NEET 2021 Question paper & Solutions PDF by Embibe
Chemistry (Code -M5)

51. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are :

(A) 8,4

(B) 6,12

(C) 2,1

(D) 12,6

Correct Answer (D)

In HCP Structure,

$Z = 6$

Tetrahedral voids = 12

octahedral voids = 06

Hence, the correct answer is (D)

52. $\mathrm{Zr}(Z \approx 40)$ and $\mathrm{Hf}\,(Z = 72)$ have similar atomic and ionic radii because of :

(A) belonging to same group

(B) diagonal relationship

(C) lanthanoid contraction

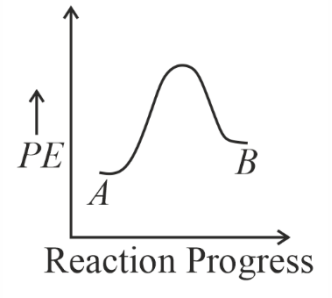
(D) having similar chemical properties

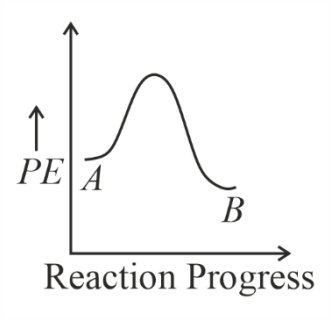
Correct option (C)

$Zr(40)$ and Hf (72) have similar atomic and ionic radii because of Lanthanoid Contraction. The $4f$ orbital offers very poor screening. So, the radius (atomic as well as Ionic) of Zr and Hf are almost the same.

53. For a reaction $\mathrm{A} \rightarrow \mathrm{B}$, enthalpy of reaction is $-4.2\mathrm{kJmol}^{-1}$ and enthalpy of activation is $9.6\,\mathrm{kJ\,mol}^{-1}$. The correct potential energy profile for the reaction is shown in the option.

(A)





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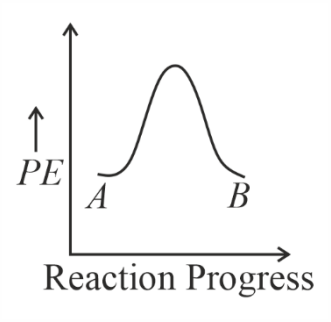
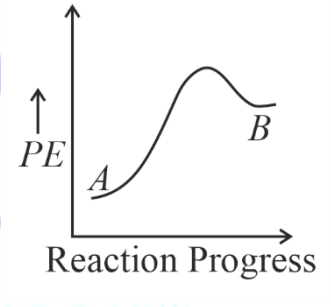


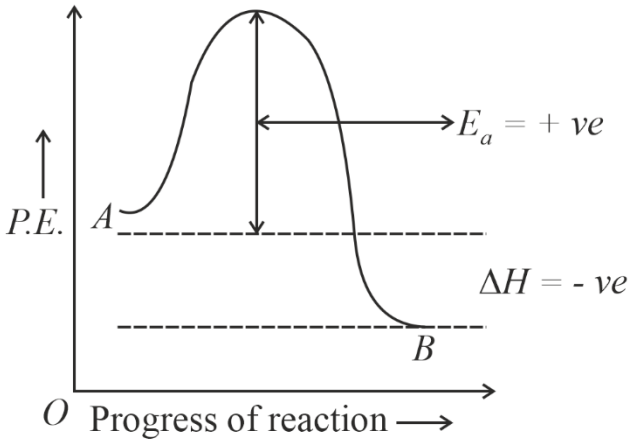
(C)



(D)

Correct option (B)

Only option (B) is exothermic. Rest all options are endothermic.



54. Tritium, a radioactive isotope of hydrogen, emits which of the following particles?

(A) Beta (β^-)

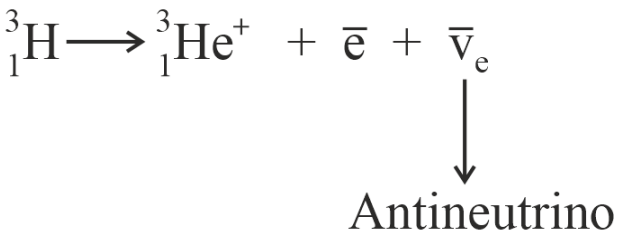
(B) Alpha (α)

(C) Gamma (γ)

(D) Neutron (n)

Correct option (A)

$Tritium$ decays to $^{3}_{2}He^{+}$ by β^-decay.



55. The RBC deficiency is deficiency disease of :

(A) Vitamin B_{12}.

(B) Vitamin B_6

(C) Vitamin B_1

(D) Vitamin B_2

Correct option (A)

RBC deficiency is because of deficiency of vitamin B_{12}.

56. The molar conductance of $NaCl, HCl$ and CH_3COONa at infinite dilution are $126.45, 426.16$ and $91.0\,S\,cm^2\,mol^{-1}$ respectively. The molar conductance of CH_3COOH at infinite dilution is. Choose the right option for your answer.

(A) $201.28\,S\,cm^2\,mol^{-1}$

(B) $390.71\,S\,cm^2\,mol^{-1}$

(C) $698.28 \mathrm{S cm^2\ mol^{-1}}$

(D) $540.48 \mathrm{S cm^2\ mol^{-1}}$

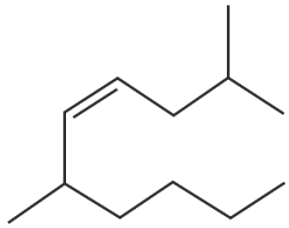
Correct option (B)

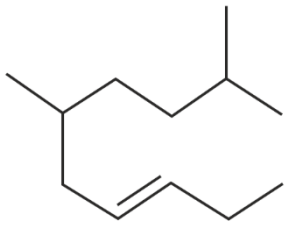
$\Lambda_m^\infty(CH_3COOH) = \Lambda_m^\infty(CH_3COONa) + \Lambda_m^\infty(HCl) - \Lambda_m^\infty(NaCl)$

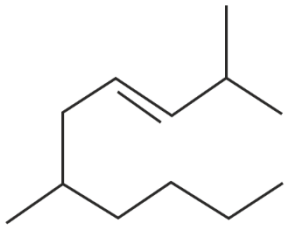
$= 91 + 426.16 - 126.45$

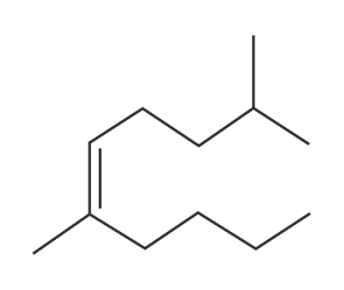
$= 390.71\ S\ cm^2\ mole^{-1}$

57. The correct structure of 2,6 - Dimethyl-dec-4-ene is:

(A) 

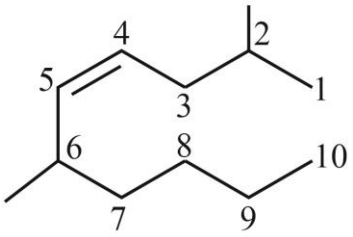
(B) 

(C) 

(D) 

Correct Option (A)

Solution:



2, 6 - Dimethyl - dec - 4 - ene

58. The maximum temperature that can be achieved in blast furnace is :

(A) upto $1200\,\mathrm{K}$

(B) upto $2200\,\mathrm{K}$

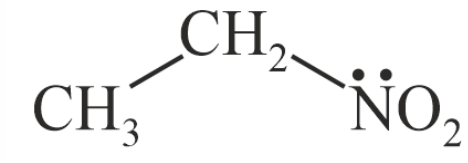
(C) upto $1900\,\mathrm{K}$

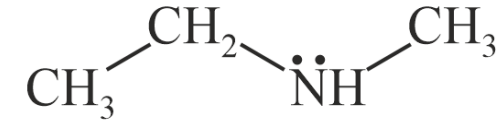
(D) upto $5000\,\mathrm{K}$

Correct option (B)

Furnace can ashine a maximum temperature of around $2200\ K$.

59. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali.

(A) 

(B) 

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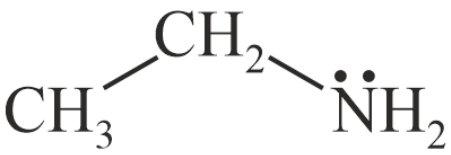
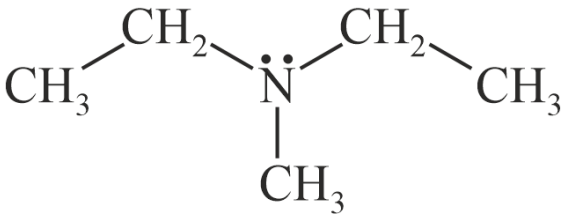


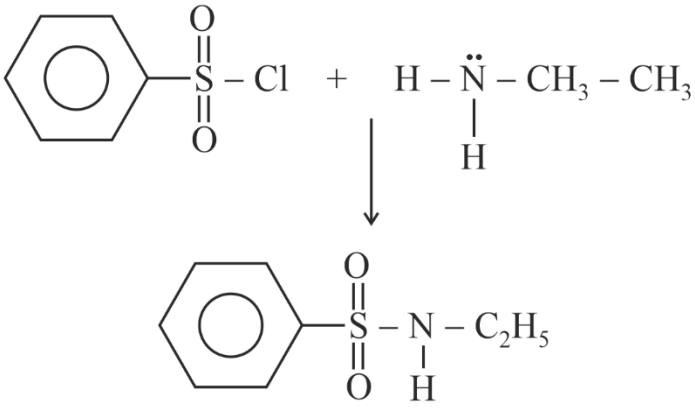
(D)



Correct option (C)

1^0 Amines react with Hinsberg's reagent $(C_6H_5SO_2Cl)$ to form sulphonamides with an acidic Hydrogen.

Hence, these are soluble in alkali.



Soluble in alkali

60. The following solutions were prepared by dissolving $10\,g$ of glucose $(C_6H_{12}O_6)$ in $250ml$ of water (P_1), $10\,g$ of urea (CH_4N_2O) in $250ml$ of water (P_2) and $10\,g$ of sucrose $(C_{12}H_{22}O_{11})$ in $250ml$ of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is :

(A) $P_2 > P_1 > P_3$

(B) $P_1 > P_2 > P_3$

(C) $P_2 > P_3 > P_1$

(D) $P_3 > P_1 > P_2$

Correct option (A)

Osmotic pressure $(\pi) = CRT$

At same temperature, $\pi \propto c$

Solution (1) $C_1 = \frac{10}{180} = \frac{10}{180} \times 4$

$\frac{250}{1000} = \frac{40}{180} = \frac{2}{9} M$

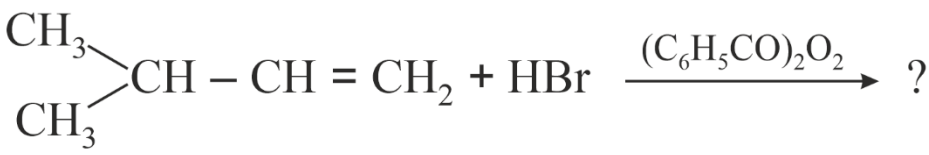
$C_1 = 0.222\ M$

Solution (2) $C_2 = \frac{\frac{10}{60}}{\frac{250}{1000}} = \frac{1}{6} \times 4 = 0.667\ M$

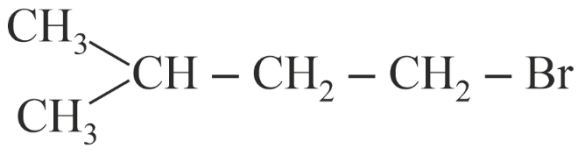
Solution (3) $C_3 = \frac{10}{342} \times \frac{1000}{250} = 0.1169\ M$

$\because C_2 > C_1 > C_3$ $\therefore$ Hence, order: $P_2 > P_1 > P_3$

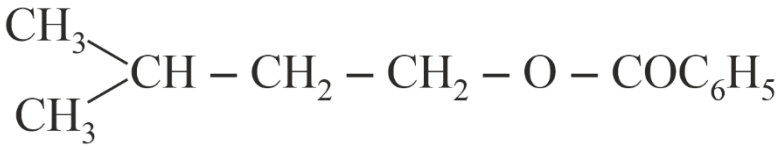
61. The major product of the following chemical reaction is:



(A)



(B)



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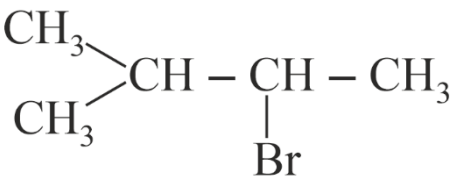
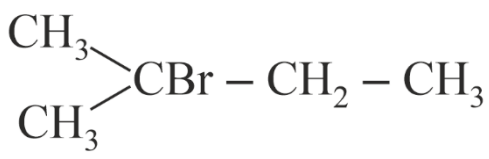
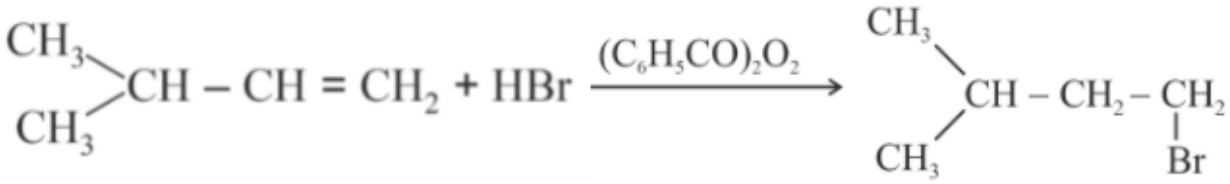


(D)



Correct option (A)

Unsymmetrical alkenes undergo anti markovnikov's addition reaction with HBr in the Presence of peroxide



62. Given below are two statements :

Statement I :

Aspirin and Paracetamol belong to the class of narcotic analgesics.

Statement II :

Morphine and Heroin are non-narcotic analgesics. In the light of the above statements, choose the correct answer from the options given below.

(A) Both Statement I and Statement II are true.

(B) Both Statement I and Statement II are false.

(C) Statement I is correct but Statement II is false.

(D) Statement I is incorrect but Statement II is true.

Correct option (B)

Non-addictive analgesics are Known as Non-narcotic analgesics. Aspirin and paracetamol belong to this class. Narcotics are also called opioid pain relievers.. Both morphine and Heroin are belong to this class.

63. The correct sequence of bond enthalpy of ' $C-X$ bond is:

(A) $CH_3-F<CH_3-Cl<CH_3-Br<CH_3-I$

(B) $CH_3-F>CH_3-Cl>CH_3-Br>CH_3-I$

(C) $CH_3-F<CH_3-Cl>CH_3-Br>CH_3-I$

(D) $CH_3-Cl>CH_3-F>CH_3-Br>CH_3-I$

Correct option (B)

Bond enthalpy is inversely proportional to the bond length. The bond length order of C-X bond in methyl halides depends on the size of the halogen atom. Bond length order: $CH_3-F<CH_3-Cl<CH_3Br<CHI$

Hence, bond enthalpy order is

$CH_3-F>CH_3-Cl>CH_3-Br>CH_3-I$

64. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are :

(A) sp^3 and 4

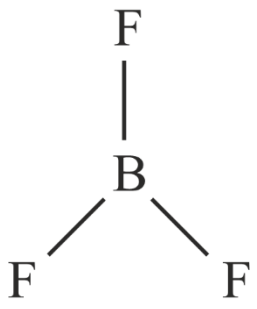
(B) sp^3 and 6

(C) sp^2 and 6

(D) sp^2 and 8

Correct option (C)

The structure of BF_3 can be shown as follows,



Three hybrid orbital are required to form BF_3. Hence, the hybridisation of Boron is sp^2 and the number of electrons around the boron is 6 due to the presence of three B-F bonds.

65. Which one among the following is the correct option for right relationship between C_P and C_V for one mole of ideal gas?

(A) $C_P + C_V = R$

(B) $C_P - C_V = R$

(C) $C_P = RC_V$

(D) $C_V = RC_P$

Correct option (B)

For one mole of ideal gas

$\Delta H = \Delta U + \Delta(PV)$

$= \Delta U + \Delta(RT)$

$= \Delta U + R\Delta T$

$\Delta H = C_p \Delta T,\ \Delta U = C_V \Delta T$

$C_p\Delta T = C_V\Delta T + R\Delta T$

$C_p = C_V + R$

$C_p - C_V = R$

66. Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is :

(A) Calcium chloride

(B) Strontium chloride

(C) Magnesium chloride

(D) Beryllium chloride

Correct option (D)

Due to the high polarising power of Be^{2+} ion, its compounds are covalent. $BeCl_2$ is readily soluble in organic solvents.

67. An organic compound contains 78 % (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formulā of this compound is : [Atomic wt. of C is H is 1]

(A) CH

(B) CH_2

(C) CH_3

(D) CH_4

Correct option (C)

	C	H
% by weight	78	22
% by moles	$\frac{78}{12}$	$\frac{22}{1}$
	6.5	22
Simplest ratio	$\frac{6.5}{6.5}$	$\frac{22}{6.5}$
	1	3

Hence, the empirical formula of this compound is CH_3.

68. The major product formed in the dehydrohalogenation reaction of 2 -Bromopentane is Pent-2-ene. This product formation is based on ?

(A) Saytzeff's Rule

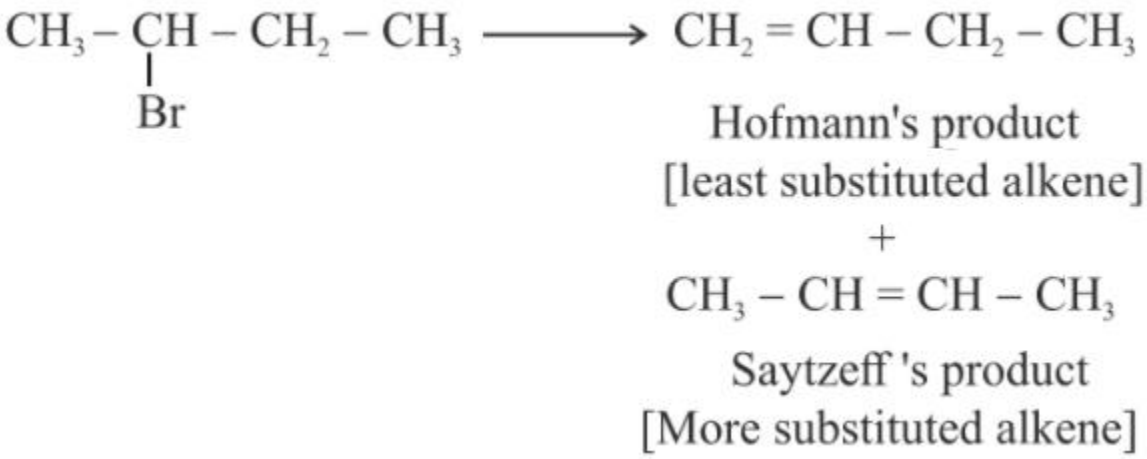
(B) Hund's Rule

(C) Hofmann Rule

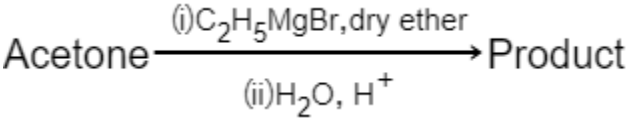
(D) Huckel's Rule

Correct option (A)

2 -bromopentane gives 2-pentene as the major product according to Saytzeff's rule as it is more substituted alkene



69. What is the IUPAC name of the organic compound formed in the following chemical reaction?



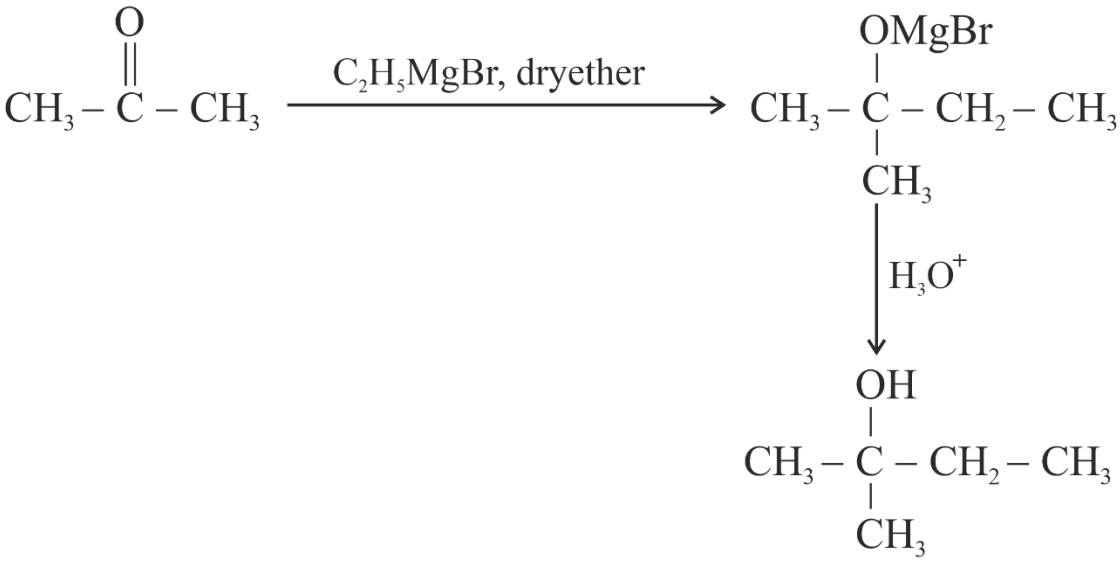
(A) 2 -methyl propan-2-ol

(B) pentan-2-ol

(C) pentan-3-ol

(D) 2 -methylbutan-2-ol

Correct option (D)



The compound contain four carbons in the Longest chain, main functional group is alcohol (suffix name ol) and methyl group attached at 2^{nd} position.

Hence, the IUPAC Name is 2-methylbutan-2-ol

70. Noble gases are named because of their inertness towards reactivity. Identify an incorrect statement about them.

(A) Noble gases are sparingly soluble in water.

(B) Noble gases have very high melting and boiling points.

(C) Noble gases have weak dispersion forces.

(D) Noble gases have large positive values of electron gain enthalpy.

Correct option (B)

Due to the presence of weak dispersion forces, noble gases are sparingly soluble in water and they have low melting and boiling points. Due to the presence of completely filled electronic configuration they have large positive values of electron gain enthalpy.

71. The pK_b of dimethylamine and pK_a of acetic acid are 3.27 and 4.77 respectively at $T(K)$. The correct option for the pH of dimethylammonium acetate solution is:

(A) 8.50

(B) 5.50

(C) 7.75

(D) 6.25

Correct option (C)

pk_b of dimethylamine $= 3.27$

pk_a of acetic acid $= 4.77$

Dimethylammonium acetate is salt of weak acid & weak base for which pH is:

$pH = 7 + \frac{1}{2}pk_a - \frac{1}{2}pK_b$

$= 7 + \frac{1}{2} \times 4.77 - \frac{1}{2} \times 3.27$

$= 7.75$

72. The right option for the statement "Tyndall effect is exhibited by", is :

(A) NaCl solution

(B) Glucose solution

(C) Starch solution

(D) Urea solution

Correct option (C)

Tyndall effect is exhibited by colloidal solutions and not true solutions. Starch solution is colloid, so it will exhibit the Tyndall effect.

73. Statement I :

Acid strength increases in the order given as

HF << HCl << HBr << HI

Statement II :

As the size of the elements F, Cl, Br, I increases down the group, the bond strength of HF, HCl HBr and HI decreases and so the acid strength increases.

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

(A) Both Statement I and Statement II are true.

(B) Both Statement I and Statement II are false.

(C) Statement I is correct but Statement II is false.

(D) Statement I is incorrect but Statement II is true.

Correct Answer: (A)

Solution:

Acidic strength of hydracids increases in order

$HF \ll HCl \ll HBr \ll HI$

So, statement-I is true

The above order of acidic strength is due to decrease in bond strength. As the size of atom increases, bond length increases and bond strength decreases.

Thus, statement I and statement II are true

74. Ethylene diaminetetraacetate (EDTA) ion is:

(A) Hexadentate ligand with four "O" and two "N" donor atoms

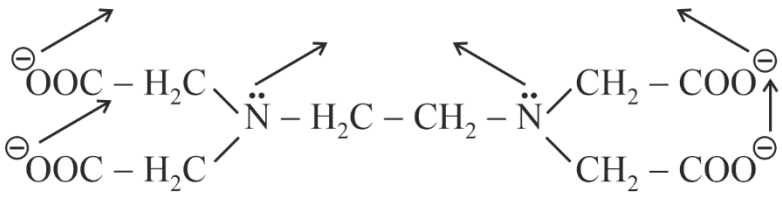
(B) Unidentate ligand

(C) Bidentate ligand with two"N" donor atoms

(D) Tridentate ligand with three "N" donor atoms

Correct option (A)

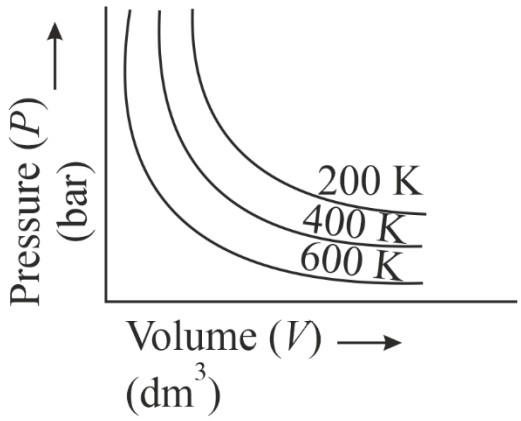
EDTA is



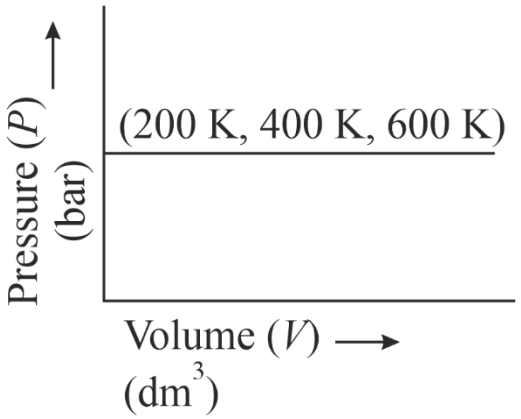
EDTA is hexadentate ligand having four oxygen donor atoms and two nitrogen donor atoms.

75. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures:

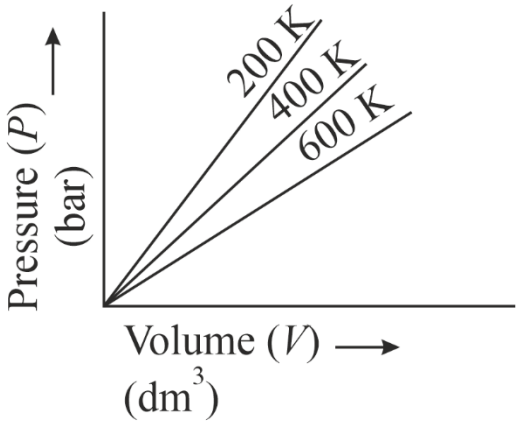
(A)

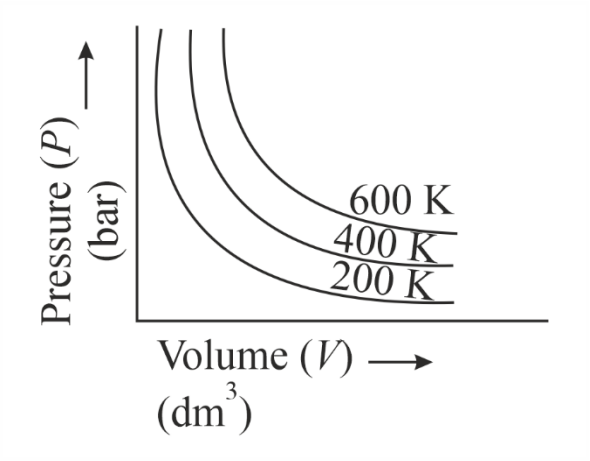

Pressure (P)
(bar)
200 K
400 K
600 K
Volume (V)
(dm3)

(B)


Pressure (P)
(bar)
(200 K, 400 K, 600 K)
Volume (V)
(dm3)

(C)


Pressure (P)
(bar)
200 K
400 K
600 K
Volume (V)
(dm3)

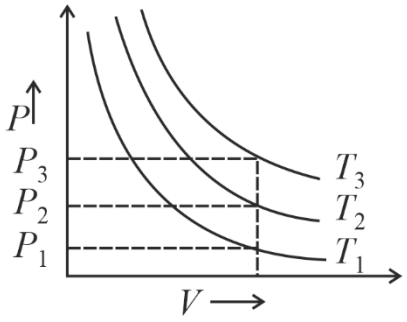


(D)

Correct Answer: (D)

Solution: According to Boyle's law

PV = constant (T & n constant)



$T_3 > T_2 > T_1$

for any fixed volume

$P_3 > P_2 > P_1$

$P_3V = nRT_3, P_2V = nRT_2, P_1V = nRT_1$

Therefore, $T_3 > T_2 > T_1$

76. The structures of beryllium chloride in solid state and vapour phase, are:

(A) Chain and dimer, respectively

(B) Linear in both

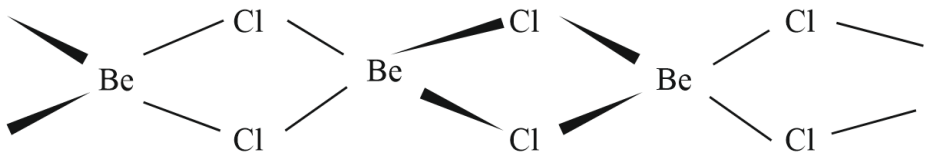
(C) Dimer and Linear, respectively

(D) Chain in both

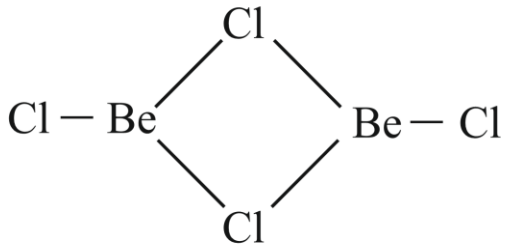
Correct Answer: (A)

Solution:

In solid state, $BeCl_2$ has polymeric chain structure:



In, vapour state, $BeCl_2$ has dimeric structure



77. Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?

(A) Electrolysis

(B) Chromatography

(C) Distillation

(D) Zone refining

Correct option (C)

Metal which is liquid at room temperature is mercury and to refine this metal distillation is carried out.

78. The compound which shows metamerism is:

(A) C_5H_{12}

(B) C_3H_8O

(C) C_3H_6O

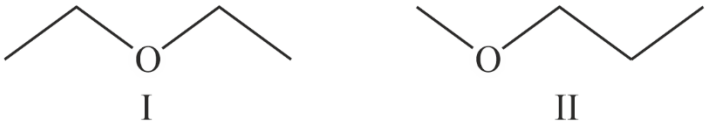
(D) $C_4H_{10}O$

Correct option (D)

Metamerism is shown by polyvalent functional groups like ester,ether and ketone.

Unequal distribution of alkyl groups around polyvalent functional group give rise to metamerism.

$C_4H_{10}O$: ether



I II

I and II are metamers

79. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :

(A) 7

(B) 5

(C) 2

(D) 3

Correct option (D)

Body-centred unit cell is possible in following crystal system:-

a.) Cubic

b) Tetragonal

c.) Orthorhombic

Thus, three body-centred unit cells are possible among 14 types of Bravais lattice.

80. Which one of the following polymers is prepared by addition polymerisation?

(A) Teflon

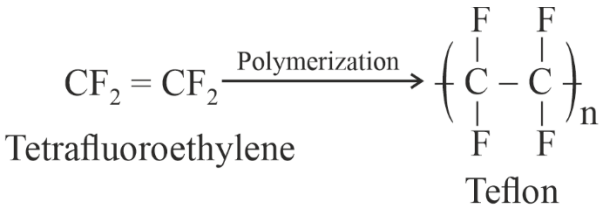
(B) Nylon-66

(C) Novolac

(D) Dacron

Correct option (A)

Teflon is formed by addition polymerisation of tetrafluoroethylene.



Tetrafluoroethylene Teflon

Nylon-66, Novolac of Dacron are condensation polymers.

81. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is : [speed of light, c=3.0 x 10^8 ms^{-1}]

(A) $219.3\ m$

(B) $219.2\ m$

(C) $2192\ m$

(D) $21.92\ cm$

. Correct option (A)

Wavelength $\lambda = \frac{c}{v}$

$$\lambda = \frac{3 \times 10^8}{1368 \times 10^3}$$

$\lambda = 219.298\ m$

$\lambda \approx 219.3\ m$

82. Which of the following reactions is the metal displacement reaction ? Choose the right option.

(A) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$

(B) $Cr_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Cr$

(C) $Fe + 2HCl \rightarrow FeCl_2 + H_2 \uparrow$

(D) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2 \uparrow$

Correct option (B)

Metal displacement reaction is

$$Cr_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Cr$$

83. The **incorrect** statement among the following is:

(A) Actinoid contraction is greater for element to element than Lanthanoid contraction.

(B) Most of the trivalent Lanthanoid ions are colorless in the solid state.

(C) Lanthanoids are good conductors of heat and electricity.

(D) Actinoids are highly reactive metals, especially when finely divided.

Correct option (B)

Most of the trivalent Lanthanoid ions are coloured in the solid state.

84. Dihedral angle of least stable conformer of ethane is:

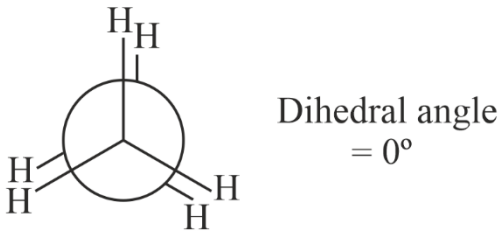
(A) 120°

(B) 180°

(C) 60°

(D) 0°

Correct option (D)



Dihedral angle
= 0°

Eclipsed
conformer

85. Match List - I with List - II.

	List-I		List-II
(a)	PCl_5	(i)	Square pyramidal
(b)	SF_6	(ii)	Trigonal planar
(c)	BrF_6	(iii)	Octahedral
(d)	BF_3	(iv)	Trigonal bipyramidal

Choose the correct answer from the options given below.

(A) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

(B) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

(C) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(D) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

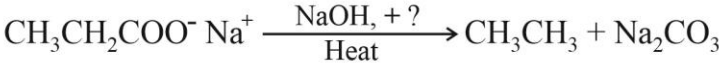
Correct option (A)

PCl_5 → Trigonal bipyramidal

SF_6 → Octahedral

BrF_5 → Square pyramidal

BF_3 →Trigonal planar



86.

Consider the above reaction and identify the missing reagent/chemical.

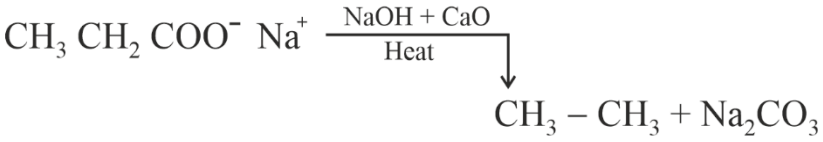
(A) B_2H_6

(B) Red Phosphorus

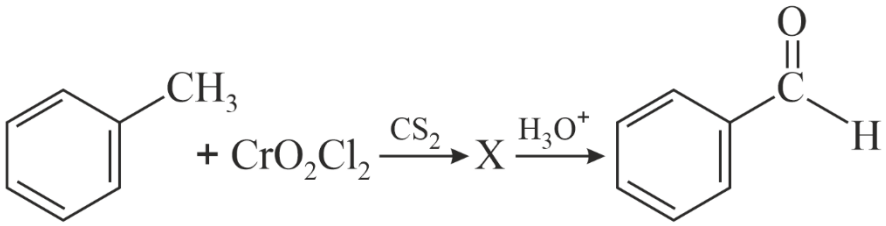
(C) CaO

(D) DIBAL-H

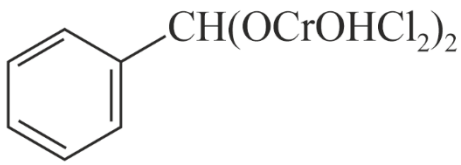
Correct option (C)



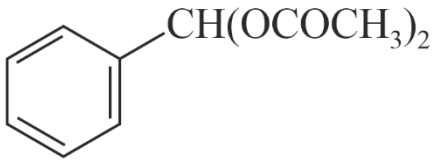
87. The intermediate compound 'X' in the following chemical reaction is :



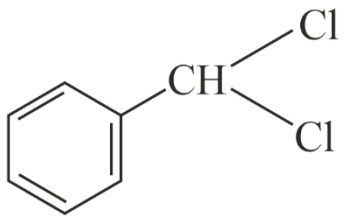
(A)



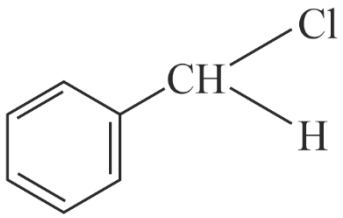
(B)



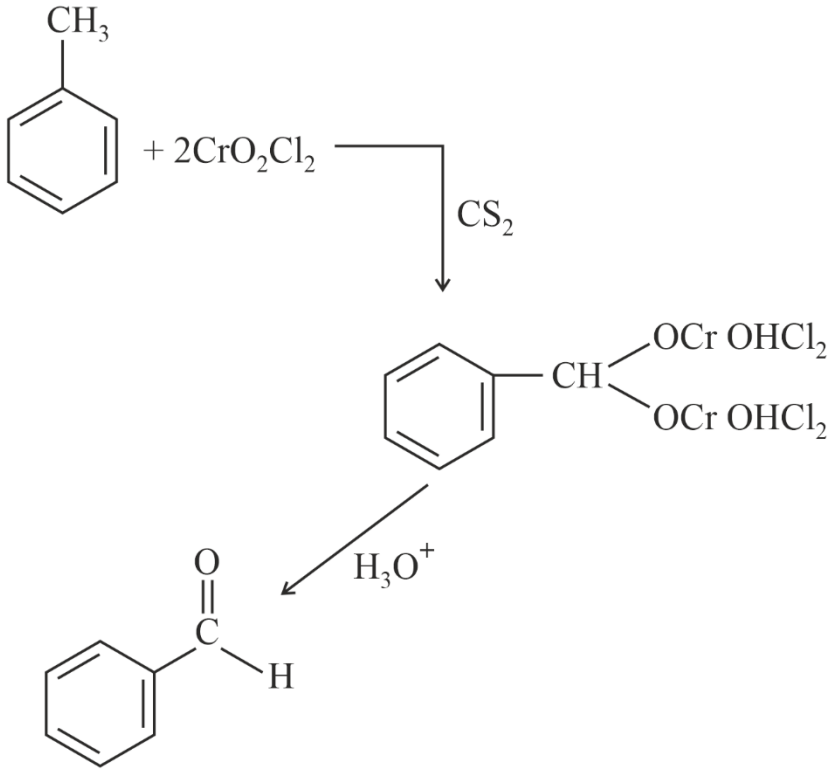
(C)



(D)



Correct option (A)



88. Match List - I with List - II.

	List - I	List-II
(a)	$2SO_2(g)+O_2(g)\rightarrow 2SO_3(g)$	(i) Acid rain
(b)	$HOCl(g)\xrightarrow{hv}OH+Cl$	(ii) Smog

$CaCO_3 + H_2SO_4 \rightarrow$

(c) $CaSO_4 + H_2O + CO_2$ (iii) Ozone depletion

$NO_2(g) \xrightarrow{hv}$

(d) $NO(g) + O(g)$ (iv) Tropospheric pollution

Choose the correct answer from the options given below.

(A) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

(B) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

(C) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

(D) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Correct option (C)

$a \rightarrow (iv)$

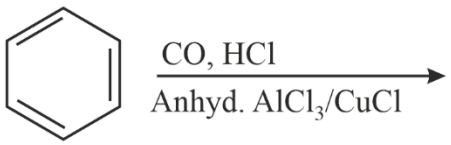
$b \rightarrow (iii)$

$c \rightarrow (i)$

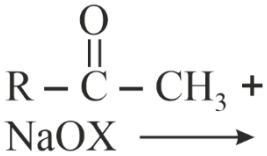
$d \rightarrow (ii)$

89. Match List - I with List - II.

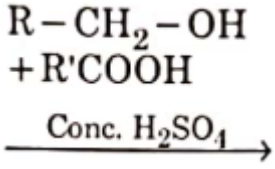
List - I List-II

(a) 

(i) Hell-Volhard-Zelinsky reaction

(b) 

(ii) Gattermann-Koch reaction

(c) 

(iii) Haloform reaction

(d) $R-CH_2COOH \xrightarrow[(ii)\ H_2O]{(i)\ X_2/Red\ P}$ (iv) Esterification

Choose the correct answer from the options given below.

(A) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

(B) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

(C) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

(D) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

Correct option (D)

$a \rightarrow (ii)$

$b \rightarrow (iii)$

$c \rightarrow (iv)$

$d \rightarrow (i)$

90. Match List - I with List - II.

List-I		List - II
(a) $[Fe(CN)_6]^{3-}$	(i)	5.92 BM
(b) $[Fe(H_2O)_6]^{3+}$	(ii)	0 BM
(c) $[Fe(CN)_6]^{4-}$	(iii)	4.90 BM
(d) $[Fe(H_2O)_6]^{2+}$	(iv)	1.73 BM

Choose the correct answer from the options given below.

(A) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

(B) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

(C) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

(D) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

Correct option (D)

$[Fe(CN)_6]^{3-}$ has Fe^{3+}central ion (d^5)

Electronic configuration (SFL)

$t_{2g}{}^{2,2,1}\ e_g{}^{0,0}$

$n = 1$

Magnetic moment:

$\mu = \sqrt{n(n+2)}$ B.M.

$= \sqrt{1(1+2)}$

$= \sqrt{3}$

= 1.73 BM

$[Fe(H_2O)_6]^{3+}$: has d^5 electrons.

Electronic configuration (WFL)

$t_{2g}{}^{1,1,1}\ e_g{}^{1,1}$

$n = 5$

$\mu = \sqrt{5(5+2)} = \sqrt{35}$,

= 5.92 B.M.

$[Fe(CN)_6]^{4-}$ has d^6electrons.

Electronic configuration (SFL)

$t_{2g}{}^{2,2,1}\ e_g{}^{0,0}$

$n = 0$

$\mu = 0$ B.M.

$[Fe(H_2O)_6]^{2+}$ has d^6 electron

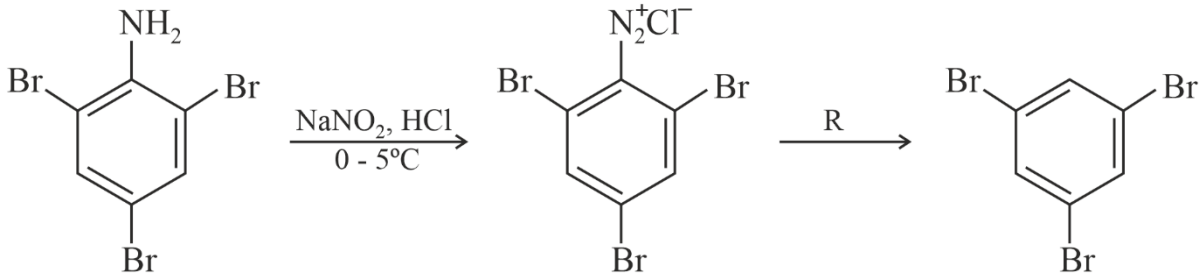
Electronic configuration: (WFL)

$t_{2g}{}^{2,2,1}\ e_g{}^{1,1}$

$n = 4$

$\mu = \sqrt{4(4+2)} = 4.90$ B.M.

91.



(A) H_2O

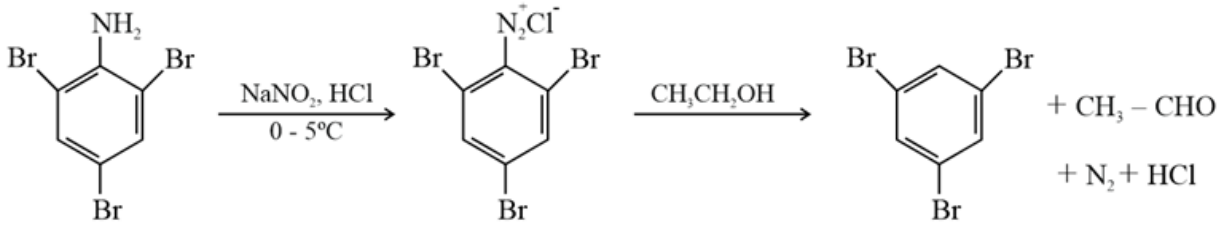
(B) CH_3CH_2OH

(C) HI

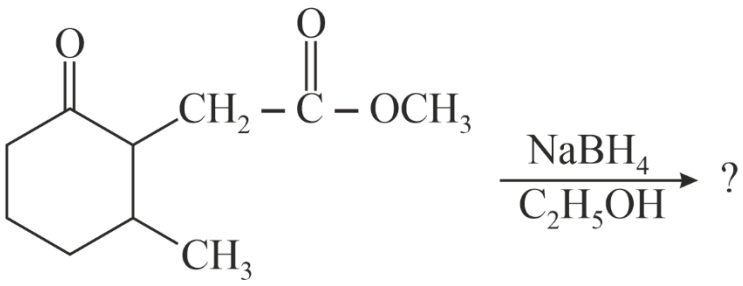
(D) CuCN/KCN

Correct Option: (B)

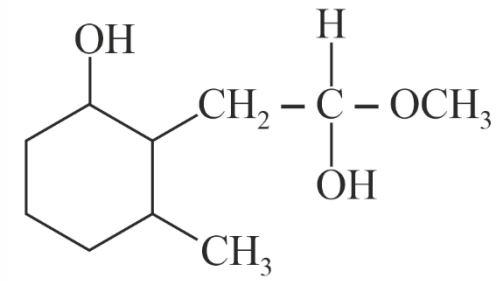
When benzene diazonium chloride reacts with ethanol, it forms benzene and acetaldehyde along with the removal of nitrogen gas and hydrogen chloride.



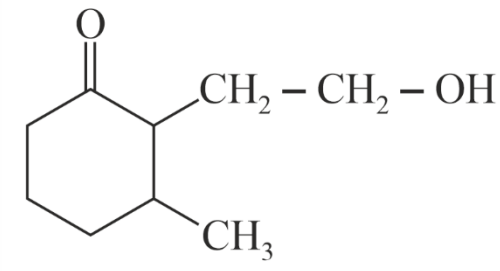
92. The product formed in the following chemical reaction is :



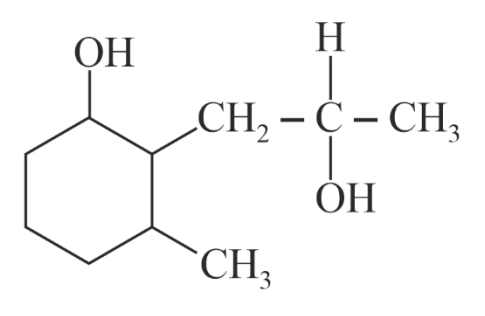
(A)



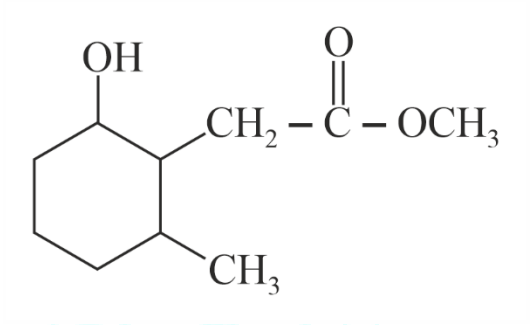
(B)



(C)

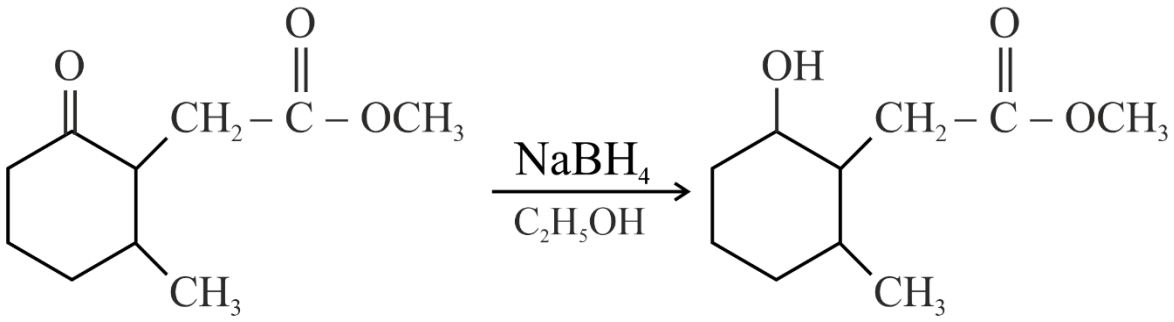


(D)



Correct option: (D)

Sodium borohydride is a good reducing agent. Although not as powerful as lithium aluminum hydride ($LiAlH_4$), it is very effective for the reduction of aldehydes and ketones to alcohols. By itself, it will generally not reduce esters, carboxylic acids, or amides (although it will reduce acyl chlorides to alcohols).



93. From the following pairs of ions which one is not an iso-electronic pair?

(A) O^{2-}, F^{-}

(B) Na^{+}, Mg^{+2}

(C) Mn^{2+}, Fe^{3+}

(D) Fe^{2+}, Mn^{2+}

Correct Option: (D)

1) O^{2-}, F^{-} Both have 10 electrons

2) Na^{+}, Mg^{+2} Both have 10 electrons

3) Mn^{2+}, Fe^{+3} Both have 23 electrons

4) Mn^{2+} has 23 electrons while, Fe^{+2} have 24 electrons So they are not an iso-electronic pair.

94. The molar conductivity of 0.007 M acetic acid is 20 S cm^2 mol^{-1}. What is the dissociation constant of acetic acid ? Choose the correct option.

$$\left[\begin{array}{l}\Lambda^{\circ}_{H^+} = 350\ \text{S cm}^2\ \text{mol}^{-1} \\ \Lambda^{\circ}_{CH_3COO^-} = 50\ \text{S cm}^2\ \text{mol}^{-1}\end{array}\right]$$

(A) 1.75×10^{-4} mol L^{-1}

(B) 2.50×10^{-4} mol L^{-1}

(C) 1.75×10^{-5} mol L^{-1}

(D) 2.50×10^{-5} mol L^{-1}

Correct option: (C)

$\Lambda^{o}_{CH_3COOH} = \Lambda^{o}_{CH_3COO^-} + \Lambda^{o}_{H^+}$

$\Lambda^{o}_{CH_3COOH} = 350 + 50 = 400\ Scm^2\ mol^{-1}$

$\Lambda_{CH_3COOH} = 20\ Scm^2\ mol^{-1}$ Given

$\alpha = \frac{\Lambda_{CH_3COOH}}{\Lambda^{o}_{CH_3COOH}} = \frac{20}{400} = 5 \times 10^{-2}$

$K_a = c\alpha^2 = 0.007 \times (5 \times 10^{-2})^2 = 1.75 \times 10^{-5}\ mol\ L^{-1}$

95. Choose the correct option for the total pressure (in atm.) in a mixture of $4\text{g}O_2$ and $2\text{g}H_2$ confined in a total volume of one litre at 0°C is :

[Given $\text{R} = 0.082\,\text{L atm mol}^{-1}\text{K}^{-1}, \text{T} = 273\text{K}$]

(A) 2.518

(B) 2.602

(C) 25.18

(D) 26.02

Correct Option: (C)

Given $V = 1L,\ T = 273\ K,\ R = 0.082\ \ P_T = ?$ and $n_T = \frac{4}{32} + \frac{2}{2} = \frac{9}{8}$

We know that: $P_T V = n_T RT$ Ideal Gas equation.

Now putting the values

$P_T = \frac{9}{8} \times 0.082 \times 273 = 25.18\ atm$

96. The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in molar ratio $3:2$ is :

[At 45°C vapour pressure of benzene is $280\,\text{mmHg}$ and that of octane is $420\,\text{mmHg}$. Assume Ideal gas]

(A) $160\,\text{mm of Hg}$

(B) $168\,\text{mm of Hg}$

(C) $336\,\text{mm of Hg}$

(D) $350\,\text{mm of Hg}$

Correct Option: (3)

Given: $P_B^o = 280\ mm\ of\ Hg$, $P_O^o = 420\ mm\ of\ Hg$

$X_B = \frac{3}{5}\ and\ X_O = \frac{2}{5}$

We know that according to Raoult's Law

$P_T = X_B P_B^o + X_O P_O^o = \frac{3}{5} \times 280 + \frac{2}{5} \times 420 = 336\ mm\ of\ Hg$

97. For irreversible expansion of an ideal gas under isothermal condition, the correct option is :

(A) $\Delta U = 0, \Delta S_{\text{total}} = 0$

(B) $\Delta U \neq 0, \Delta S_{\text{total}} \neq 0$

(C) $\Delta U = 0, \Delta S_{\text{total}} \neq 0$

(D) $\Delta U \neq 0, \Delta S_{\text{total}} = 0$

Correct Option: (C)

Since the process is isothermal, that means temperature will remain constant. And internal energy depends only on temperature so internal energy will also be constant that is $\Delta U = 0$

And since there is irreversible expansion, the entropy of the universe will change. $\Delta S_{total} \neq 0$

98. Which of the following molecules is nonpolar in nature?

(A) $POCl_3$

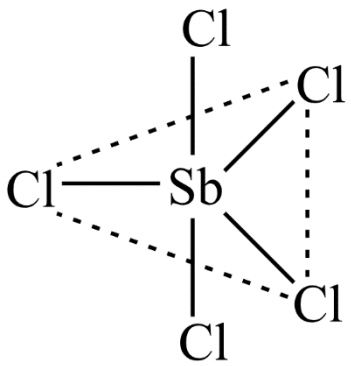
(B) CH_2O

(C) $SbCl_5$

(D) NO_2

Correct Option: (C)

All the given option have asymmetric structure except $SbCl_5$, it has a symmetric structure (trigonal pyramidal) with only 5 bond pairs and zero lone pair. So it will have zero dipole moment, i.e., it will be non-polar.



99. In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it?

(A) $HF < HCl < HBr < HI$: Increasing acidic strength

(B) $H_2O < H_2S < H_2Se < H_2Te$: Increasing pK_a values

(C) $NH_3 < PH_3 < AsH_3 < SbH_3$: Increasing acidic character

(D) $CO_2 < SiO_2 < SnO_2 < PbO_2$: Increasing oxidizing power

Correct Option: (B)

1) HF < HCl < HBr < HI bond strength decreases therefore acidic strength increases.

2) $H_2O < H_2S < H_2Se < H_2Te$ from going down the group bond length increase so bond strength decreases therefore acidic nature of these will increase but pK_a will decrease.

So this given order is wrong.

3) $NH_3 < PH_3 < AsH_3 < SbH_3$ from going down the group bond length increase so bond strength decreases therefore acidic nature of these will increase

4) $CO_2 < SiO_2 < SnO_2 < PbO_2$ From going down the group stability of higher oxidation state decreases due to inert pair effect therefore their tendency to reduce will increase, so their oxidizing power will increase.

100. The slope of Arrhenius Plot $\left(\ln \text{kv/s} \frac{1}{\text{T}}\right)$ of first order reaction is $-5\times10^3\,\text{K}$. The value of E_a of the reaction is. Choose the correct option for your answer.

[Given $\text{R} = 8.314\text{JK}^{-1}\,\text{mol}^{-1}$]

(A) $41.5\,\text{kJ}\,\text{mol}^{-1}$

(B) $83.0\,\text{kJ}\,\text{mol}^{-1}$

(C) $166\,\text{kJ}\,\text{mol}^{-1}$

(D) $-83\,\text{kJ}\,\text{mol}^{-1}$

Correct Option: (A)

Arrhenius equation is $k = Ae^{-\frac{E_a}{RT}}$

So, $ln\ k\ = ln\ A\ - \frac{E_a}{RT}$

This is a straight-line equation of form $y = mx + c$

Where $y = ln\ k\ , x = \frac{1}{T}\ ,\ m = -\frac{E_a}{R}\ and\ c = ln\ A$

$m = -\frac{E_a}{R}$

$-5 \times 10^3 K = -\frac{E_a}{8.314}$

$E_a = 8.314\ \times 5 \times 10^3\ J\ mol^{-1} = 41.5\ kJ\ mol^-$