JEE (MAIN)-2025 (Online)

Chemistry Memory Based
Answer & Solutions

EVENING SHIFT

DATE : 04-04-2025

Disclaimer

ALLEN

MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – APRIL, 2025
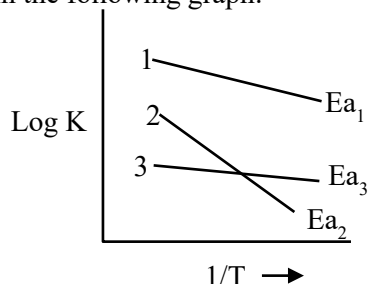**(Held On Friday 04ᵗʰ April, 2025)** **TIME : 03 : 00 PM to 06 : 00 PM**

CHEMISTRY	TEST PAPER WITH SOLUTION

SECTION-A

1. Maximum IE and minimum IE of group-13 elements
(1) B, ln   (2) B, Tl
(3) Al, ln   (4) Al, Tl
Ans. **(1)**
Sol. IE order in group 13 elements
$B > Tl > Ga > Al > ln$

2. In the following graph:

What is the correct order of increasing order of activation energy (Ea).
(1) $Ea_2 > Ea_1 > Ea_3$ (2) $Ea_1 > Ea_2 > Ea_3$
(3) $Ea_3 > Ea_2 > Ea_1$ (4) $Ea_2 > Ea_3 > Ea_1$
Ans. **(1)**
Sol. $k = Ae^{-E_a/RT}$

$$\log k = \log A - \frac{E_a}{2.303RT}$$

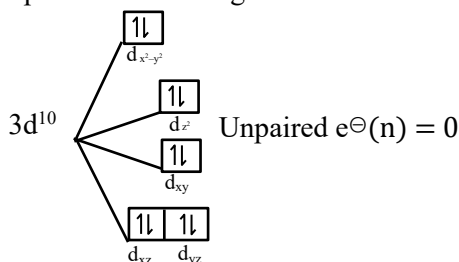As negative slope increases activation energy increases.

3. Consider the following complex ions
(a) $Ni(CO)_4$ (b) $[Ni(CN)_6]^{2-}$
(c) $[FeF_6]^{3-}$ (d) $[CoF_6]^{3-}$
Which of the following order is correct for their unpaired electrons
(1) $c > d > a = b$ (2) $c > d > a > b$
(3) $a > b > c > d$ (4) $c > a > d > b$
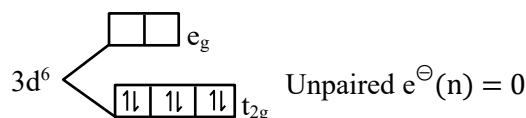**Ans.** **(1)**
(a) $Ni(CO)_4$
$Ni \Rightarrow 3d^8 4s^2$
In presence of CO ligands Ni convert into $3d^{10}$

(b) $[Ni(CN)_6]^{2-}$
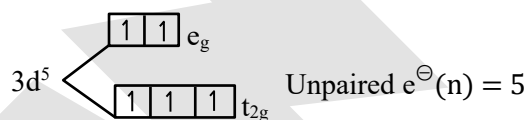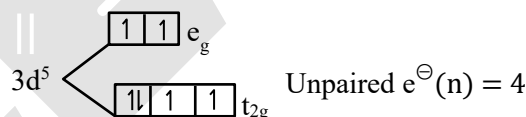$Ni^{4\oplus} \Rightarrow 3d^6\ 4s^0$, $CN^{\ominus} \Rightarrow SFL$

(c) $[FeF_6]^{3-}$
$Fe^{3\oplus} \Rightarrow 3d^5$
$F^{\ominus} \Rightarrow WFL$
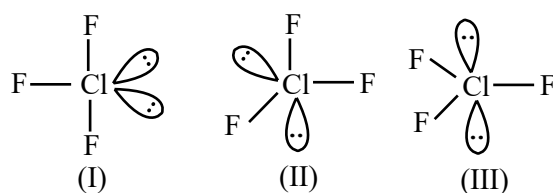

(d) $[CoF_6]^{3-}$
$Co^{3\oplus} \Rightarrow 3d^6$, $F^{\ominus} \Rightarrow WFL$

Order
$c > d > a = b$

**4.** Statement I: CIF_3 has 3 possible structures

Statement II: III is most stable structure due to least lp-bp repulsion.

(1) Statement I and Statement II both are correct.

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

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

(4) Both Statements are incorrect.

Ans. **(2)**

Sol. **Statement-I**

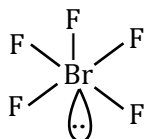According to arrangement of lone pairs ClF_3 has 3 possible structures.
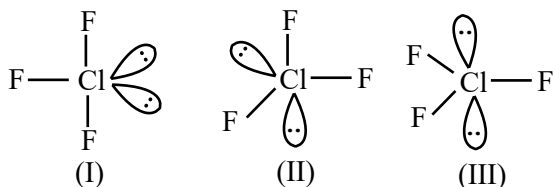
Statement-2

According to Bent's rule structure (I) is the most stable structure of ClF_3

5. A compound $[A = MCl_4 \cdot 3NH_3]$ reacts with $AgNO_3$ and gives x mole of AgCl. Now x is the number of lone pair of e^- on BrF_5. Then calculate G.I. of compound (A).
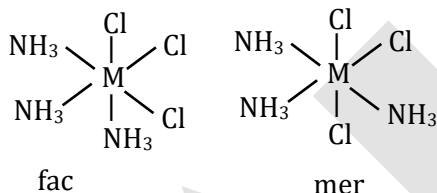
(1) 0   (2) 1

(3) 2   (4) 3

Ans. **(2)**

Sol.

x = no. of lone pair = 1

6. Incorrect order of I.E. is

(1) $Mn^+ < Mn^{2+}$ (2) $Mn^{+2} < Fe^{+2}$

(3) $Fe^{+2} < Fe^{+3}$ (4) $Mn^+ < Cr^+$

Ans. **(2)**

Sol. (1) $Mn^+ < Mn^{2+}$ (correct)

      (d^6)   (d^5)

      1509   3260

(2) $Mn^{+2} < Fe^{+2}$ (Incorrect)

      (d^5)   (d^6)

      3260   2963

(3) $Fe^{+2} < Fe^{+3}$ (correct)

      (d^6)   (d^5)

(4) $Mn^+ < Cr^+$ (correct)

      (d^6)   (d^5)

      1509   1592

7. Given below are two statements.

Statement I: The formula of cryoscopic constant is given as $K_f = \dfrac{MRT_f^2}{1000 \times \Delta H_{fusion}}$.

Statement II: K_f of water is greater than benzene.

In light of the above statements choose the most appropriate option.

(1) Statement I and Statement II both are correct.

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

(3) Statement I is incorrect but Statement II is correct.
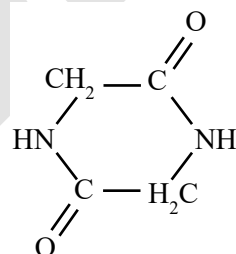
(4) Both Statements are incorrect.

Ans. **(2)**

Sol. $k_f = \dfrac{MRT_f^2}{1000 \times \Delta H_{fus}}$

$k_f \propto M$

Molar mass $\Rightarrow$ Water < Benzene
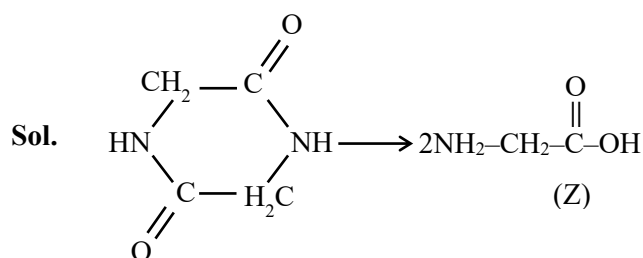
     $(k_f)_{water} < (k_f)_{benzene}$

8. x is a peptide which is hydrolysed to 2 amino acids y and z. y when react with HNO_2 gives lactic acid. z when heated gives cyclic structure as below:
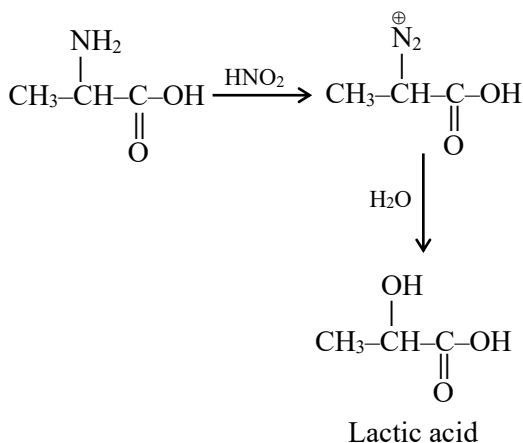

y and z respectively are

(1) Alanine and Lysine

(2) Alanine and Glycine

(3) Glycine and Alanine

(4) Valine and Glycine

Ans. **(3)**

Sol.

CH₃–CH–C–OH $\xrightarrow{HNO_2}$ CH₃–CH–C–OH

Lactic acid

9. Statement I: Alcohol is prepared from alkyl halide in presence of aq. KOH by elimination.

Statement II: Alkenes are prepared from alkyl halide with alc. KOH by β-elimination.

(1) Statement I and Statement II both are correct.

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

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

(4) Both Statement are incorrect.

Ans. **(3)**

Sol. Statement I is incorrect as aq. KOH gives mostly substitution reaction and gives substitution product.

Statement II is correct as alc. KOH gives β-elimination reaction.

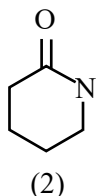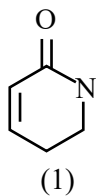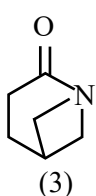**10.** Write Basic Strength order of following compounds
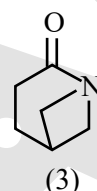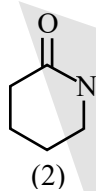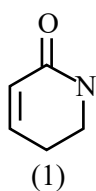
(1) 3,1,2   (2) 2,3,1
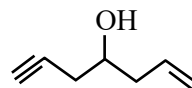
(3) 1,3,2   (4) 2,1,3

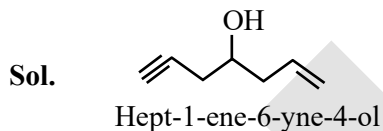**Ans.** **(1)**

Sol. Basic Strength order

Cross conjugation
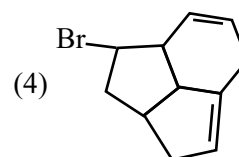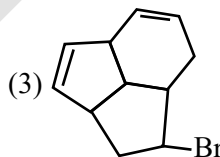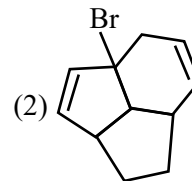
11. Find the IUPAC name of the given compound

(1) Hept-2-ene-6-yne-4-ol

(2) Hept-6-ene-2-yne-4-ol
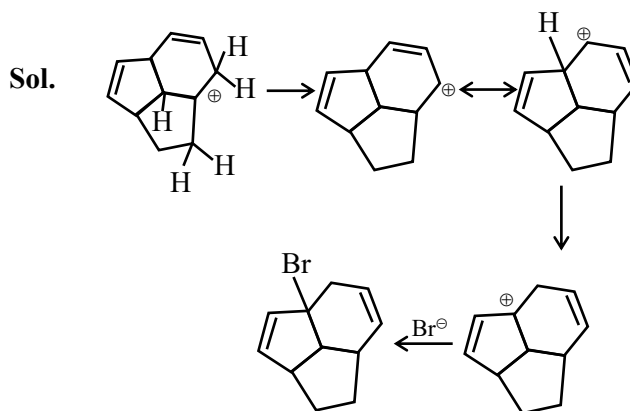
(3) Hept-1-ene-6-yne-4-ol

(4) Hept-6-ene-1-yne-4-ol

Ans. **(3)**

Sol.

Hept-1-ene-6-yne-4-ol

12. Find the major product

$\xrightarrow[\text{(1 eq.)}]{\text{HBr}}$ Major product

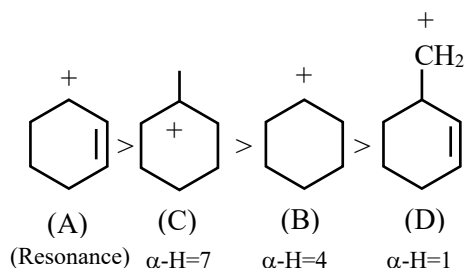(1)   (2)

(3)   (4)

Ans. **(2)**

Sol.
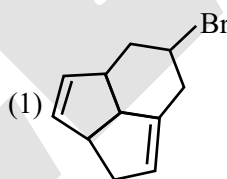
13. Arrange the following carbocation in decreasing order of their stability.
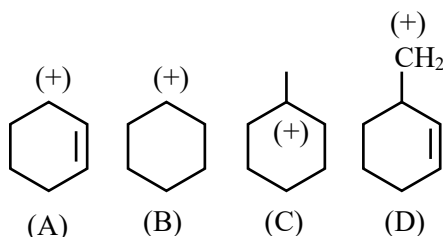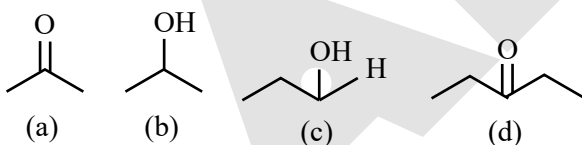

(A)   (B)   (C)   (D)

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

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

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

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

Ans. **(2)**

Sol. Carbocation stability order
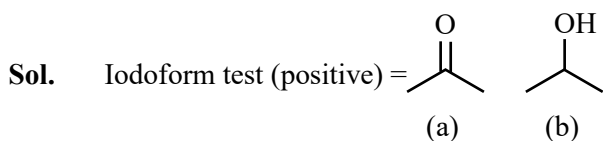

(A)   (C)   (B)   (D)
(Resonance) α-H=7   α-H=4   α-H=1

14. Which of the following gives yellow precipitate with I$_2$/NaOH

(a)   (b)   (c)   (d)

(1) a & b   (2) b & c

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

Ans. **(1)**

Sol. Iodoform test (positive) =

(a)   (b)

15. In which of the following first cation is more stable the second?
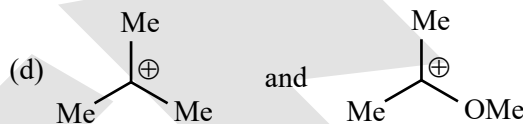
(a)

and

(b)

and

(c)

and

(d)

and

(1) a & b   (2) b & c

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

Ans. **(1)**

Sol. (a)

and
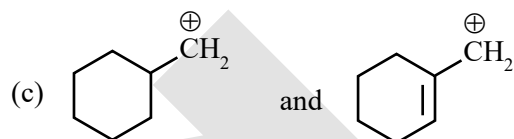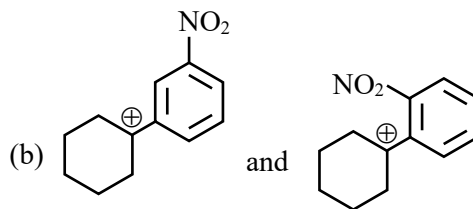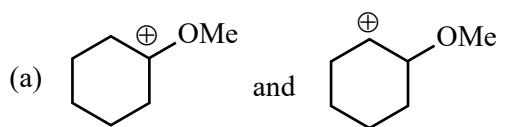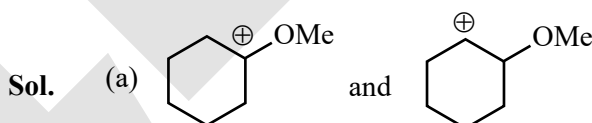
Due to back bonding 1st is more stable than II

(b)

and
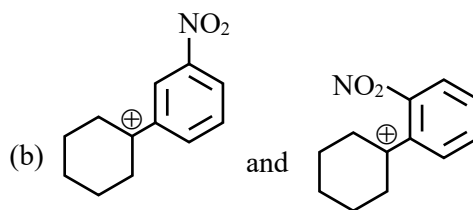
Due to distant electron withdrawing group 1st is more stable than II

SECTION-B

16. Total number of electrons in chromium (z = 24) for which the value of azimuthal quantum number (ℓ) is 1 and 2.

Ans. **(17)**

Sol. Cr(z=24) 1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1

n =   1   2   2   3   3   3   4

ℓ =   0   0 $\boxed{1}$ 0 $\boxed{1}$ $\boxed{2}$ 0
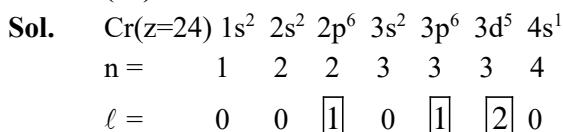
Total electrons having ℓ = 1 and ℓ = 2

$\Rightarrow 6 + 6 + 5 = 17$

17. A sample of limestone having moss of 150 Kg which is 75% pure. Find the mass of calcium oxide if the sample is heated till decomposition.

Ans. **(63)**

Sol. $CaCO_3 \longrightarrow CaO + CO_2$

150 kg

Pure $CaCO_3$ is $150 \text{ kg} \times \dfrac{75}{100}$

$= 150 \times 10^3 \times \dfrac{75}{100} = 1125 \times 10^2 \text{ gm}$

Mole of $CaCO_3 = \dfrac{1125 \times 10^2}{100} = 1125 \text{ mole}$

Mole of CaO = 1125 mole

Mass of CaO = 1125 × 56

$\qquad\qquad$ = 63000 gm

$\qquad\qquad$ = 63 kg

18. Consider the following zero order reaction:

A → Products

Half-life of the reaction is 1 hr if initial concentration of the reactant is 2 mol/L. Find the half-life of the reaction in minutes if the initial concentration of the reaction is 0.5 mol/L.

Ans. **(15)**

Sol. $t_{1/2} \propto [A_0]$ for zero order

$\dfrac{(t_{1/2})_1}{(t_{1/2})_2} = \dfrac{[A_0]_1}{[A_0]_2}$

$\dfrac{1}{(t_{1/2})_2} = \dfrac{2}{0.5}$

$t_{1/2} = 0.25$ hrs.

19. If x mg of $Mg(OH)_2$ is added in 1L of solution to make a solution with pH = 10, then find the value of x.

[Given : MW of $Mg(OH)_2$ = 58 g/mol]

Assume $Mg(OH)_2$ dissociates completely in water.

Ans. **(3)**

Sol. $Mg(OH)_2 \longrightarrow Mg^{+2} + 2OH^{\ominus}$

pH = 10

$[H^+] = 10^{-10}$

$[OH^{\ominus}] = 10^{-4}$

$[Mg(OH)_2] = \dfrac{10^{-4}}{2}$

$\Rightarrow$ mole of $Mg(OH)_2 = \dfrac{10^{-4} \times 1}{2}$

Mass of $Mg(OH)_2 = \dfrac{10^{-4}}{2} \times 58$

$= 29 \times 10^{-4} \text{ gm}$

$= 2.9 \text{ mg} \approx 3 \text{ mg}$