

## Question no. 46

If the molar conductivity ( $\Lambda_m$ ) of a  $0.050 \text{ mol L}^{-1}$  solution of a monobasic weak acid is  $90 \text{ S cm}^2 \text{ mol}^{-1}$ , its extent (degree) of dissociation will be

[Assume ( $\Lambda_+^\circ = 349.6 \text{ S cm}^2 \text{ mol}^{-1}$  and  $\Lambda_-^\circ = 50.4 \text{ S cm}^2 \text{ mol}^{-1}$ )]

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

$$\Lambda_m = 90 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\Lambda_m^\circ = 349.6 + 50.4$$

$$= 400 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\alpha = \frac{\Lambda_m}{\Lambda_m^\circ}$$

$$\frac{90}{400} = \underline{0.225}$$

Question no. 47

Given below are two statements:

**Statements I:** A hypothetical diatomic molecule with bond order zero is quite stable. *F*

**Statements II:** As bond order increases, the bond length increases. *F*

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

Chem. bonding

$$B.L. \propto \frac{1}{B.O.}$$

(3)

Question no. 48

$$Z = 1$$

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)  $\frac{1}{9}$

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

$$\frac{1}{\lambda} = RZ^2 \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

$$\frac{\frac{1}{\lambda_1}}{\frac{1}{\lambda_2}} = \frac{R \left( \frac{1}{4} - \frac{1}{9} \right)}{R \left( \frac{1}{16} - \frac{1}{36} \right)}$$

$$\frac{\lambda_2}{\lambda_1} = \frac{5}{4 \times 9} \times \frac{4 \times 36}{16 \times 36} \quad \text{(4)}$$

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

Question no. 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.  $[\text{Cu}(\text{H}_2\text{O})_4]^{2+}$       D.  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$

Choose the correct answer from the options given below:

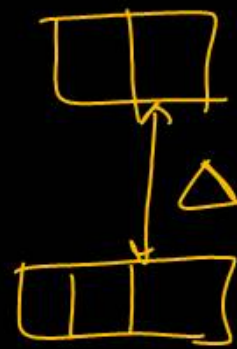
- (1)  $C < A < D < B$       (2)  $B < D < A < C$   
 (3)  $B < A < D < C$       (4)  $C < D < A < B$

3

$$\lambda_{abs} \propto \frac{1}{\text{C.F.S.E}}$$

$$\propto \frac{1}{\text{field str. of ligand}}$$

$$\propto \frac{1}{\text{O.N. of C.M.A}}$$



$$\Delta = E_{abs} = \frac{hc}{\lambda_{abs}}$$

ligand st =  $\text{CN}^- > \text{NH}_3 > \text{H}_2\text{O}$

$$\Delta = B > A > D > C$$

$$\lambda_{abs}: B < A < D < C$$

## Question no. 50

If the rate constant of a reaction is  $0.03 \text{ s}^{-1}$  how much time does it take for  $7.2 \text{ mol L}^{-1}$  concentration of the reactant to get reduced to  $0.9 \text{ mol L}^{-1}$ ?

(Give: L-1)?

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

1st order

$$t_{1/2} = \frac{0.693}{k} = \frac{0.693}{0.03}$$

$$7.2 \xrightarrow{t_{1/2}} 3.6 \xrightarrow{t_{1/2}} 1.8 \xrightarrow{t_{1/2}} 0.9$$

$$t = 3t_{1/2}$$

$$t = 3 \times \frac{0.693}{0.03}$$

$$t = 69.3 \text{ sec}$$

Question no. 51

Match List I with List II

	List I (Mixture)		List I (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-lyc	III.	Fractional distillation
D.	Aniline - water	IV.	Simple distillation

Choose the correct option answer from the options 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

A - IV

B - III

C - I

D - II

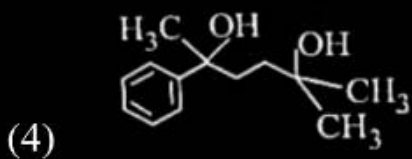
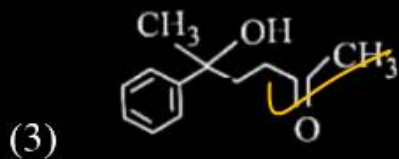
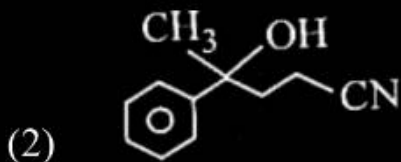
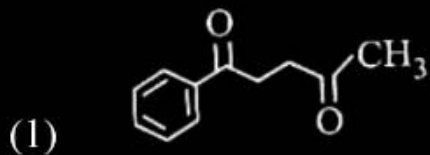
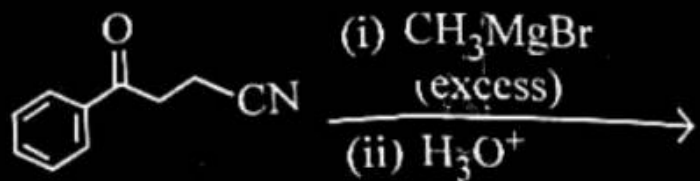
(2)

Basic concept of org. chem.

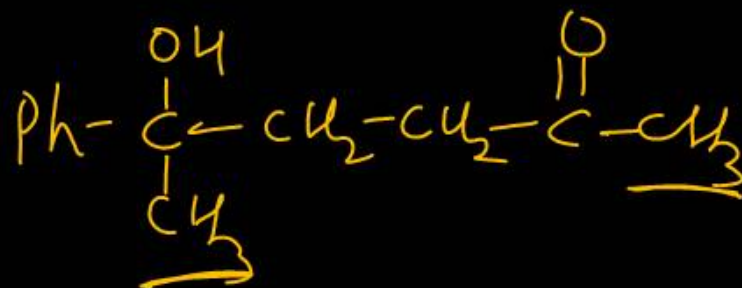
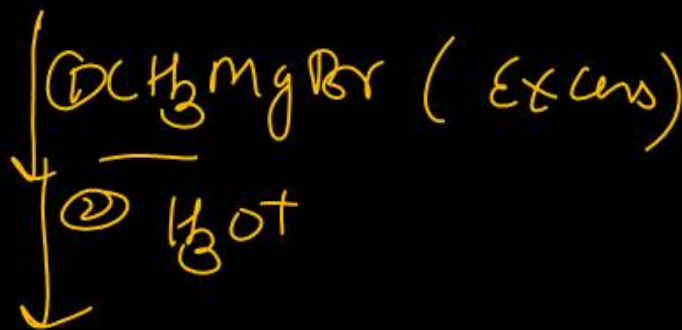
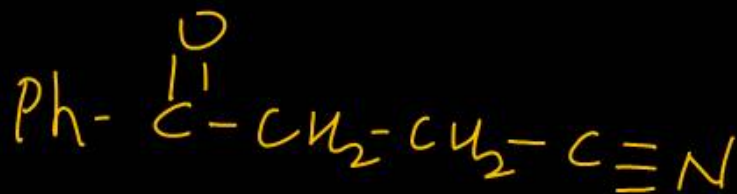
Separation Method

distillation

Question no. 52



(3)

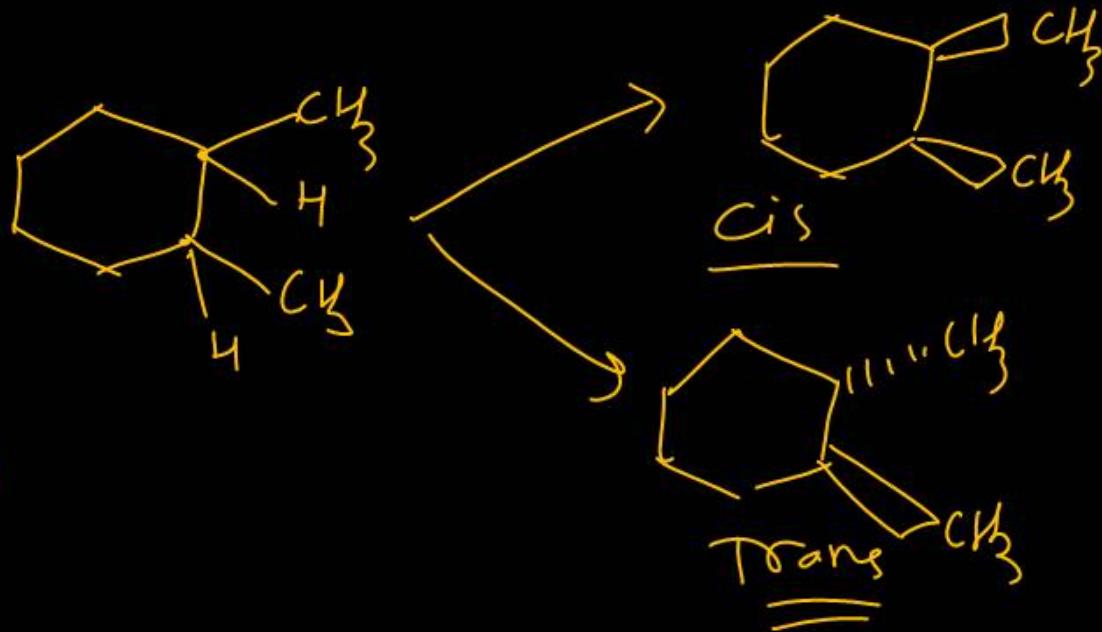


Question no. 53

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

1





Question no. 54

Among the following, choose the the ones with equal number of atoms,

A. 212 g of  $\text{Na}_2\text{CO}_3$  (s) [molar mass = 106 g]

B. 248 g of  $\text{Na}_2\text{O}$  (s) [molar mass = 62 g]

C. 240 g of  $\text{NaOH}$  (s) [molar mass = 40 g]

D. 12 g of  $\text{H}_2$  (g) [molar mass = 2 g]

E. 220 g of  $\text{CO}_2$  (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

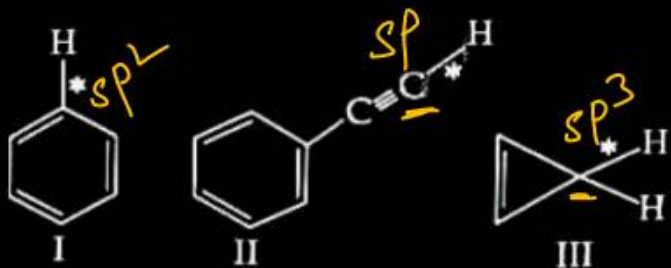
(3) A, B, and D only      (4) B, C, and D only

$$\begin{aligned} \text{mol} &= \frac{212}{106} = 2 \times N_A \times 6 = 12 N_A \text{ atom} \\ \text{mol} &= \frac{248}{62} = 4 \times N_A \times 3 = 12 N_A \text{ atom} \\ \text{mol} &= \frac{240}{40} = 6 \times N_A \times 3 = 18 N_A \text{ atom} \\ \text{mol} &= \frac{12}{2} = 6 \times N_A \times 2 = 12 N_A \text{ atom} \\ \text{mol} &= \frac{220}{44} = 5 \times N_A \times 3 = 15 N_A \text{ atom} \end{aligned}$$

A, B, D Same atom

Question no. 55

Among the given compounds I–III, the correct order of bond dissociation energy of C–bond marked with \* is :



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

C-H Bond diss. energy

B.E  $\propto$  % s-character in Hybrid orbital

$$sp > sp^2 > sp^3$$

$$II > I > III$$

2

Question no. 56

The standard heat of formation, in kcal/mol of  $\text{Ba}^{2+}$  is:

[Given : standard heat of formation of  $\text{SO}_4^{2-}$  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



$$\Delta H_{\text{BaSO}_4(\text{Aq})} = -349 + 4.5$$

$$= -344.5$$

$$-128.5$$

$$-344.5 = -216 + \text{Ba}^{+2}$$

$$-344.5 + 216$$



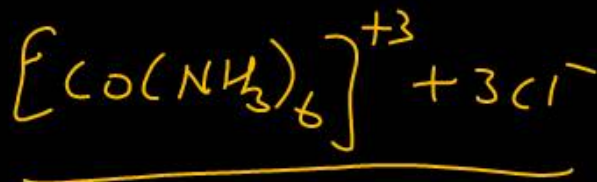
Question no. 58

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



Co-ordination ~~the~~ comp.

No Disso.



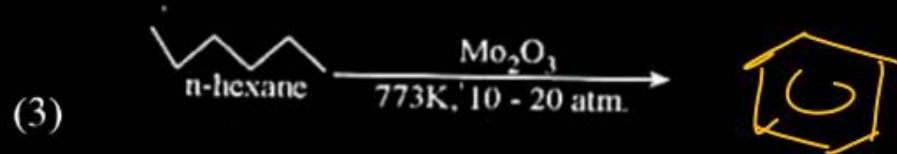
2 ions

No Disso.

Ans: (2,3)

Question no. 59

Which one of the following reactions does NOT give benzene as the product?



Question no. 60

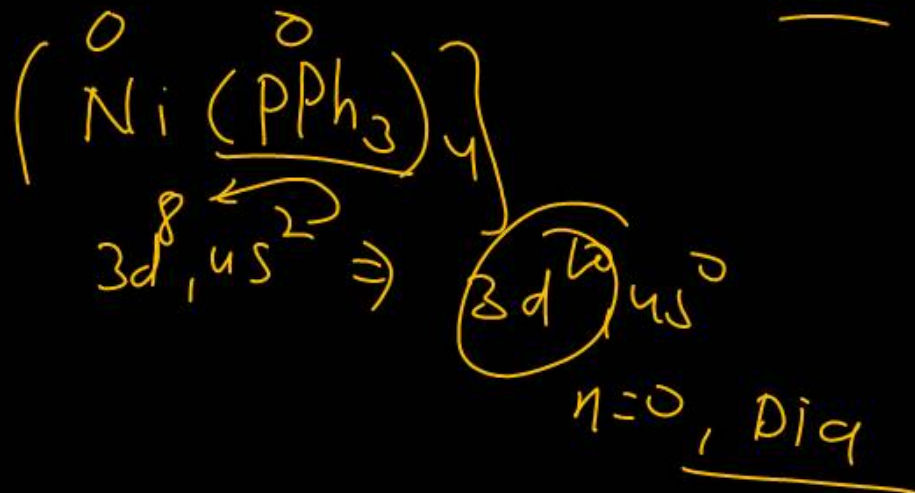
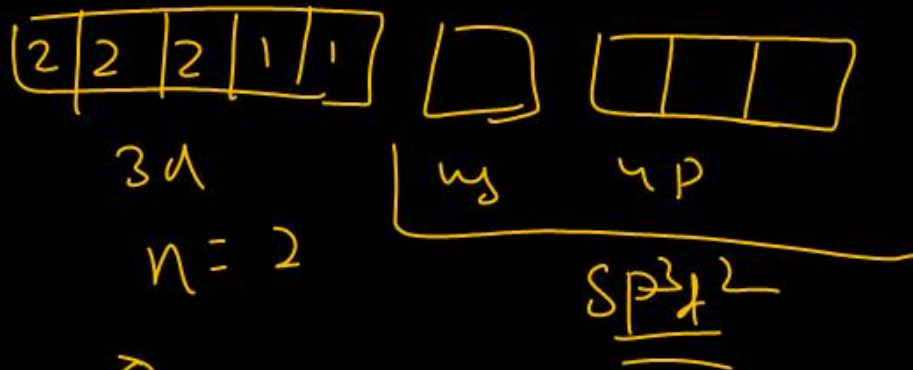
Which of the following are paramagnetic?

- 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

4







Question no. 62

Match List-I with List-II

	List I		List I
A.	Haber process	I.	Fe catalyst
B.	Wacker oxidation	II.	$\text{PdCl}_2$
C.	Wilkinson catalyst	III.	$[(\text{PPh}_3)_3\text{RhCl}]$
D.	Ziegler catalyst	IV.	$\text{TiCl}_4$ with $\text{Cl}(\text{CH}_3)_3$

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~~

Ans: 4

d-block  
Application of d-block element

Question no. 63

Match List-I with List-II

	List I (Name of Vitamin)		List I (Deficiency disease)
A.	Vitamin B <sub>12</sub>	I.	Cheilosis
B.	Vitamin D	II.	Convulsions
C.	Vitamin B <sub>2</sub>	III.	Rickets
D.	Vitamin B <sub>6</sub>	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

A - IV  
B - III  
C - I  
D - II

Ans = 3

Monomolecule  
vitamins  
Table

Question no. 64

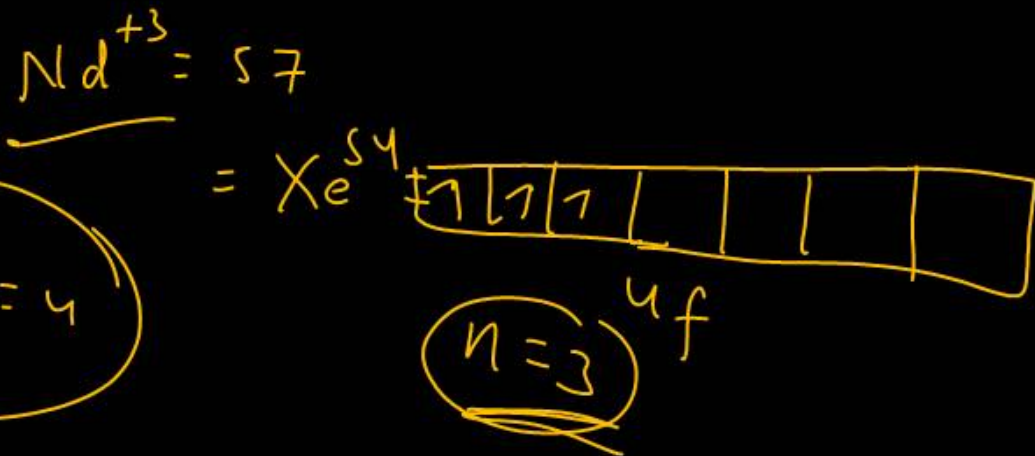
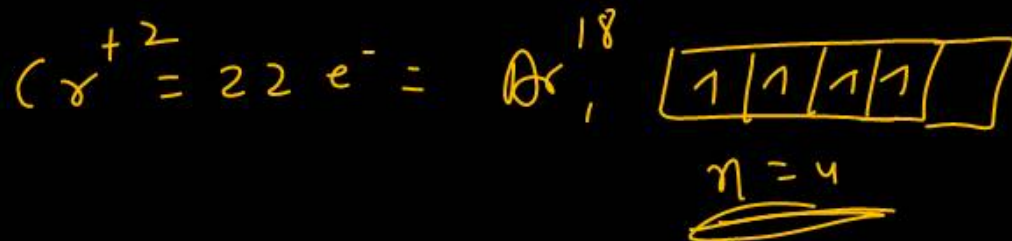
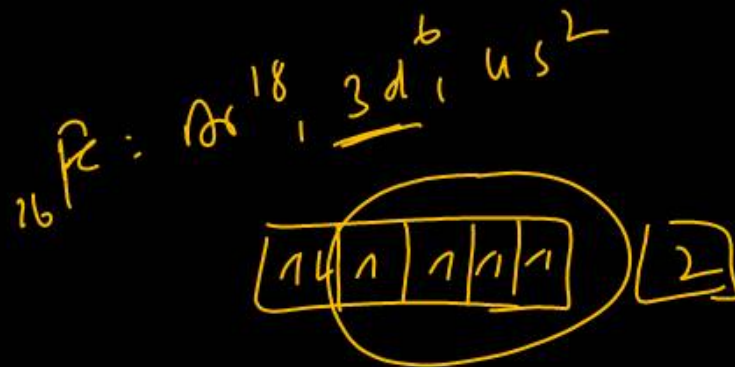
Given below are two statements:

**Statements I:** Ferromagnetism is considered as an extreme form of paramagnetism. True

**Statements II :** The number of unpaired electrons in a  $\text{Cr}^{2+}$  ion ( $Z = 24$ ) is the same as that of a  $\text{Nd}^{3+}$  ion ( $Z = 60$ ). False

In the light of the above statements, choose the most 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



Ans = 4

Question no. 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 closed to:

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

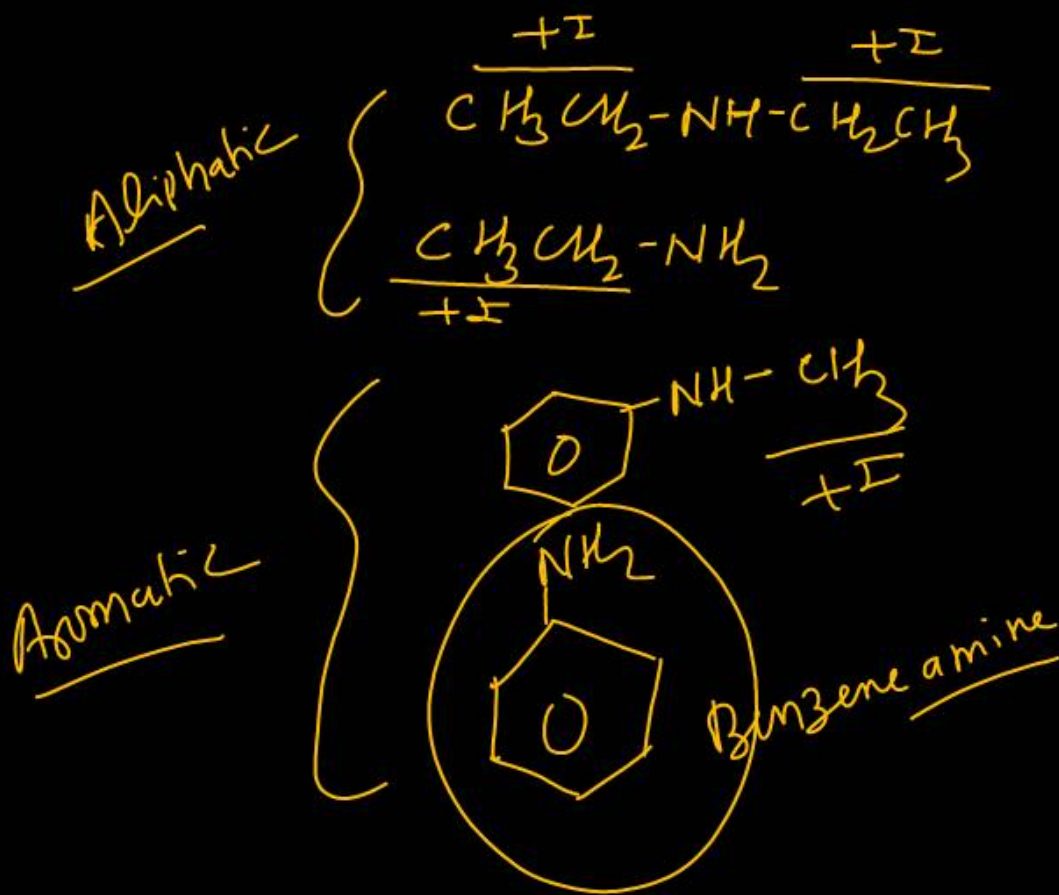
$$t_{99.9\%} = 10 t_{1/2}$$
$$= 10 \times 1$$

$$t_{99.9} = 10 \text{ minutes}$$

Question no. 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-ethylethanamine
- (4) N-ethylethanamine > ethanamine > N-methylaniline > benzenamine



Question no. 67

Match List-I with List-II

	List I (Ion)		List I (Group Number in Cation Analysis)
A.	$\text{Co}^{2+}$	I.	Group - I
B.	$\text{Mg}^{2+}$	II.	Group - III
C.	$\text{Pb}^{2+}$	III.	Group - IV
D.	$\text{Al}^{3+}$	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-III, B-II, C-IV, D-I

A - III  
 B - IV  
 C - I  
 D - II

Ans: 3

Salt analysis

Lub Manual

Table of Benz Radical  
 Wet Test

Question no. 68

Phosphoric acid ionizes in three steps with their ionization constant values

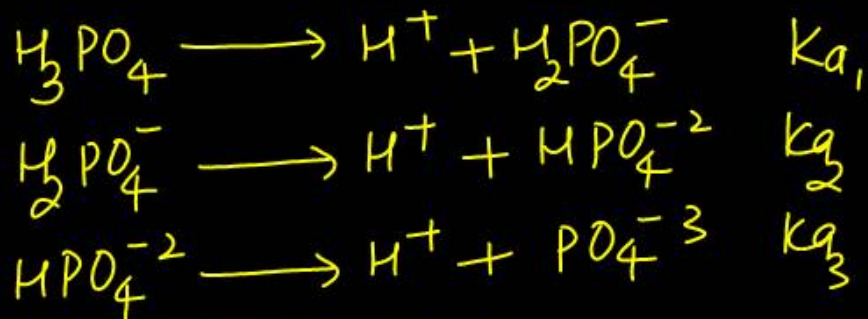
$K_{a1}$ ,  $K_{a2}$  and  $K_{a3}$ , respectively, while  $K$  is the overall ionization constant.

Which of the following statements are true?

- A.  $\log K = \log K_{a1} + \log K_{a2} + \log K_{a3}$  ✓
- B.  $H_3PO_4$  is a stronger acid than  $H_2PO_4^-$  and  $HPO_4^{2-}$  ✓
- C.  $K_{a1} > K_{a2} > K_{a3}$  ✓✓
- D.  $K_{a1} = \frac{K_{a3} + K_{a2}}{2}$  ✗

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



$$K_{a1} > K_{a2} > K_{a3} \quad \checkmark\checkmark$$

$$K_{eq} = K_1 \times K_2 \times K_3$$

$$\log K = \log K_{a1} + \log K_{a2} + \log K_{a3}$$

Question no. 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. X F

B. On Pauling scale, the electronegativity values of N and Cl are not the same. F

E.N. Cl = N = 3

C. Ar,  $K^+$ ,  $Cl^-$ ,  $Ca^{2+}$ , and  $S^{2-}$  are all isoelectronic species. T

→ 18 ele. each

D. The correct order of the first ionization enthalpies of Na, Mg, Al, and Si is  $Si > Al > Mg > Na$ . F



E. The atomic radius of Cs is greater than that of Li and Rb. T

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

Ans = (3)



Question no. 70

Given below are two statements:

**Statements I:** Like nitrogen that can form ammonia, arsenic can form arsine. T

**Statements II :** Antimony cannot form antimony pentoxide. F

In the light of the above statements, choose the most correct 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

4

NITRIT  
P-block

group-15

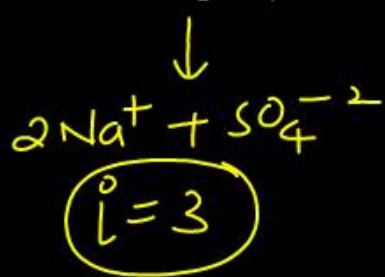
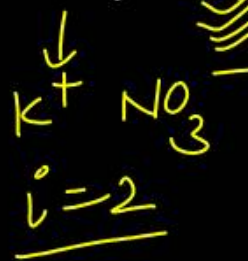
\* Rxn with  $O_2$ :  $\frac{E_{2O_3}, E_2}{E_{2O_5}}$

$NH_3$ ,  $AsH_3$   
↳ Arsene

Question no. 71

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

- (1) 0.015 M  $C_6H_{12}O_6$  (2) 0.01 M-Urea  
(3) 0.01 M  $KNO_3$  (4) 0.01 M  $Na_2SO_4$



$$C_{eff} = C \times i$$

$C_{eff} \text{ Move } \rightarrow C.P. \uparrow$

- ①  $0.015 \times 1 = 0.015$   
②  $0.01 \times 1 = 0.01$   
③  $0.01 \times 2 = 0.02$   
④  $0.01 \times 3 = 0.03$

$C_{eff} \uparrow$   $Na_2SO_4 \uparrow$   $B.P. \uparrow$

Question no. 72

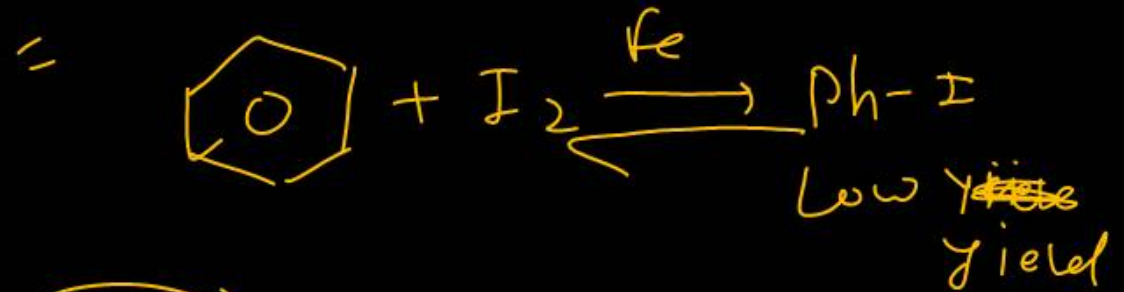
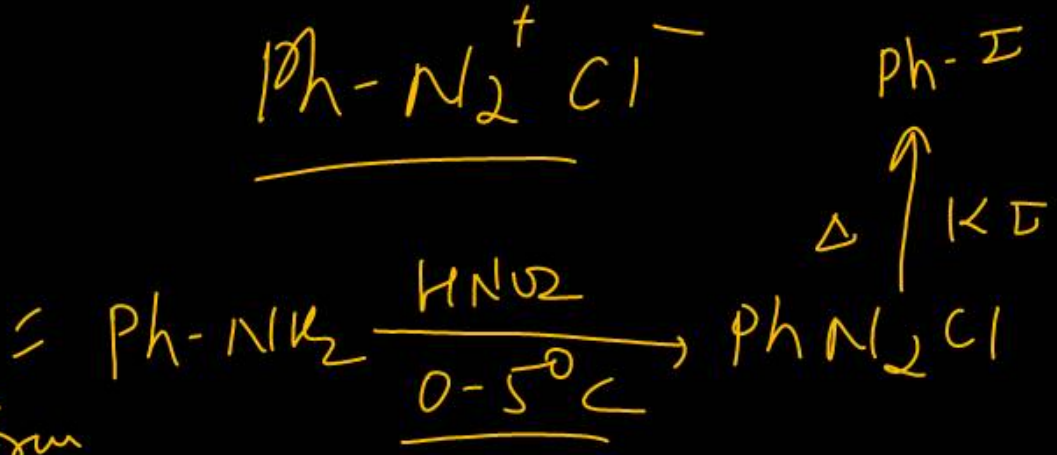
Given below are two statements:

**Statements I:** Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273 – 278 K. It decompose easily in the dry state. True

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

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

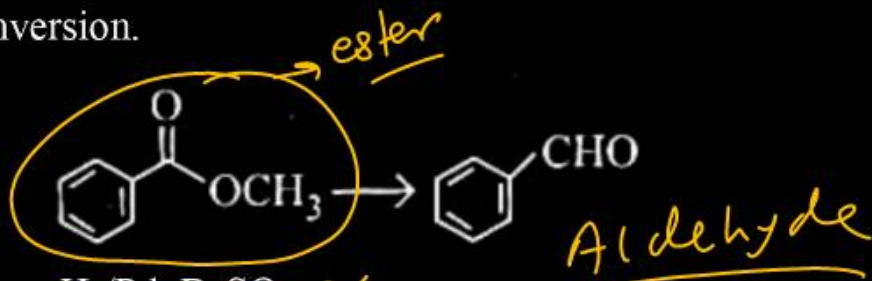
- (1) Statement I is incorrect but Statement II is correct
- (2) Both Statement I and Statement II are correct
- (3) Both Statement I and Statement II are incorrect
- (4) Statement I is correct but Statement II is incorrect



Ans = 2

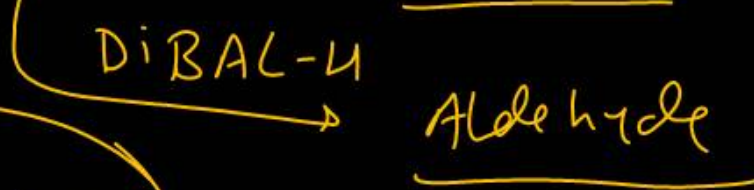
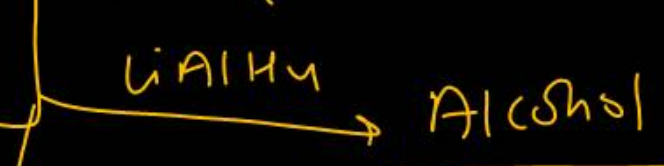
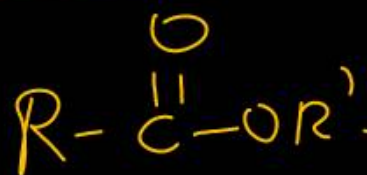
Question no. 73

Identify the suitable reagent for the following conversion.



- (1)  $\text{H}_2/\text{Pd}-\text{BaSO}_4$  X
- (2) (i)  $\text{LiAlH}_4$ , (ii)  $\text{H}^+/\text{H}_2\text{O}$  X
- (3) (i)  $\text{AlH}(\text{iBu})_2$ , (ii)  $\text{H}_2\text{O}$  ✓
- (4) (i)  $\text{NaBH}_4$ , (ii)  $\text{H}^+/\text{H}_2\text{O}$  X

DiBAL-H



Ans: 3

Question no. 74

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

**Assertion (A):** CCCCI undergoes  $S_N2$  reaction faster than CCCCCl.

**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:

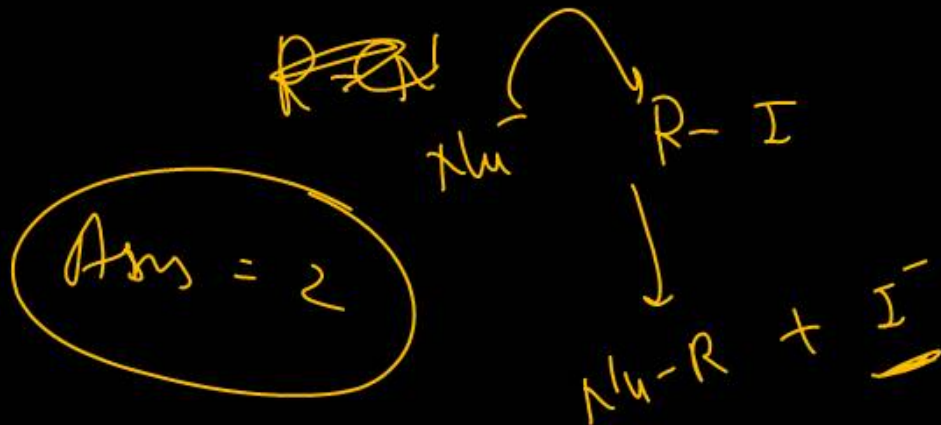
- (1) A is false but R is true
- (2) Both A and R are true and R is the correct explanation of A
- (3) Both A and R are true R is not the correct explanation of A
- (4) A is true but R is false

Rate  $S_N2$



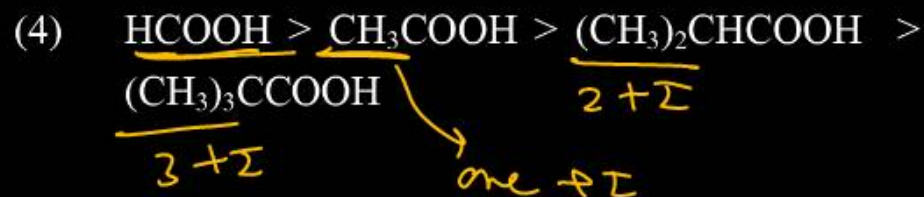
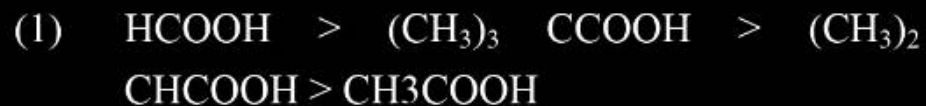
→ better leaving group

True  
True / correct expl. ✓



Question no. 75

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

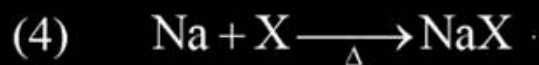
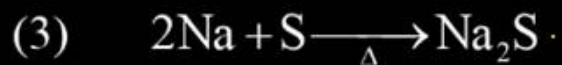
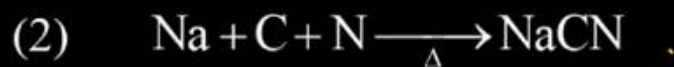


Ans: 4

acidic strength  $\propto$   $\frac{1}{+I \text{ effect}}$

Question no. 76

Which one of the following reactions does **NOT** belong to "Lassaigne's test"?



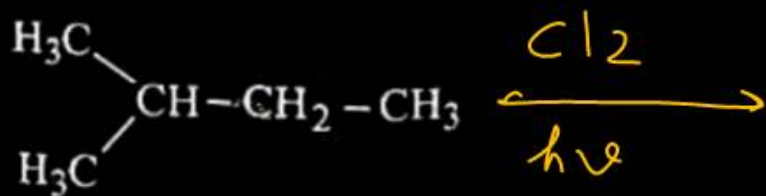
Ans: (1)

Basic principle of  
org. chem.

analysis of element

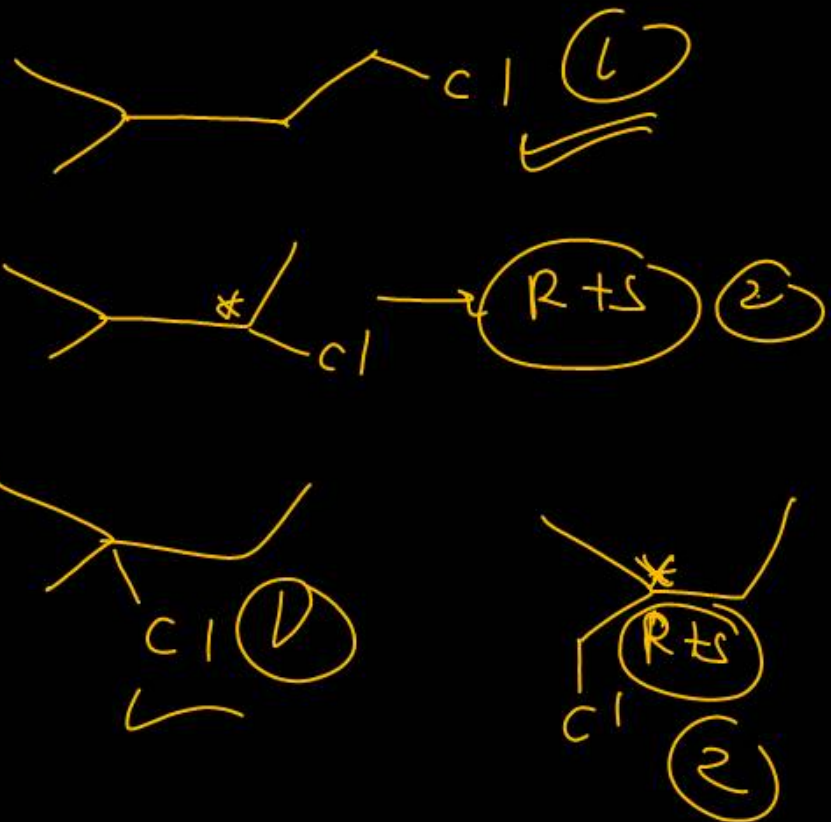
Question no. 77

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



- (1) ✓ 6  
 (3) 3

- (2) 2  
 (4) 5





Sugar 'X'

- A. is found in honey.
- B. is a keto sugar.
- C. exists in  $\alpha$  and  $\beta$  - anomeric forms.
- D. is laevorotatory.

'X' is:

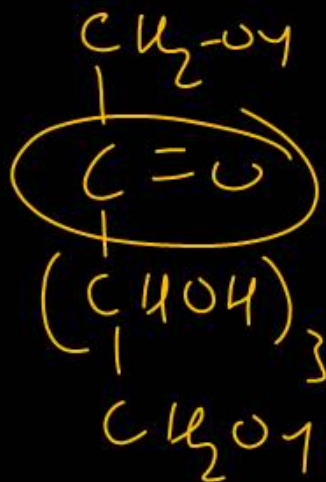
- (1) Sucrose
- (2) D-Glucose
- (3) D-Fructose
- (4) Maltose

Ans: (3)

X Biomolecule  
Carbohydrate  
 structure of fructose

laevo

Ketose



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

Question no. 80

Higher yield of NO in

N<sub>2</sub>(g) + O<sub>2</sub>(g)  $\rightleftharpoons$  2NO(g) can be obtained at

[ $\Delta H$  of the reaction = + 180.7 kJ mol<sup>-1</sup>]

- A. higher temperature ✓
- B. lower temperature ✗
- C. higher concentration of N<sub>2</sub> ✓
- D. higher the concentration of O<sub>2</sub> ✓

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

$\Delta H = +ve$  Endothermic  
favourable  $\rightarrow$  High temp.

A, C, D

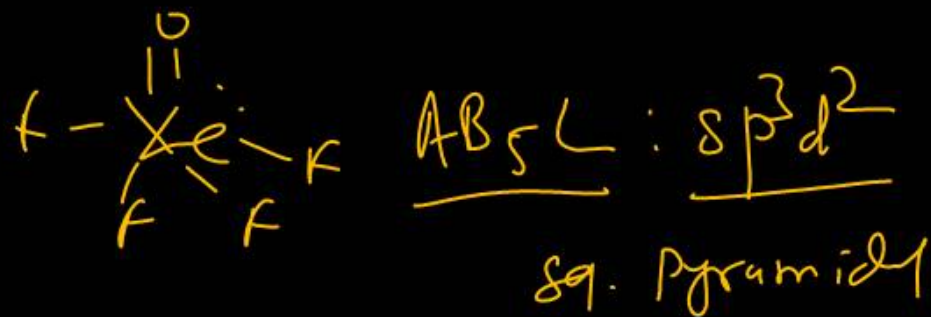
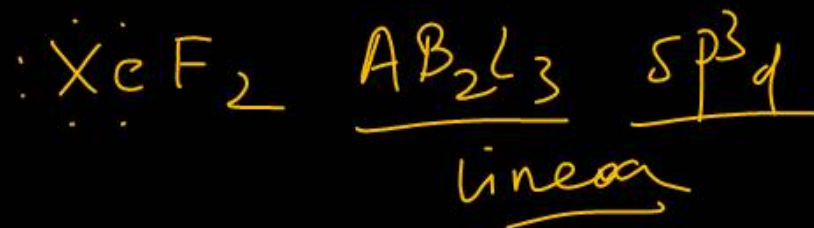
Match List-I with List-II

	List I		List I
A.	<del>XeO<sub>3</sub></del>	<del>I.</del>	<del>sp<sup>3</sup>d; linear</del>
B.	<del>XeF<sub>2</sub></del>	<del>II.</del>	<del>sp<sup>3</sup>; pyramidal</del>
C.	<del>XeOF<sub>4</sub></del>	<del>III.</del>	<del>sp<sup>3</sup>d<sup>3</sup>; distorted octahedral</del>
D.	<del>XeF<sub>6</sub></del>	<del>IV.</del>	<del>sp<sup>3</sup>d<sup>2</sup>; square pyramidal</del>

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

Ans: 2



Question no. 82

Match List-I with List-II

	List I (Example)		List I (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

A - II    B - I    C - IV    D - III

3

Question no. 83

Energy and radius of first Bohr orbit of  $\text{He}^+$  and  $\text{Li}^{2+}$  are

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

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

$r_n(\text{Li}^{2+}) = 17.6 \text{ pm}$

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

$r_n(\text{He}^+) = 17.6 \text{ pm}$

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

$r_n(\text{Li}^{2+}) = 17.6 \text{ pm}$

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

$r_n(\text{He}^+) = 26.4 \text{ pm}$

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

$r_n(\text{Li}^{2+}) = 26.4 \text{ pm}$

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

$r_n(\text{He}^+) = 17.6 \text{ pm}$

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

$r_n(\text{Li}^{2+}) = 17.6 \text{ pm}$

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

$r_n(\text{He}^+) = 26.4 \text{ pm}$

$z=2$   $z=3$

$$r = \frac{0.53 n^2}{z} \text{ \AA}$$

$n=1$

$$E_n = \frac{-2.18 \times 10^{-18} \text{ J} \cdot z^2}{n^2}$$

J/atom

$$r_{\text{He}^+} = \frac{0.53 \times 1^2}{2} = 0.264 \text{ \AA}$$

$$= 26.4 \text{ pm}$$

$$r_{\text{Li}^{2+}} = \frac{0.53 \times 1^2}{3} = 0.176 \text{ \AA} = 17.6 \text{ pm}$$

$$E_n(\text{He}^+) = \frac{-2.18 \times 10^{-18} \times (4)}{1} = -8.72 \times 10^{-18} \text{ J}$$

$$E_n(\text{Li}^{2+}) = \frac{-2.18 \times 10^{-18} \times (9)}{1} = -19.62 \times 10^{-18} \text{ J}$$

Question no. 84

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

- A.  $[\text{Ne}]3s^1 \rightarrow s$       B.  $[\text{Ar}]3d^34s^2 \rightarrow d$   
C.  $[\text{Kr}]4d^{10}5s^25p^5 \rightarrow p$       D.  $[\text{Ar}]3d^{10}4s^1 \rightarrow d\text{-block}$   
E.  $[\text{Rn}]5f^06d^27s^2 \rightarrow d$

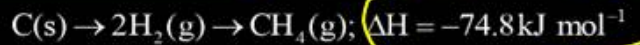
Choose the correct answer from the option given below:

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

3

Main block element  
 $= (s + p)$  block

**Question no. 85**



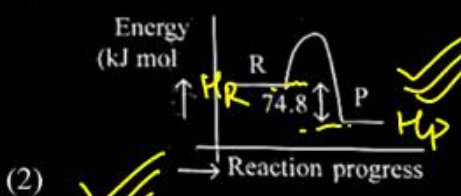
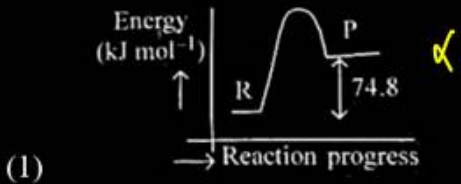
Which of the following diagram gives an accurate representation of the above reaction?

[R → reactants; P → products]

$\Delta H = -ve \rightarrow \text{Exothermic}$

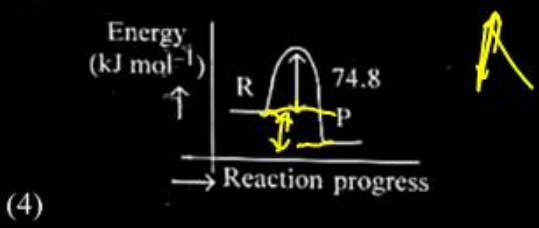
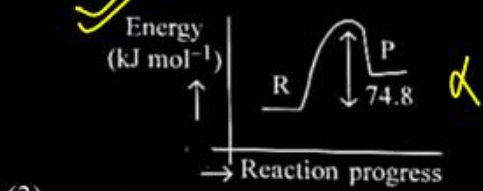
$H_R > H_P$

$\Delta H = H_P - H_R$



$\Delta H = H_P - H_R = -ve$

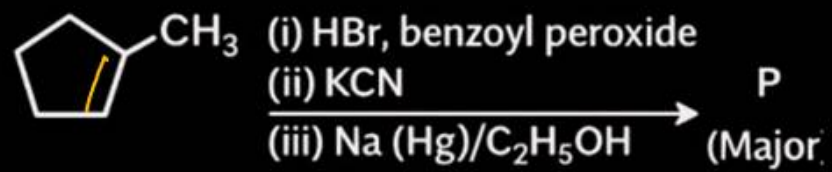
(2) option correct

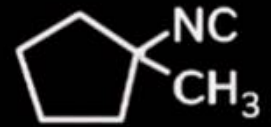
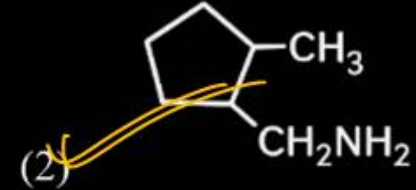
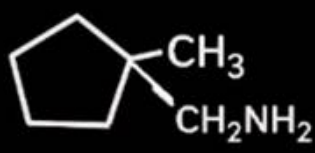
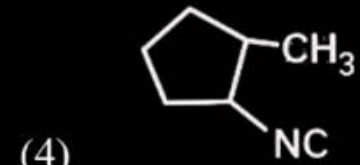


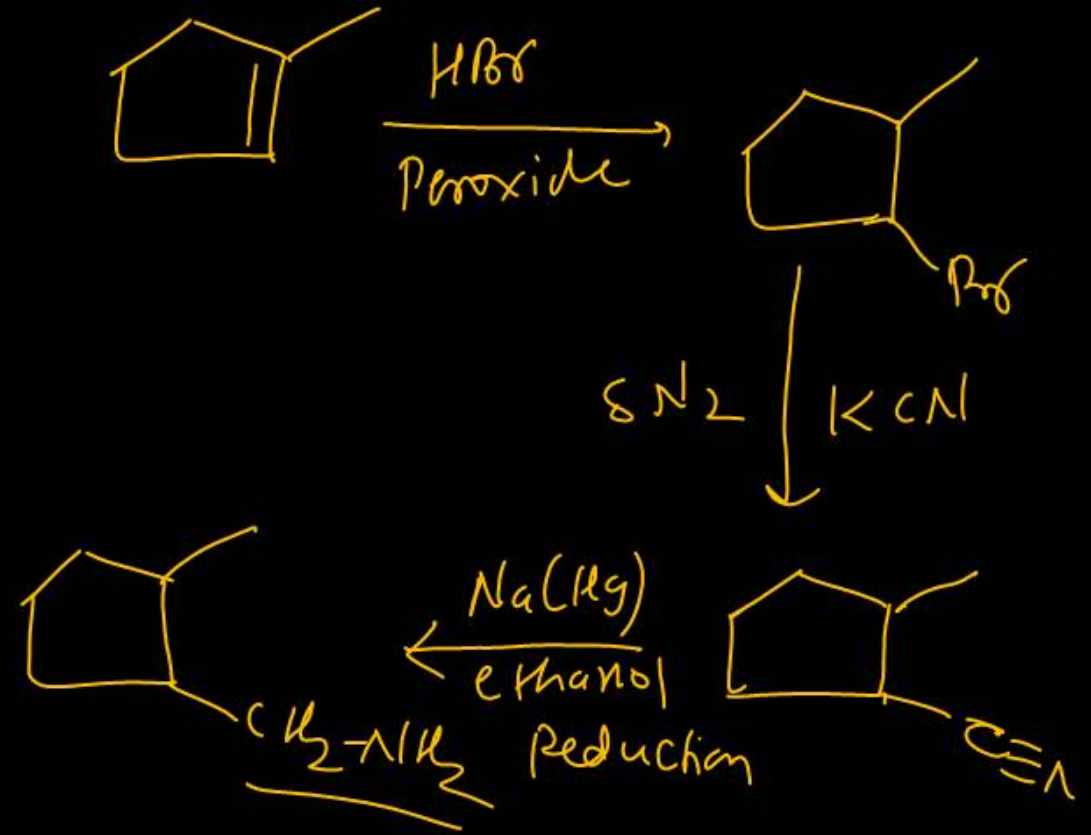


Question no. 86

Predict the major product 'P' in the following sequence of reactions –



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



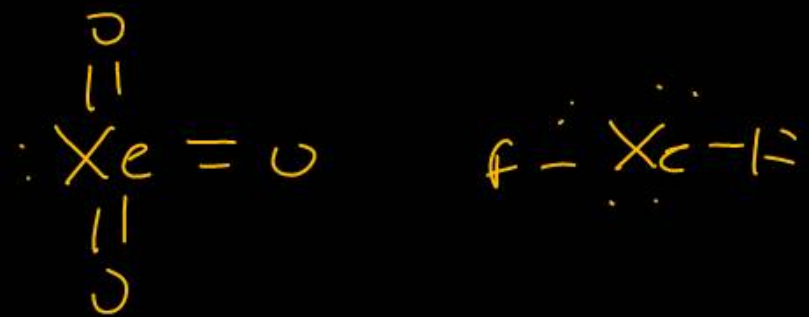
Question no. 87

Identify the correct orders against the property mentioned:

- A.  $\text{H}_2\text{O} > \text{NH}_3 > \text{CHCl}_3$  – dipole moment **T**
- B.  $\text{XeF}_4 > \text{XeO}_3 > \text{XeF}_2$  – number of lone pairs on central atom **F**
- C.  $\text{O-H} > \text{C-H} > \text{N-O}$  – bond length **F**
- D.  $\text{N}_2 > \text{O}_2 > \text{H}_2$  – bond enthalpy **T**

Choose the correct answer from the options given below:

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



Size  $\text{N, O, C} \gg \underline{\text{H}}$

Bond length  $\propto$  size of atom

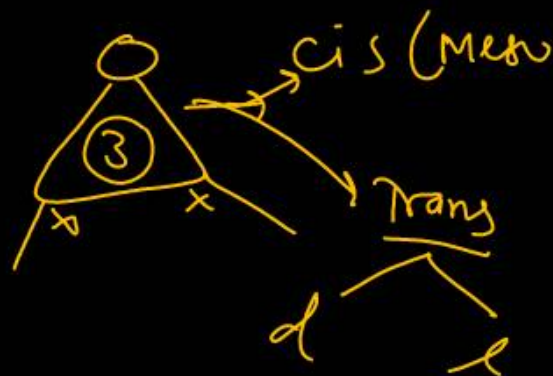
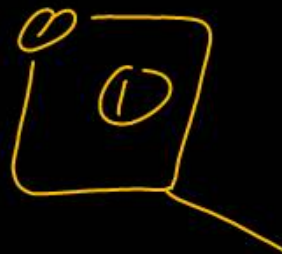
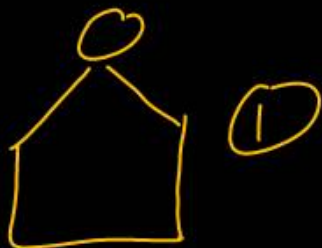
B.O  
 $\text{N}_2 = 3$   
 $\text{O}_2 = 2$   
 $\text{H}_2 = 1$

Question no. 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

$$\frac{C_4H_8O}{D.O.U. = 1}$$



10

## Question no. 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)  $2.077 \times 10^{-5}$         (4) 0.033

$$K_c = \frac{k_f}{k_b} = \frac{k_f}{2500k_f}$$

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

$$\Delta n_g = 2 - 1 = 1$$

$$K_p = \frac{k_f}{2500k_f} \times (0.0831 \times 1000)$$

$$= \frac{1}{2500} \times 83.1$$

$$K_p = 0.033$$

Question no. 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

$$P_s = P_A^0 X_A + P_B^0 X_B$$

$$P_s = 63 \times \frac{5}{15} + 78 \times \frac{10}{18}$$
$$= 21 + 52$$

$$P_s = 73$$

$$(P_s)_{\text{results}} > (P_s)_{\text{given}}$$

-ve deviation