26th Mar & 15th Apr

Know more

ALLEN ONLINE

# Think JEE 2027 will be your best shot?

Join the **Leader Online Course!**

Win up to

**90%** scholarship

via **ASAT**

Enrol Now