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

[Assume $\Lambda^0_+ = 349.6$ S cm^2 mol^{-1} and $\Lambda^0_- = 50.4$ S cm^2 mol^{-1}]

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

Ans. (4)

Sol. $(\Lambda_M^\infty) = (\Lambda_M^\infty)_+ + (\Lambda_M^\infty)_-$

$= 349.6 + 50.4 = 400$

$$\alpha = \frac{\lambda_m^C}{\lambda_m^\infty} = \frac{90}{400} = 0.225$$

47. Given below are two statements :

Statement-I : A hypothetical diatomic molecule with bod 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

Ans. (3)

Sol. Bond order = 0 (molecule does not exist) $\Rightarrow$ unstable

B.O $\propto$ B.E. $\propto$ 1/B.L.

$\rightarrow$ As bond order $\uparrow$ bond length $\downarrow$

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

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

Ans. (1)

Sol. $\frac{\lambda_I}{\lambda_{II}} = \frac{\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)_{II}}{\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)_{I}} = \frac{\frac{1}{(4)^2} - \frac{1}{(6)^2}}{\frac{1}{(2)^2} - \frac{1}{(3)^2}} = \frac{1}{4}$

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

A. $[Co(NH_3)_6]^{3+}$ B. $[Co(CN)_6]^{3-}$

C. $[Cu(H_2O)_4]^{2+}$ D. $[Ti(H_2O)_6]^{3+}$

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

Ans. (3)

Sol. (C) $[Cu(H_2O)_4]^{+2} \Rightarrow Cu^{+2} \Rightarrow$ Tetrahedral

$\boxed{CFSE \propto \frac{1}{\lambda}}$ CFSE less so $\lambda \uparrow$

So 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) 21.0 s (2) 69.3 s (3) 23.1 s (4) 210 s

Ans. (2)

Sol. $K = 0.03\ sec^{-1}$

$K = \frac{2.303}{t} \log \frac{C_0}{C_t}$

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

$t = \frac{2.303}{0.03} \log 8 = \frac{2.303}{0.03} \times 3 \times 0.3 = 69.3\ sec.$

51. Match **List-I** with **List-II** -

List-I **(Mixture)**	**List-II** **(Method of separation)**
A. $CHCl_3 + C_6H_5NH_2$	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 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

Ans. (2)

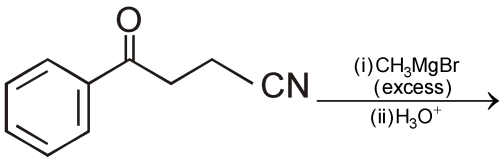
Sol. $CHCl_3 + C_6H_5NH_2$ $\Rightarrow$ Simple distillation

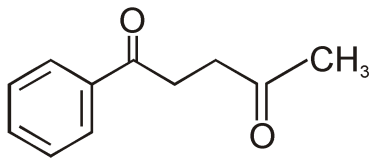
Crude oil in petroleum industry $\Rightarrow$ Fractional distillation

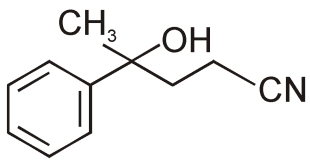
Glycerol from spent-lye $\Rightarrow$ Distillation under reduced pressure

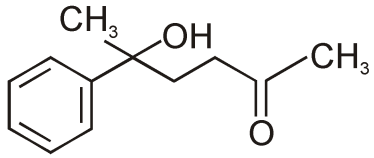
Aniline - water $\Rightarrow$ Steam distillation

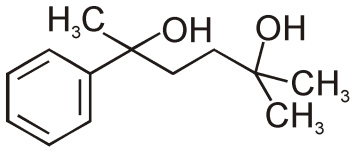
52. The major product of the following reaction is :



(1) 

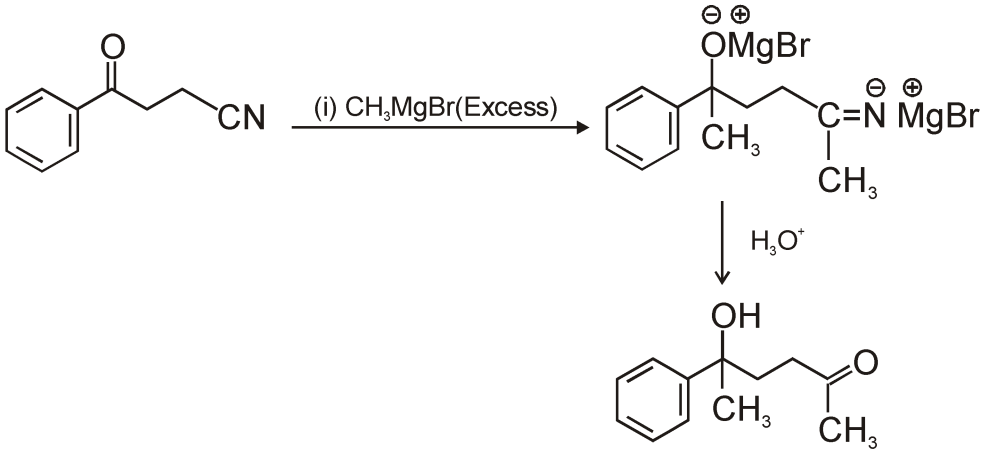
(2) 

(3) 

(4) 

Ans. (3)

Sol.



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

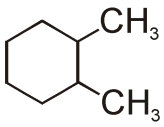
(1) 1,2-Dimethylcyclohexane

(2) Pent-1-ene

(3) 2-Methylhex-2-ene

(4) 1,1-Dimethylcyclopropane

Ans. (1)

Sol. 

1, 2 dimethyl cyclohexane can exist as cis-trans isomer.

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

A. 212 g of Na_2CO_3 (s) [molar mass = 106 g]

B. 248 g of Na_2O (s) [molar mass = 62 g]

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

D. 12 g of H_2(g) [molar mass = 2 g]

E. 220 g of CO_2 (s) [molar mass = 44 g]

(1) B, D and E only

(2) A, B and C only

(3) A, B and D only

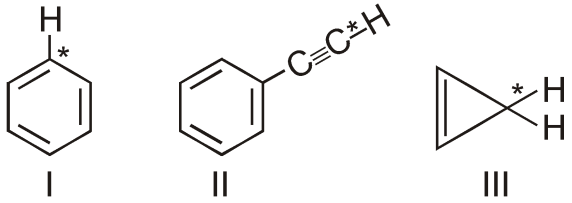
(4) B, C and D only

Ans. (3)

Sol.

Compound	Mole	Atoms
Na_2CO_3	$\frac{212}{106} = 2$	$2N_A \times 6 = 12N_A$
Na_2O	$\frac{248}{62} = 4$	$4N_A \times 3 = 12N_A$
NaOH	$\frac{240}{40} = 6$	$6N_A \times 3 = 18N_A$
H_2	$\frac{12}{2} = 6$	$6N_A \times 2 = 12N_A$
CO_2	$\frac{220}{44} = 5$	$5N_A \times 3 = 15N_A$

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



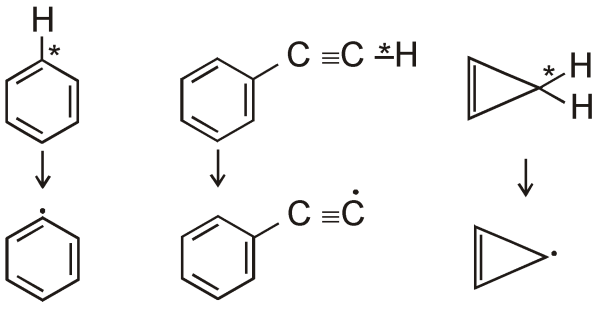
I II III

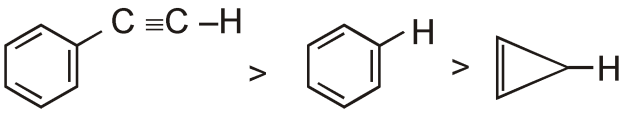
(1) II > III > I (2) II > I > III

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

Ans. (2)

Sol.



B.E. order : 

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 $BaSO_4(s)$ = – 4.5 kcal/ mol,
standard heat of formation of $BaSO_4(s)$ = – 349 kcal/mol]

(1) +220.5 (2) –128.5

(3) – 133.0 (4) +133.0

Ans. (2)

Sol. $BaSO_4(aq) \xrightarrow{-4.5} BaSO_4(s)$ $\Delta_r H = -4.5$

$\Delta_r H = (\Delta H_f)_{BaSO_4(s)} - (\Delta Hf)_{BaSO_4(aq)}$

$-4.5 = -349 - ((\Delta H_f)_{Ba^{+2}} + (\Delta H_f)_{SO_4^{-2}})$

$-344.5 = x + (-216)$

$x = -128.5 = (\Delta H_f)_{Ba^{+2}}$

57. onsider the following compounds :

$\underline{K}O_2$, $H_2\underline{O}_2$ and $H_2\underline{S}O_4$.

The oxidation states of the underlined elements in them are, respectively -

(1) +4, –4 and +6 (2) +1, –1 and +6

(3) +2, –2 and +6 (4) +1, –2 and +4

Ans. (2)

Sol. $\underline{K}O_2$, $H_2\underline{O}_2$ and $H_2\underline{S}O_4$.

+1 –1 +6

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

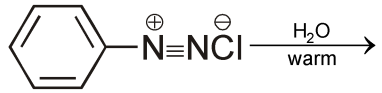
(1) $[Co(NH_3)_5Cl]Cl$ (2) $[Co(NH_3)_3Cl_3]$

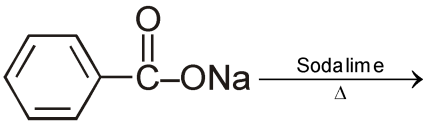
(3) $[Co(NH_3)_4Cl_2]$ (4) $[Co(NH_3)_6]Cl_3$

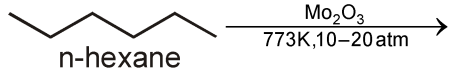
Ans. (2, 3)

Sol. Conductance $\propto$ No of ions

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

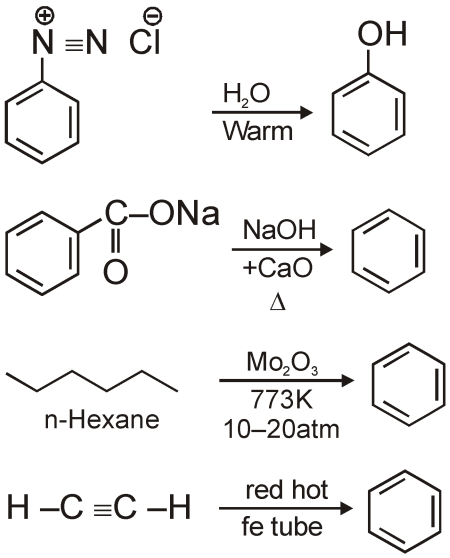
(1) 

(2) 

(3) 

(4) $H-C\equiv C-H \xrightarrow[\text{at 873K}]{\text{Red Hot Iron Tube}}$

Ans. (1)

Sol. 

60. Which of the following are paramagnetic ?

A. $[NiCl_4]^{-2}$

B. $[Ni(CO)_4]$

C. $[Ni(CN)_4]^{-2}$

D. $[Ni(H_2O)_6]^{+2}$

E. $[Ni(PPh_3)_4]$

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

Ans. (4)

Sol. Paramagnetic

(A) $Ni^{+2} \Rightarrow$ unpaired $e^- = 2$

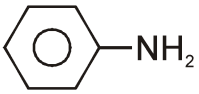
(B) zero unpaired e^-

(C) $Ni^{+2} \Rightarrow CN^- \Rightarrow$ SFL, So zero unpaired e^-

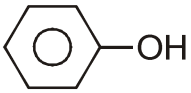
(D) $Ni^{+2} \Rightarrow$ 2 unpaired e^- (H_2O, W.F.L)

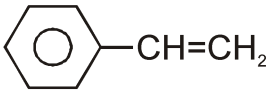
(E) $PPh_3 \Rightarrow$ SFL, So zero unpaired e^-

61. Which of the following compound **does not** decolourize bromine water ?

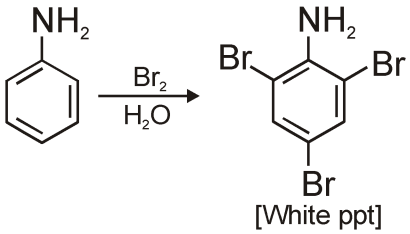
(1) 

(2) 

(3) 

(4) 

Ans. (2)

Sol. 

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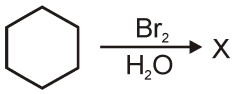
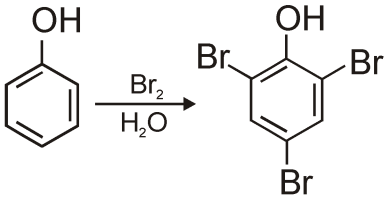
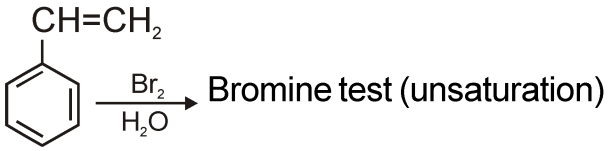




[White ppt]



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. $[(PPh_3)_3RhCl]$
D. Ziegler catalyst	IV. $TiCl_4$ with $Al(CH_3)_3$

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)**

Sol. Haber $\rightarrow$ Fe

Wacker $\rightarrow$ $PdCl_2$

Wilkinson $\rightarrow$ $[PPh_3\ RhCl]$

Ziegler catalyst $\rightarrow$ $TiCl_4$ with $Al(CH_3)_3$

63. Match List-I with List-II -

List-I	**List-II**
(Name of Vitamin)	**(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

Ans. **(3)**

Sol. Vitamin. $B_{12} \rightarrow$ Pernicious anaemia

Vitamin D $\rightarrow$ Rickets

Vitamin $B_2 \rightarrow$ Cheilosis

Vitamin $B_6 \rightarrow$ Convulsions

64. Given below are two statements :

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

Statement-II : The number of unpaired electrons in a Cr^{+2} ion (Z = 24) is the same as that of a Nd^{+3} ion (Z = 60).

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

Ans. (4)

Sol. Statement-I : Ferromagnetism is considerd as an extreme from of paramagnetism.

(NCERT d-block)

Statement-II : $Cr^{+2} \Rightarrow$ 4 unpaired e^-

$Nd^{+3} \Rightarrow$ 3 unpaired e^-

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

Ans. (1)

Sol. $t_{99.9\%} = 10 \times t_{50\%}$

$= 10 \times 1 = 10$ min.

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

(1) Benzenamine > ethanamine > N-methylaniline > N-ethylethanamine

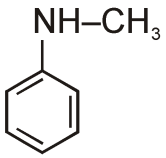
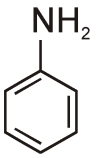
(2) N-methylaniline > Benzenamine > ethanamine > N-ethylethanamine

(3) N-ethylethanamine > ethanamine > Benzenamine > N-methylaniline

(4) N-ethylethanamine > ethanamine > N-methylaniline > Benzenamine

Ans. **(4)**

Sol. N–ethyl ethanamine > Ethanamine > N-Methyl aniline > Benzenamine

$[C_2H_5)_2NH]$ $C_2H_5NH_2$  

67. Match List-I with List-II -

List-I **(Ion)**	**List-II** **(Group number of 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-III, B-II, C-IV, D-I

Ans. **(3)**

Sol. $Co^{+2} \Rightarrow$ group -IV

$Mg^{+2} \Rightarrow$ group -VI

$Pb^{+2} \Rightarrow$ group -I

$Al^{+3} \Rightarrow$ group -III

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. $\log K = \log K_{a_1} + \log K_{a_2} + \log K_{a_3}$

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

Ans. (1)

Sol. H_3PO_4 is polyprotic weak acid

$H_3PO_4 \rightleftharpoons H_2PO_4^- + H^+ ;\ Ka_1$

$H_2PO_4^- \rightleftharpoons HPO_4^{-2} + H^+ ;\ Ka_2$

$HPO_4^{-2} \rightleftharpoons PO_4^{-3} + H^+ ;\ Ka_3$

$Ka_1 > Ka_2 > Ka_3$

$Ka = Ka_1 \times Ka_2 \times Ka_3$

$\log Ka = \log Ka_1 + \log Ka_2 + \log Ka_3$

H_3PO_4 is a acid where as $H_2PO_4^-$ and HPO_4^{2-} are amphoteric species

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^-, Ca^{2+}, and S^{2-} are all soelectronic 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

Ans. (3)

Sol. (A) Ga has law m.p

(B) $N \geq Cl$ (E.N.)

(C) correct

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

(E) size Li < Na < K < Rb < Cs

70. Given below are two statements :

Statement-I : Like nitrogen that can form amonia, 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 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. (4)

Sol. Statement-I : NH_3 is formed & AsH_3 is also formed

Statement-II : Sb_2O_5 is formed

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

(1) 0.015M $C_6H_{12}O_6$ (2) 0.01M Urea

(3) 0.01M KNO_3 (4) 0.01M Na_2SO_4

Ans. (4)

Sol. $\Delta T_b \propto i \times$ conc.

(1) $\Delta T_b \propto 0.01 \times 3$ (2) $\Delta T_b \propto 0.015 \times 1$

(3) $\Delta T_b \propto 0.01 \times 1$ (4) $\Delta T_b \propto 0.01 \times 2$

72. Given below are two statements :

Statement-I : Benzenediazoium salt is prepared by the reaction of aniline with nitrous acid at 273- 278K. 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

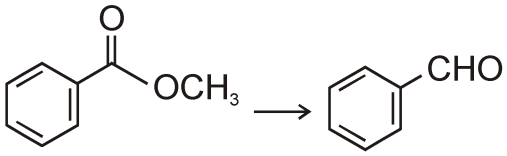
(3) Both Statement I and Statement II are incorrect

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

Ans. (2)

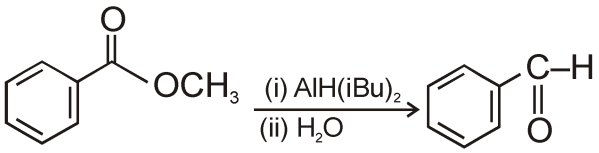
Sol. Both Statement I and Statement II are correct

73. Identify the suitable reagent for the following conversion.



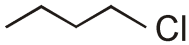
(1) $H_2/Pd\text{-}BaSO_4$
(2) (i) $LiAlH_4$, (ii) H^+/H_2O
(3) (i) $AlH(iBu)_2$ (ii) H_2O
(4) (i) $NaBH_4$, (ii) H^+/H_2O

Ans. **(3)**

Sol. 

DIBAL $\rightarrow AlH(iBu)_2$

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 and R is not the correct explanation of A
(4) A is false but R is false

Ans. **(2)**

Sol. Both A and R are true and R is the correct explanation of A

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) $HCOOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$

Ans. **(4)**

Sol. $HCOOH > CH_3COOH > CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH > CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-COOH$

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

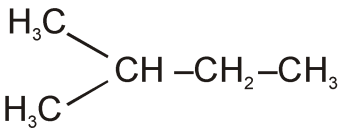
(1) $2CuO + C \xrightarrow{\Delta} 2Cu + CO_2$ (2) $Na + C + N \xrightarrow{\Delta} NaCN$

(3) $2Na + S \xrightarrow{\Delta} Na_2S$ (4) $Na + X \xrightarrow{\Delta} NaX$

Ans. **(1)**

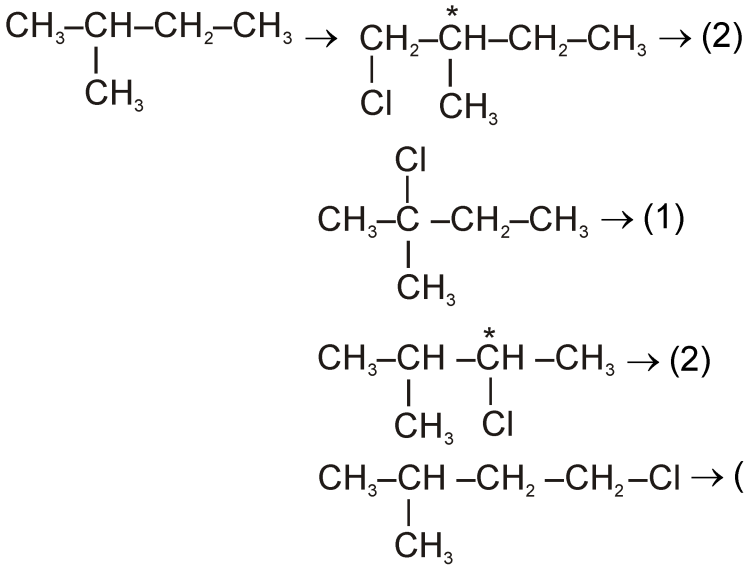
Sol. Lassaigne's test is used to convert : X, N, S in NaX, NaCN and Na_2S

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



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

Ans. **(1)**

Sol. 

Total isomers = 6

78. Sugar 'X"

A. is found in honey.

B. is a keto sugar.

C. exists in α and β -anomeric forms.

D. is laevorotatory.

'X' is :

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

Ans. **(3)**

Sol. 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

Ans. (1)

Sol. Dalton's Atomic theory explain : Law of conservation of mass, Law of constant proportion, Law of multiple proportion

80. Higher yield of NO in

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ can be obtained at [ΔH of the reaction = + 180.7 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

Ans. (1)

Sol. $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ ΔH = +ve

So, high conc. of N_2 and O_2 and high temperature are favourable for higher yield of NO(g)

81. Match List-I with List-II

List-I	**List-II**
A. XeO_3	I. sp^3d; linear
B. XeF_2	II. sp^3; pyramidal
C. $XeOF_4$	III. sp^3d^3; distorted octahedral
D. XeF_6	IV. sp^3d^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

Ans. (2)

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

Ans. **(3)**

Sol.

Humidity	$\Rightarrow$	Liquid in gas
Alloys	$\Rightarrow$	Solid in solid
Amalgams	$\Rightarrow$	Liquid in gas
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) $E_n(Li^{2+}) = -8.72 \times 10^{-16}$J ;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -19.62 \times 10^{-16}$ J;
$r_n(He^+) = 17.6$ pm

(2) $E_n(Li^{2+}) = -19.62 \times 10^{-18}$J ;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -8.72 \times 10^{-18}$ J;
$r_n(He^+) = 26.4$ pm

(3) $E_n(Li^{2+}) = -8.72 \times 10^{-18}$J ;
$r_n(Li^{2+}) = 26.4$ pm
$E_n(He^+) = -19.62 \times 10^{-18}$ J;
$r_n(He^+) = 17.6$ pm

(4) $E_n(Li^{2+}) = -19.62 \times 10^{-16}$J ;
$r_n(Li^{2+}) = 17.6$ pm
$E_n(He^+) = -8.72 \times 10^{-16}$ J;
$r_n(He^+) = 26.4$ pm

Ans. (2)

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

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

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

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

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

A. $[Ne]3s^1$

B. $[Ar]3d^3 4s^2$

C. $[Kr]4d^{10}5s^2 5p^5$

D. $[Ar]3d^{10}4s^1$

E. $[Rn]5f^0 6d^2 7s^2$

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

Ans. (3)

Sol. Main group elements $\Rightarrow$ s & p block elements

(A) $\rightarrow$ s-block

(B) $\rightarrow$ d-block

(C) $\rightarrow$ p-block

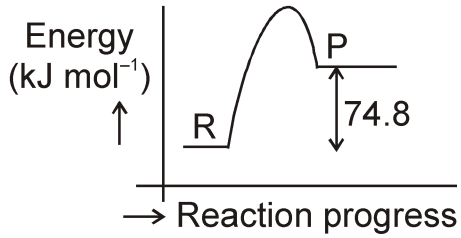
(D) $\rightarrow$ d-block

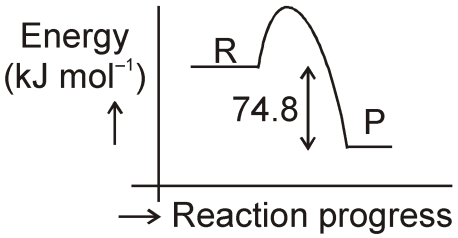
(E) $\rightarrow$ f-block

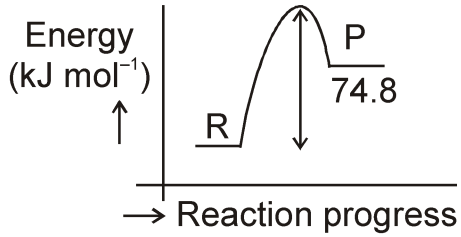
85. $C(s) + 2H_2(g) \rightarrow CH_4(g); \Delta H = -74.8 kJ\ mol^{-1}$

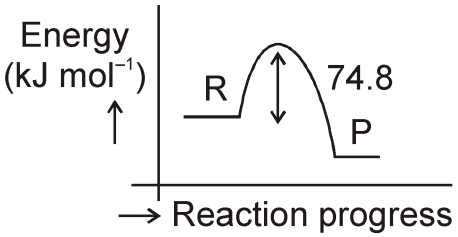
Which of the following diagrams gives an accurate representation of the above reaction?

[R → reactants; P → products]

(1)


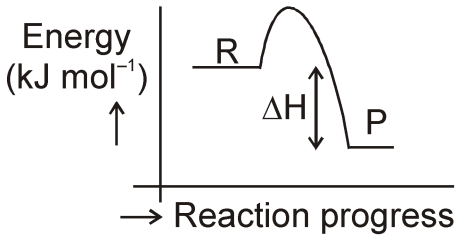
(2)


(3)


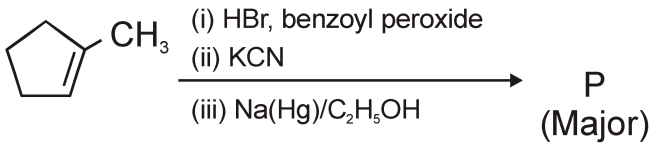
(4)


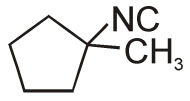
Ans. (2)

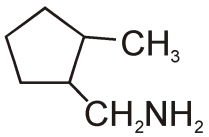
Sol. For exothermic reaction

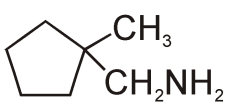


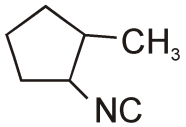
86. Predict the major product 'P' in the following sequence of reactions -



(1)


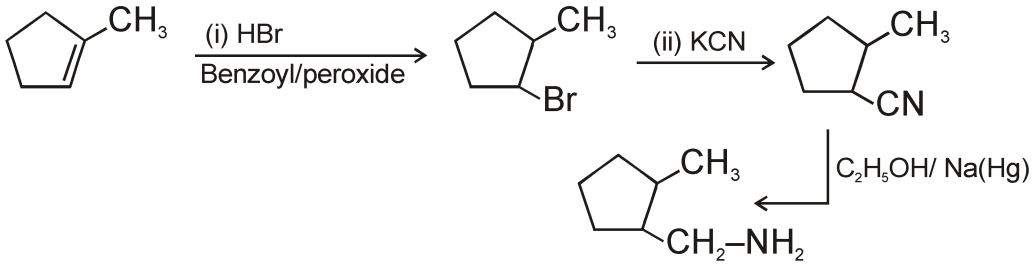
(2)


(3)


(4)


Ans. (2)

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

Ans. (2)

Sol. (A) H_2O $> NH_3$ $> CHCl_3$

(NCERT) 1.85D 1.47D 1.04D

(B) $XeF_2 \Rightarrow$ 3 L.P, $XeF_4 \Rightarrow$ 2 L.P, $XeO_3 \Rightarrow$ 1 L.P

(C) N–O > C–H > O –H (B.L)

(D) $N_2 > O_2 > H_2$ (B.E)

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

Ans. (4)

Sol. M.F. $C_4H_8O \rightarrow$ Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers are 10.

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 L atm $mol^{-1}K^{-1}$]

K_p for the reaction at 1000 K is

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

Ans. (4)

Sol. $K_C = \frac{K_f}{K_b} = \frac{1}{2500}$

$K_P = K_C (RT)^{\Delta ng}$

$= \frac{1}{2500} (0.083 \times 1000) = 0.033$

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 respecitively. 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.

Ans. (3)

Sol. $P_S = P_A^0 X_A + P_B^0 X_B \quad P_A^0 = 63\,\text{torr}, \; P_B^0 = 78\,\text{torr}$

$= 63 \times \frac{5}{15} + 78 \times \frac{10}{15} = 73$ torr

$P_{obs} = 70$ torr

$P_{obs} < P_{theo} \Rightarrow$ so The solution shows negative deviation.