

47

NEET 2025

Chemistry

46. If the molar conductivity (Λ_m) of a 0.050 mol L⁻¹ solution of a monobasic weak acid is 90 S cm² mol⁻¹, its extent (degree) of dissociation will be

[Assume $\Lambda_+^0 = 349.6$ S cm² mol⁻¹ and $\Lambda_-^0 = 50.4$ S cm² mol⁻¹]

- (1) 0.215 (2) 0.115
(3) 0.125 (4) 0.225

Sol:

$$\alpha = \frac{\Lambda}{\Lambda^0} \quad \Lambda^0 = \Lambda_+^0 + \Lambda_-^0$$

$$= \frac{90}{349.6 + 50.4} = \frac{90}{400} = 0.225$$

47. Given below are two statements :

Statement I : A hypothetical diatomic molecule with bond order zero is quite stable.

Statement II : As bond order increases, the bond length increases.

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

- (1) Statement I is false but Statement II is true
(2) Both Statement I and Statement II are true
(3) Both Statement I and Statement II are false
(4) Statement I is true but Statement II is false

Sol:

B.O = 0 — unstable

S-I X

B.O \propto $\frac{1}{\text{Bond length}}$

S-II X

BOTH Incorrect

48. The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes $n = 2 \rightarrow n = 3$ and $n = 4 \rightarrow n = 6$ transitions, respectively, is

- (1) $\frac{1}{4}$ (2) $\frac{1}{36}$
(3) $\frac{1}{16}$ (4) $\frac{1}{9}$

Sol:

$$\frac{1}{\lambda} = -R_H \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$$

$$\frac{\lambda_1}{\lambda_2} = \frac{1}{4}$$

49. The correct order of the wavelength of light absorbed by the following complexes is,

- A. $[\text{Co}(\text{NH}_3)_6]^{3+}$ B. $[\text{Co}(\text{CN})_6]^{3-}$
 C. $[\text{Co}(\text{H}_2\text{O})_4]^{2+}$ D. $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$

Choose the correct answer from the options given below:

- (1) $C < A < D < B$ (2) $B < D < A < C$
 (3) $B < A < D < C$ (4) $C < D < A < B$

Sol:

NCERT Table

Strong field $\rightarrow \text{CN}^-$
 Highest splitting $\rightarrow \text{ET} \rightarrow \lambda_{\text{max}}$

$\text{CN}^- > \text{NH}_3$

$B < A < D < C$

50. If the rate constant of a reaction is 0.03 s^{-1} , how much time does it take for 7.2 mol L^{-1} concentration of the reactant to get reduced to 0.9 mol L^{-1} ? (Given: $\log 2 = 0.301$)

- (1) 21.0s (2) 69.3s
 (3) 23.1s (4) 210s

Sol:

$$k = \frac{2.303}{t} \log \frac{A_0}{A_t}$$

$$t = \frac{2.303}{0.03} \log \frac{7.2}{0.9}$$

$$t = \frac{2.303}{3} \times 100 \div \log 2$$

$$t = 0.693 \times 100$$

$$t = 69.3$$

51. Match List I with List II

	List-I (Mixture)		List-II (Method of Separation)
A.	$\text{CHCl}_3 + \text{C}_6\text{H}_5\text{NH}_2$	I.	Distillation under reduced pressure
B.	Crude oil in petroleum industry	II.	Steam distillation
C.	Glycerol from spent-lye	III.	Fractional distillation
D.	Aniline - water	IV.	Simple distillation

Choose the correct answer given below :

- (1) A-III, B-IV, C-II, D-I
 (2) A-IV, B-III, C-I, D-II
 (3) A-IV, B-III, C-II, D-I
 (4) A-III, B-IV; C-I, D-II

Sol:

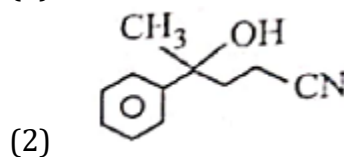
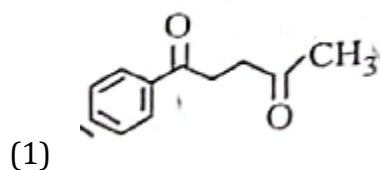
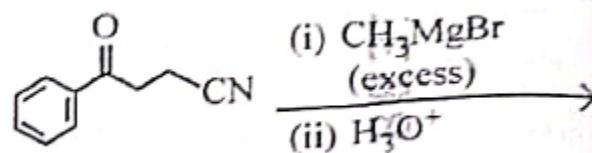
$\text{CHCl}_3 + \text{C}_6\text{H}_5\text{NH}_2 \rightarrow$ Simple Dist.

Crude oil \rightarrow Fractional

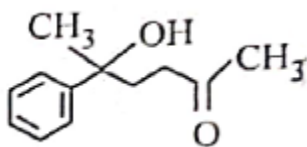
Glycerol \rightarrow Reduced P.

Aniline + $\text{H}_2\text{O} \rightarrow$ Steam Dist.

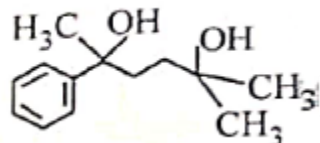
52. The major product of the following reaction is :



(3)

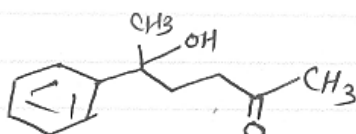


(4)



Sol:

ketone + C.R. \rightarrow 3^o Alc.
 Cyanide + C.R. \rightarrow ketone.



53. Which one of the following compounds can exist as cis-trans isomers?

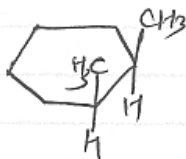
(1) 1,2-Dimethylcyclohexane

(2) Pent-1-ene

(3) 2-Methylhex-2-ene

(4) 1,1-Dimethylcyclopropane

Sol:



1,2-Dimethylcyclohexane

54. Among the following, choose the ones with equal number of atoms:-

A. 212 g of Na₂CO₃(s) [molar mass = 106 g]

B. 248 g of Na₂O (s) [molar mass = 62 g]

C. 240 g of NaOH (s) [molar mass = 40 g]

D. 12 g of H₂(g) [molar mass = 2 g]

E. 220 g of CO₂(g) [molar mass = 44 g]

Choose the correct answer from the options given below:-

(1) B, D, and E only

(2) A, B, and C only

(3) A, B, and D only

(4) B, C, and D only

Sol:

(A) 212 g Na₂CO₃ $\xrightarrow{6 \text{ atoms}}$
 $n = \frac{212}{106} = 2 \text{ moles}$
 No. of atoms = 2 x (6) = 12 mole atoms

(B) $n = \frac{248}{62} = 4 \text{ moles}$
 Na₂O \downarrow 3 atoms
 No. of atoms = 4 x (3) = 12 mole atoms.

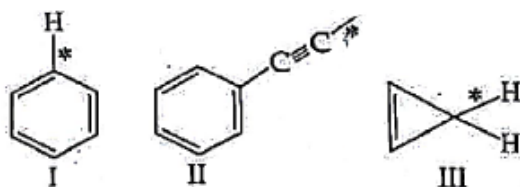
(C) $n = \frac{240}{40} = 6 \text{ moles}$
 NaOH \downarrow 3 atoms
 No. of atoms = 6 x (3) = 18 moles

(D) 12 g H₂ $\xrightarrow{2 \text{ atoms}}$
 $n = \frac{12}{2} = 6 \text{ moles}$
 no. of atoms = 6 x (2) = 12 mole atoms

(E) $n = \frac{220}{44} = 5 \text{ moles}$
 CO₂ \downarrow 3 atoms
 no. of atoms = 5 x (3) = 15 mole atoms

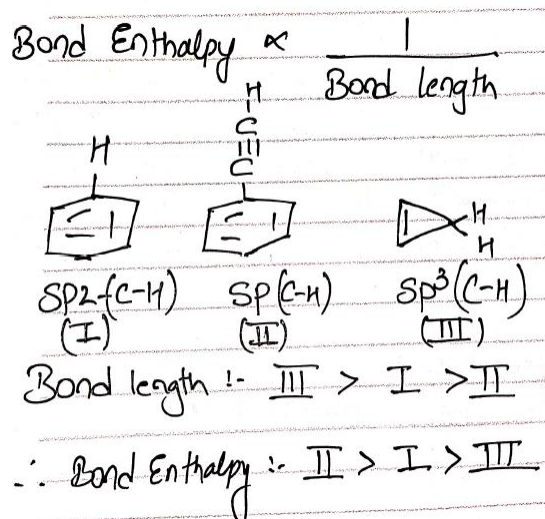
12 moles \rightarrow A/B/D

55. Among the given compounds I-III, the correct order of bond dissociation energy of C - H bond marked with * is



- (1) II > III > I (2) II > I > III
 (3) I > II > III (4) III > II > I

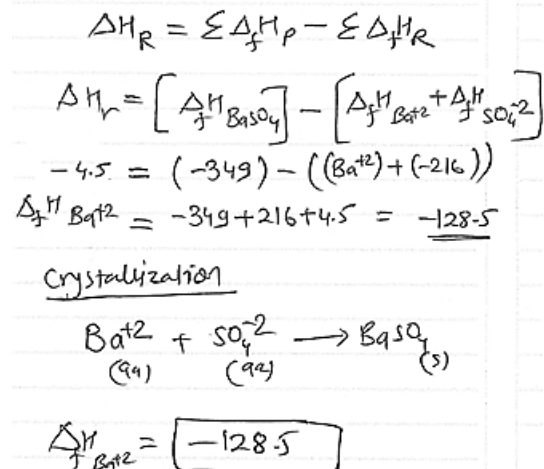
Sol:



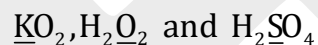
56. The standard heat of formation, in kcal/mol of Ba^{2+} is [Given : standard heat of formation of SO_4^{2-} ion(aq) = - 216 kcal/mol, standard heat of crystallisation of $\text{BaSO}_4(\text{s})$ = - 4.5 kcal/mol, standard heat of formation of $\text{BaSO}_4(\text{s})$ = - 349 kcal/mol]

- (1) + 220.5 (2) - 128.5
 (3) - 133.0 (4) 133.0

Sol:



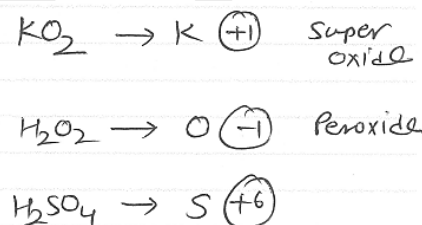
57. Consider the following compounds :



The oxidation states of the underlined elements in term are, respectively,

- (1) +4, - 4 and + 6 (2) +1, - 1 and +6
 (3) + 2, - 2 and +6 (4) +1, - 2 and +4

Sol:




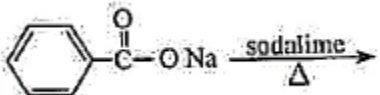
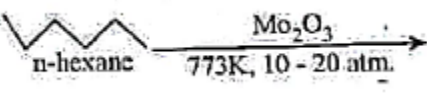
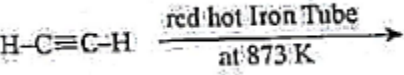
58. Out of the following complex compounds, which of the compound will be having the minimum conductance in solution?

- (1) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}$ (2) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
 (3) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$ (4) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$

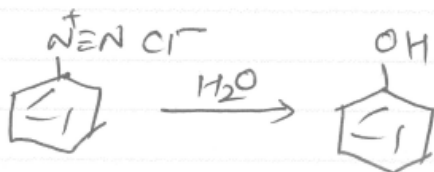
Sol:

No ions \rightarrow NO conductance.
 Less ions \rightarrow less conductance
 more ions \rightarrow more conductance.

59. Which one of the following reactions does not give benzene as the product?

- (1) 
- (2) 
- (3) 
- (4) 

Sol:



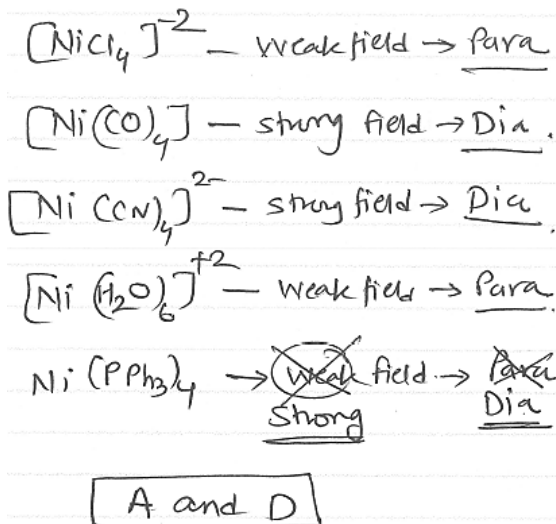
60. Which of the following are paramagnetic?

- A. $[\text{NiCl}_4]^{2-}$ B. $\text{Ni}(\text{CO})_4$
 C. $[\text{Ni}(\text{CN})_4]^{2-}$ D. $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
 E. $\text{Ni}(\text{PPh}_3)_4$

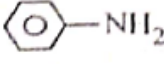

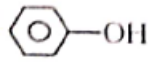
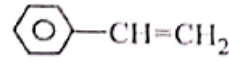
Choose the correct answer from the options given below

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

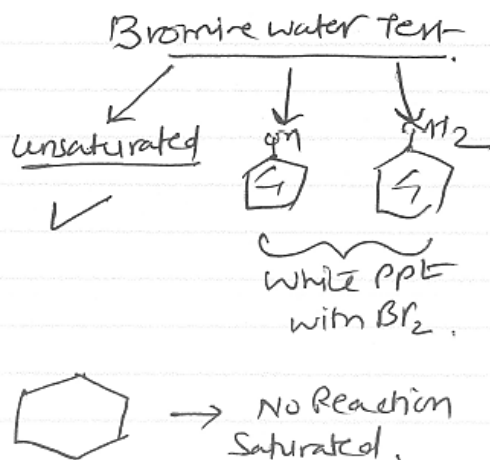
Sol:



61. Which one of the following compounds does not decolourize bromine water?

- (1)  (2) 
 (3)  (4) 

Sol:



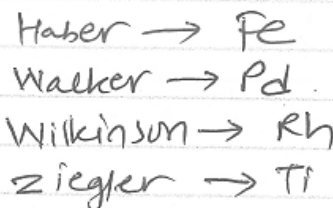
62. Match List - I with List II

	List-I		List-II
A.	Haber process	I.	Fe catalyst
B.	Wacker oxidation	II.	PdCl_2
C.	Wilkinson catalyst	III.	$[(\text{PPh}_3)_3\text{RhCl}]$
D.	Ziegler catalyst	IV.	TiCl_4 with $\text{Al}(\text{CH}_3)_3$

Choose the correct answer from the options given below:

- (1) A-I, B-IV, C-III, D-II
 (2) A-I, B-II, C-IV, D-III
 (3) A-II, B-III, C-I, D-IV
 (4) A-I, B-II, C-III, D-IV

Sol:



63. Match List I with List I

	List-I (Name of Vitamin)		List-II (Deficiency disease)
A.	Vitamin B ₁₂	I.	Cheilosis
B.	Vitamin D	II.	Convulsions
C.	Vitamin B ₂	III.	Rickets
D.	Vitamin B ₆	IV.	Pernicious anaemia

Choose the correct answer from the options given below :

- (1) A-IV, B-III, C-II, D-I
- (2) A-I, B-III, C-II, D-IV
- (3) A-IV, B-III, C-I, D-II
- (4) A-II, B-III, C-I, D-IV

Sol:

B₁₂ → Anaemia.
 D → Rickets
 B₂ → Cheilosis.
 B₆ → Convulsions.

64. Given below are two statements:

Statement I: Ferromagnetism is considered as an extreme form of paramagnetism.

Statement II: The number of unpaired electrons in a Cr²⁺ ion (Z = 24) is the same as that of a Nd³⁺ ion (Z = 60).

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

- (1) Statement I is false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

Sol:

✓ S-I :- ferro is extreme para

X S-II :- Cr²⁺ → 3d⁴ 4s⁰

4 unpaired.
 Nd³⁺ → 4f³ 5d⁰ 6s⁰
 3 unpaired
 M diff magnetic moment

65. If the half-life (t_{1/2}) for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closest to:

- (1) 10 minutes
- (2) 2 minutes
- (3) 4 minutes
- (4) 5 minutes

Sol:

t_{99.9%} = 10 × t_{1/2}
 = 10 × 1 min
 = 10 min

66. The correct order of decreasing basic strength of the given amines is:

- (1) benzenamine > ethanamine > N-methylaniline > N-ethylethanamine
- (2) N-methylaniline > benzenamine > ethanamine > N-ethylethanamine
- (3) N-ethylethanamine > ethanamine > benzenamine > N-methylaniline
- (4) N-ethylethanamine > ethanamine > N-methylaniline > benzenamine

Sol:

2° Amine > 1° > Aromatic amines
 N-ethyl ethanamine >
 ethanamine >
 N-methylaniline >
 benzenamine.

67. Match List I with List II

	List-I (Ion)		List-II (Group Number in Cation Analysis)
A.	Co ²⁺	I.	Group-I
B.	Mg ²⁺	II.	Group-III
C.	Pb ²⁺	III.	Group-IV
D.	Al ³⁺	IV.	Group-VI

Choose the correct answer from the options given below:

- (1) A-III, B-II, C-I, D-IV
- (2) A-III B-IV, C-II, D-I
- (3) A-III B-IV, C-I, D-II**
- (4) A-1B-II, C-IV, D-I

Sol:

IV - Ni, Co, Mn, Zn
 III - Al³⁺, Cr³⁺
 I → Pb²⁺
 VI → Mg²⁺

68. Phosphoric acid ionizes in three steps with their ionization constant values

K_{a_1}, K_{a_2} and K_{a_3} , respectively while K is the overall ionization constant.

Which of the following statements are true?

- A. $\log K = K_{a_1} + K_{a_2} + K_{a_3}$
- B. H_3PO_4 is a stronger acid than $H_2PO_4^-$ and HPO_4^{2-}
- C. $K_{a_1} > K_{a_2} > K_{a_3}$
- D. $K_{a_1} = \frac{K_{a_3} + K_{a_2}}{2}$

Choose the correct answer from the options given below:

- (1) A, B and C only** (2) A and B only
- (3) A and C only (4) B, C and D only

Sol:

$H_3PO_4 \rightarrow 3H^+ + PO_4^{3-}$
 $K_{a_1} > K_{a_2} > K_{a_3}$
 $K = K_{a_1} \times K_{a_2} \times K_{a_3}$
overall
 $\therefore \log K = \log K_1 + \log K_2 + \log K_3$
 $H_3PO_4 \rightarrow$ give H^+ most easily K_1 1st
A, B & C are correct.

69. Which of the following statements are true?

- A. Unlike Ga that has a very high melting point, Cs has a very low melting point.
- B. On Pauling scale, the electronegativity values of N and Cl are not the same.
- C. Ar, K⁺, Cl⁻, Ca²⁺, and S²⁻ are all isoelectronic species.
- D. The correct order of the first ionization enthalpies of Na, Mg, Al, and Si is Si > Al > Mg > Na.
- E. The atomic radius of Cs is greater than that of Li and Rb.

Choose the correct answer from the options given below

- (1) A, C, and E only (2) A, B, and E only
- (3) C and E only** (4) C and D only

Sol:

x (A) Cl₂ - doesn't have ↑ mp.
Cl₂ - O₂ has nearly similar melting point.

x (B) On Pauling scale ✓ same
N = 3.0
Cl = 3.0

✓ (C) Same e⁻ = isoelectronic
Ar = K⁺ = Cl⁻ = Ca²⁺ = S²⁻

x (D) I.E Si > Mg > Al > Na

✓ (E) Li < N < K < Pb < Cs

70. Given below are two statements:

Statement I: Like nitrogen that can form ammonia, arsenic can form arsine.

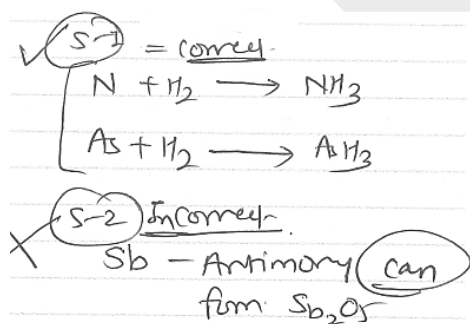
Statement II: Antimony cannot form antimony pentoxide.

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

- (1) Statement is incorrect but Statement II is correct
- (2) Both Statement I and Statement II are correct
- (3) Both Statement I and Statement II are incorrect

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

Sol:

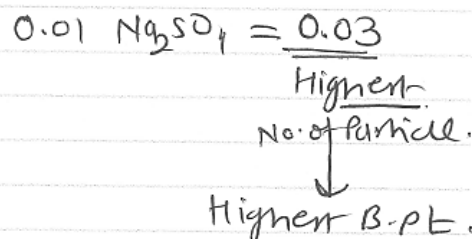


S-I	✓
S-II	x

71. Which of the following aqueous solution will exhibit highest boiling point?

- (1) 0.015M C₆H₁₂O₆
- (2) 0.01M Urea
- (3) 0.01M KNO₃
- (4) 0.01M Na₂SO₄

Sol:



72. Given below are two statements:

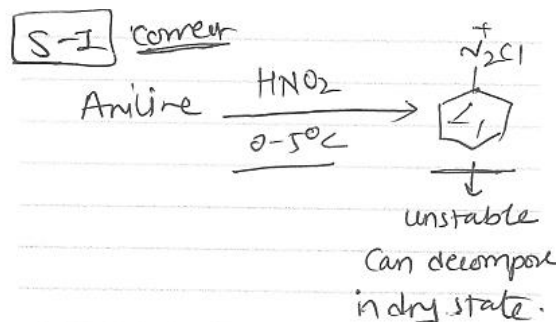
Statement I: Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273 - 278 K. It decomposes easily in the dry state.

Statement II: Insertion of iodine into the benzene ring is difficult and hence iodobenzene is prepared through the reaction of benzenediazonium salt with KI.

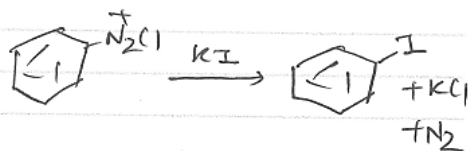
In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement I is incorrect but Statement II is correct
- (2) Both Statement I and Statement II are correct
- (3) Both Statement I and Statement II are incorrect
- (4) Statement I is correct but Statement II is incorrect

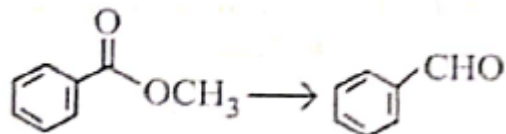
Sol:



S-II Correct.

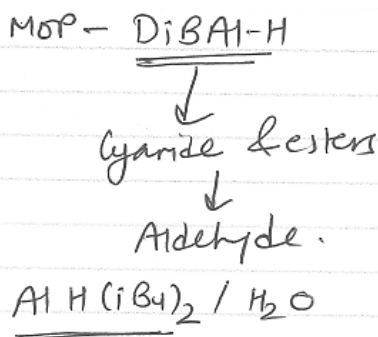


73. Identify the suitable reagent for the following conversion.



- (1) $H_2/Pd-BaSO_4$
- (2) (i) $LiAlH_4$, (ii) H^+/H_2O
- (3) (i) $AlH(iBu)_2$ (ii) H_2O
- (4) (i) $NaBH_4$, (ii) H^+/H_2O

Sol:



74. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): undergoes S_N2 reaction faster than .

Reason (R): Iodine is a better leaving group because of its large size.

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

- (1) A is false but R is true
- (2) Both A and R are true and R is the correct explanation of A
- (3) Both A and R are true but R is not the correct explanation of A

(4) A is true but R is false

Sol:



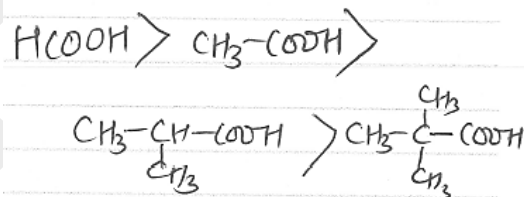
I is good leaving group. due to size.

A is correct & R is correct explanation.

75. The correct order of decreasing acidity of the following aliphatic acids is:

- (1) $HCOOH > (CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH$
- (2) $(CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH > HCOOH$
- (3) $CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH > HCOOH$
- (4) $HCOOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$

Sol:



76. Which one of the following reactions do NOT belong to "Lassaigne's test"?

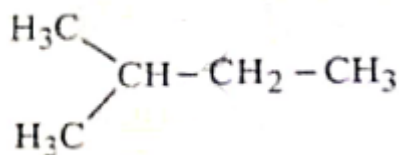
- (1) $2CuO + C \xrightarrow{\Delta} 2Cu + CO_2$
- (2) $Na + C + N \xrightarrow{\Delta} NaCN$
- (3) $2Na + S \xrightarrow{\Delta} Na_2S$
- (4) $Na + X \xrightarrow{\Delta} NaX$

Sol:

Lassaigne's test is for N, S and halogen.

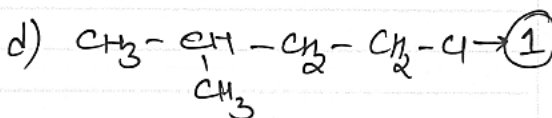
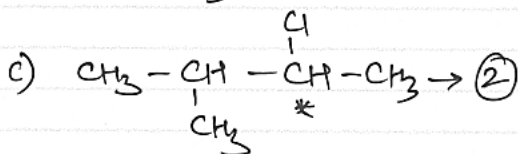
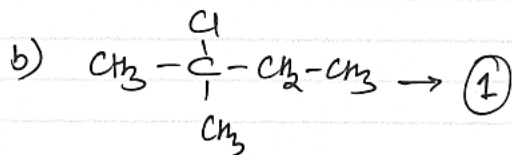
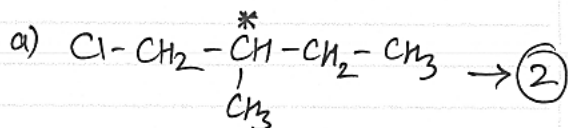
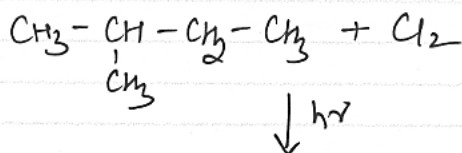
$\therefore 2CuO + C \xrightarrow{\Delta} 2Cu + CO_2$ is not a part of this test.

77. How many products (including stereoisomers) are expected from monochlorination of the following compound?



- (1) 6 (2) 2
(3) 3 (4) 5

Sol:



∴ It gives 6 isomers on monochlorination.

78. Sugar 'X'

- A. is found in honey
B. is a keto sugar
C. exist in α and β -anomeric forms
D. is laevorotatory

'X' is :

- (1) Sucrose (2) D- Glucose
(3) D- Fructose (4) Maltose

Sol:

exists in α & β -anomeric forms
∴ it has to be monosaccharides

Keto sugar \rightarrow Fructose

Levorotatory \rightarrow D-fructose

79. Dalton's Atomic theory could not explain which of the following?

- (1) Law of gaseous volume
(2) Law of conservation of mass
(3) Law of constant proportion
(4) Law of multiple proportion

Sol:

Law of gaseous volume is Avogadro's Law.

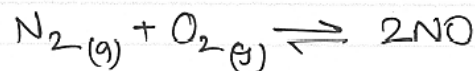
80. Higher yield of NO in $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$ can be obtained at $[\Delta H \text{ of the reaction} = +180.7 \text{ kJ mol}^{-1}]$

- A. higher temperature
B. lower temperature
C. higher concentration of N_2
D. higher concentration of O_2

Choose the correct answer from the options given below:

- (1) A, C, D only (2) A, D only
(3) B, C only (4) B, C, D only

Sol:



$$\Delta H = +180.7 \frac{\text{kJ}}{\text{mol}}$$

ΔH is +ve hence Reaction is Endothermic

∴ Reaction proceeds in forward direction with increase in temperature

and according to Le chatelier's principle as conc of reactant increases rate of forward reaction increases

∴ higher conc of N_2
 & higher conc of O_2 .

81. Match List - I with List - II

	List-I		List-II
A.	XeO ₃	I.	sp ³ d; linear
B.	XeF ₂	II.	sp ³ ; pyramidal
C.	XeOF ₂	III.	Sp ³ d ³ ; distorted octahedral
D.	XeF ₆	IV.	sp ³ d ² ; square pyramidal

Choose the correct answer from the options given below:

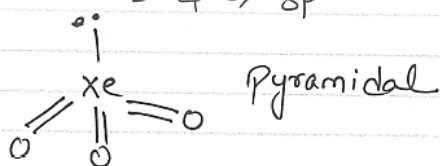
- (1) A-IV, B-II, C-I, D-III
- (2) A-II, B-I, C-IV, D-III
- (3) A-II, B-I, C-III, D-IV
- (4) A-IV, B-II, C-III, D-I

Sol:

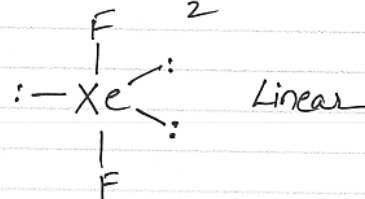
$$\frac{1}{2} [V + m - C + A]$$

$$a) XeO_3 = \frac{1}{2} [8 + 0 - 0 + 0]$$

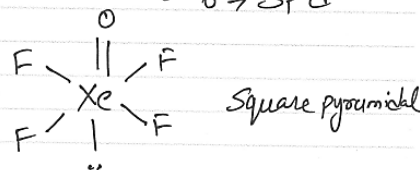
$$= 4 \Rightarrow sp^3$$



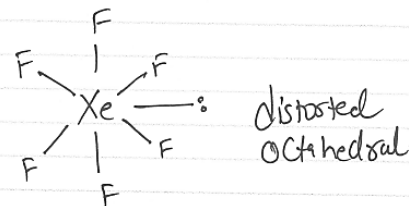
$$b) XeF_2 = \frac{1}{2} [8 + 2] = \frac{10}{2} = 5 \Rightarrow sp^3d$$



$$c) XeOF_4 = \frac{1}{2} [8 + 4] = 6 \Rightarrow sp^3d^2$$



$$d) XeF_6 = \frac{1}{2} [8 + 6] = 7 \Rightarrow sp^3d^3$$



82. Match List - I with List II

	List-I (Example)		List-II (Type of Solution)
A.	Humidity	I.	Solid in solid
B.	Alloys	II.	Liquid in gas
C.	Amalgams	III.	Solid in gas
D.	Smoke	IV.	Liquid in solid

Choose the correct answer from the options given below:

- (1) A-III, B-II, C-I, D-IV
- (2) A-II, B-IV, C-I, D-III
- (3) A-II, B-I, C-IV, D-III
- (4) A-III, B-I, C-IV, D-II

Sol:

- A) Humidity \rightarrow Liquid in gas
 B) Alloys \rightarrow Solid in Solid
 C) Amalgams \rightarrow Liquid in solid
 D) Smoke \rightarrow Solid in gas.

83. Energy and radius of first Bohr orbit of He^+ and Li^{2+} are

[Given $R_H = 2.18 \times 10^{-18}$ J, $a_0 = 52.9$ pm]

(1) $E_n(\text{Li}^{2+}) = -8.72 \times 10^{-16}$ J; $r_n(\text{Li}^{2+}) = 17.6$ pm

$E_n(\text{He}^+) = -19.62 \times 10^{-16}$ J; $r_n(\text{He}^+) = 17.6$ pm

(2) $E_n(\text{Li}^{2+}) = -19.62 \times 10^{-18}$ J; $r_n(\text{Li}^{2+}) = 17.6$ pm

$E_n(\text{He}^+) = -8.72 \times 10^{-18}$ J; $r_n(\text{He}^+) = 26.4$ pm

(3) $E_n(\text{Li}^{2+}) = -8.72 \times 10^{-18}$ J; $r_n(\text{Li}^{2+}) = 26.4$ pm

$E_n(\text{He}^+) = -19.62 \times 10^{-18}$ J; $r_n(\text{He}^+) = 17.6$ pm

(4) $E_n(\text{Li}^{2+}) = -19.62 \times 10^{-16}$ J; $r_n(\text{Li}^{2+}) = 17.6$ pm

$E_n(\text{He}^+) = -8.72 \times 10^{-16}$ J; $r_n(\text{He}^+) = 26.4$ pm

Sol:

$$E_n = -R_H \frac{Z^2}{n^2}$$

$$r_n = \frac{n^2}{Z} a_0$$

$$E_{n, \text{Li}^{2+}} = -\frac{2.18 \times 10^{-18} \times 3^2}{1^2} = -19.62 \times 10^{-18} \text{ J}$$

$$r_{n, \text{Li}^{2+}} = \frac{1^2}{3} \times 52.9 = 17.63 \text{ pm}$$

$$E_{n, \text{He}^{+2}} = -\frac{2.18 \times 10^{-18} \times 4}{1^2} = -8.72 \times 10^{-18} \text{ J}$$

$$r_{n, \text{He}^+} = \frac{1^2 \times 52.9}{2} = 26.45 \text{ pm}$$

84. Which among the following electronic configurations belong to main group elements?

- A. $[\text{Ne}]3s^1$
 B. $[\text{Ar}]3d^3 4s^2$
 C. $[\text{Kr}]4d^{10} 5s^2 5p^5$
 D. $[\text{Ar}]3d^{10} 4s^1$
 E. $[\text{Rn}]5f^0 6d^2 7s^2$

Choose the correct answer from the option given below :

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

Sol:

Main group elements are the one which belongs to s & p block.

A) $[\text{Ne}] 3s^1 \rightarrow$ s-block

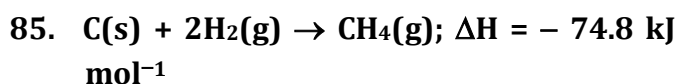
B) $[\text{Ar}] 3d^3 4s^2 \rightarrow$ d-block

C) $[\text{Kr}] 4d^{10} 5s^2 5p^5 \rightarrow$ p-block

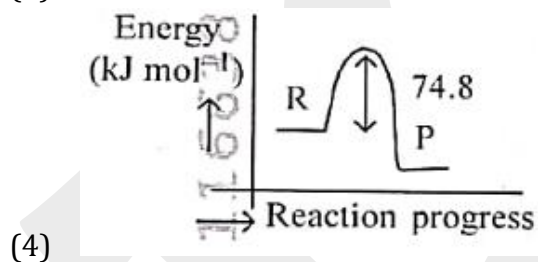
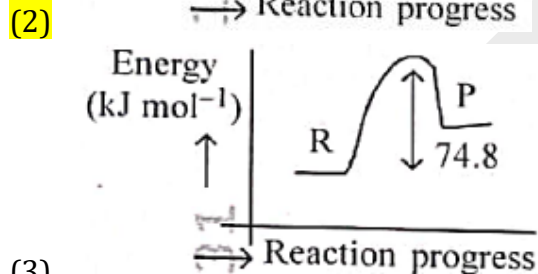
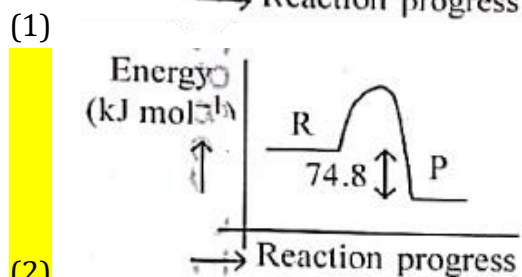
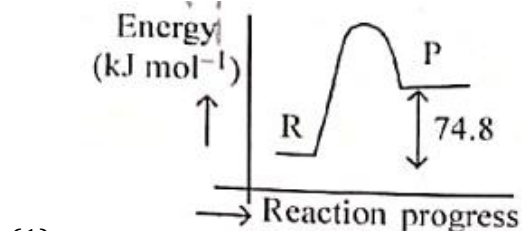
D) $[\text{Ar}] 3d^{10} 4s^1 \rightarrow$ d-block
 [Copper]

E) $[\text{Rn}] 5f^0 6d^2 7s^2 \rightarrow$ f/d block.

\therefore A & C are main group elements.

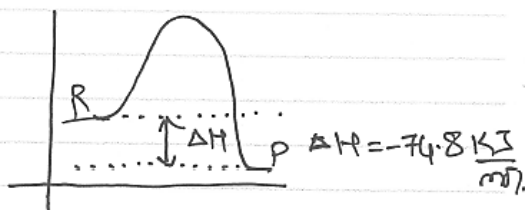


Which of the following diagrams gives an accurate representation of the above reaction? [R \rightarrow reactants; P \rightarrow products]

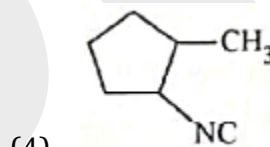
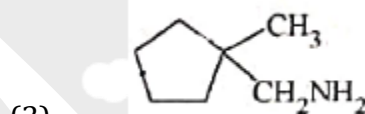
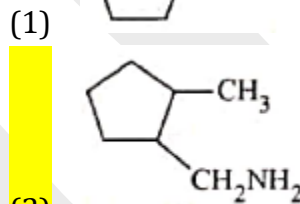
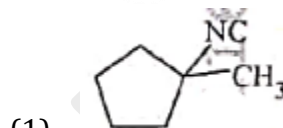
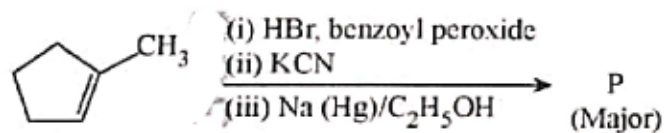


Sol:

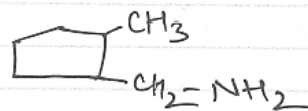
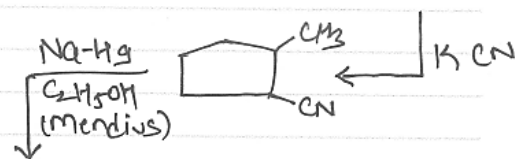
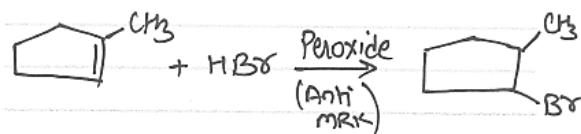
$\because \Delta H = -74.8 \text{ kJ mol}^{-1}$
Reaction is Exothermic



86. Predict the major product 'P' in the following sequence of reactions -



Sol:



87. Identify the correct orders against the property mentioned

- A. $H_2O > NH_3 > CHCl_3$ - dipole moment
- B. $XeF_4 > XeO_3 > XeF_2$ - number of lone pairs on central atom
- C. $O-H > C-H > N-O$ - bond length
- D. $N_2 > O_2 > H_2$ - bond enthalpy

Choose the correct answer from the options given below:

- (1) B, C only (2) A, D only
- (3) B, D only (4) A, C only

Sol:

a) $H_2O > NH_3 > CHCl_3$ is correct

b) XeF_2 has highest lone pair. \therefore it is incorrect.

c) $O-H \rightarrow 96 \text{ pm}$
 $C-H \rightarrow 107 \text{ pm}$ \therefore N-O is largest.
 $N-O \rightarrow 136 \text{ pm}$
 \therefore it is incorrect.

d) $N_2 > O_2 > H_2$ - Bond Enthalpy
 $N \equiv N > O=O > H-H$ is correct

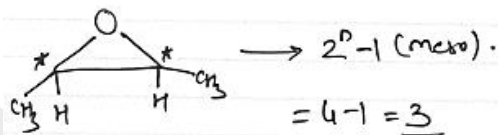
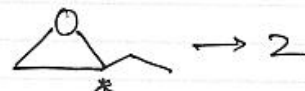
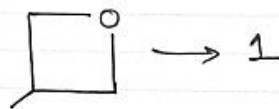
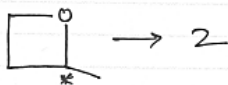
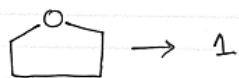
\therefore a & d are correct.

88. Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula C_4H_8O is:

- (1) 11 (2) 6
- (3) 8 (4) 10

Sol:

$C_4H_8O \rightarrow$ Cyclic Ether



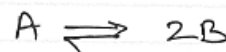
\therefore Total 10 isomers are possible

89. For the reaction $A(g) \rightleftharpoons 2B(g)$, the backward reaction rate constant is higher than the forward reaction rate constant by a factor of 2500, at 1000 K.

[Given: $R = 0.0831 \text{ L atm mol}^{-1} \text{ K}^{-1}$] K_p for the reaction at 1000 K is

- (1) 0.021 (2) 83.1
- (3) 2.077×10^5 (4) 0.033

Sol:



$$K_b = 2500 K_f \quad @ T = 1000 \text{ K}$$

$$K_c = \frac{K_f}{K_b} = \frac{1}{2500} \quad K_p = ?$$

$$K_p = K_c (RT)^{\Delta n}$$

$$\Delta n = \sum n_p - \sum n_r$$

$$= 2 - 1 = 1$$

$$\therefore K_p = K_c \times R \times T$$

$$= \frac{1 \times 0.0831 \times 1000}{2500}$$

$$= \frac{0.831}{25} = \frac{0.831 \times 4}{100}$$

$$\therefore K_p = 0.03324$$

90. 5 moles of liquid X and 10 moles of liquid Y make a solution having a vapour pressure of 70 torr. The vapour pressures of pure X and Y are 63 torr and 78 torr respectively. Which of the following is true regarding the described solution?

- (1) The solution has volume greater than the sum of individual volumes
- (2) The solution shows positive deviation.
- (3) The solution shows negative deviation.
- (4) The solution is ideal.

Sol:

$$n_x = 5 \text{ moles} \quad P_x^\circ = 63 \text{ torr}$$

$$n_y = 10 \text{ moles} \quad P_y^\circ = 78 \text{ torr}$$

$$(P_T)_{\text{obs}} = 70 \text{ torr}$$

To identify the correct statement we need to calculate P_T .

$$P_T = X_x P_x^\circ + X_y P_y^\circ$$

$$= \frac{5}{15} \times 63 + \frac{10}{15} \times 78$$

$$= 21 + 52$$

$$P_T = 73 \text{ torr}$$

$$(P_T)_{\text{obs}} < (P_T)_{\text{cal}}$$

\therefore Solution is non ideal & shows negative deviation.