FINAL NEET(UG)–2021 EXAMINATION

(Held On Sunday 12th SEPTEMBER, 2021)

CHEMISTRY — TEST PAPER WITH ANSWER & SOLUTION

SECTION-A (CHEMISTRY)

51. 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.

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement** I and **Statement II** are false.

(3) **Statement I** is correct but **Statement II** is false.

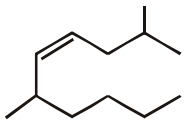
(4) **Statement I** is incorrect but **Statement II** is true.

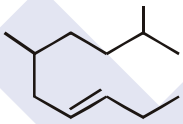
Ans. (2)

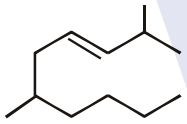
Sol. Aspirin and paracetamol belongs to the class of non-narcotic analgesic.

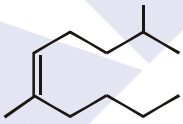
Morphine and heroin are narcotic analgesics.

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

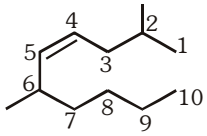
(1) 

(2) 

(3) 

(4) 

Ans. (1)

Sol. 

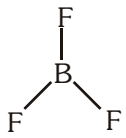
2,6-Dimethyldec-4-ene

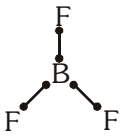
53. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are:

(1) sp^3 and 4 (2) sp^3 and 6

(3) sp^2 and 6 (4) sp^2 and 8

Ans. (3)

Sol. 



sp^2, Trigonal planar $6e^-$ around central atom

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

(1) Noble gases are sparingly soluble in water.

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

(3) Noble gases have weak dispersion forces.

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

Ans. (2)

Sol. Noble gases have weak dispersion forces so their melting and boiling point are very low.

55. 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.

(1) 201.28 S cm^2 mol^{-1}

(2) 390.71 S cm^2 mol^{-1}

(3) 698.28 S cm^2 mol^{-1}

(4) 540.48 S cm^2 mol^{-1}

Ans. (2)

Sol. $\Lambda^{\infty}_{m\,(NaCl)} = 126.45\ Scm^2\ mol^{-1}$

$\Lambda^{\infty}_{m\,(HCl)} = 426.16\ Scm^2\ mol^{-1}$

$\Lambda^{\infty}_{m(CH_3COONa)} = 91\ Scm^2\ mol^{-1}$

$\therefore \quad \Lambda^{\infty}_{m(CH_3COOH)} = \Lambda^{\infty}_{m(CH_3COONa)} + \Lambda^{\infty}_{m(HCl)} - \Lambda^{\infty}_{m(NaCl)}$

$= 91 + 426.16 - 126.45$

$= 391.72\ Scm^2\ mol^{-1}$

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

(1) NaCl solution (2) Glucose solution

(3) Starch solution (4) Urea solution

Ans. (3)

Sol. Tyndall effect is exhibited by colloidal solutions. Starch solution is a colloidal solution.

57. The RBC deficiency is deficiency disease of:

(1) Vitamin B_{12} (2) Vitamin B_6

(3) Vitamin B_1 (4) Vitamin B_2

Ans. (1)

Sol. Vitamin B_{12} deficiency $\rightarrow$ Pernicious anaemia (RBC deficient in heamoglobin)

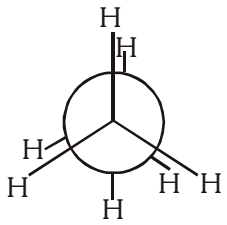
58. Dihedral angle of least stable conformer of ethane is :

(1) 120° (2) 180°

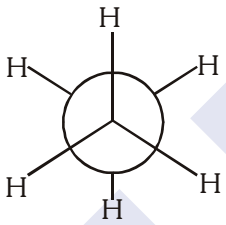
(3) 60° (4) 0°

Ans. (4)

Sol. Dihedral angle (D.A.) of least stable conformer of ethane = 0°



D.A. = 0°
(Eclipsed)



D.A. = 60°
(Staggered)

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

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

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

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

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

Ans. (2)

Sol. Most of the trivalent lanthanoid ions are coloured in the solid state.

60. The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene. This product formation is based on ?

(1) Saytzeff's Rule (2) Hund's Rule

(3) Hoffmann Rule (4) Huckel's Rule

Ans. (1)

Sol. $CH_3-CH_2-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$
(2-Bromopentane)

$\downarrow$ Dehydrohalogenation (E_2-Elimination/β-Elimination)

$CH_3-CH_2-CH=CH-CH_3$
(Pent-2-ene)
(Major product by Saytzeff's rule)

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

(1) $C_P+C_V=R$ (2) $C_P-C_V=R$

(3) $C_P = RC_V$ (4) $C_V=RC_P$

Ans. (2)

Sol. For one mole of an ideal gas

$C_p - C_v = R$

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

(1) Teflon (2) Nylon-66

(3) Novolac (4) Dacron

Ans. (1)

Sol. Teflon are prepared by addition polymerisation from tetrafluroethene

$$CF_2 = CF_2 \xrightarrow[\text{High pressure}]{\text{catalyst}} \underset{\text{Teflon}}{+CF_2-CF_2+_n}$$

Nylon-66, Novolac, Dacron are prepared by condensation polymerisation.

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

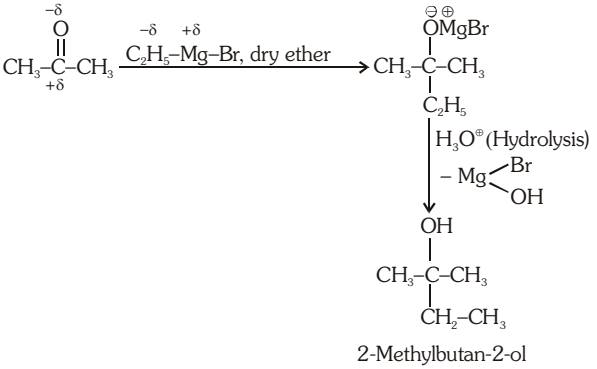
$$\text{Acetone} \xrightarrow[\text{(ii) } H_2O,\ H^+]{\text{(i) } C_2H_5MgBr,\ \text{dry Ether}} \text{Product}$$

(1) 2-methyl propan-2-ol (2) pentan-2-ol

(3) pentan-3-ol (4) 2-methyl butan-2-ol

Ans. (4)

Sol.



2-Methylbutan-2-ol

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

List-I	List-II
(a) PCl_5	(i) Square pyramidal
(b) SF_6	(ii) Trigonal planar
(c) BrF_5	(iii) Octahedral
(d) BF_3	(iv) Trigonal bipyramidal

Choose the **correct** answer from the options given below.

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

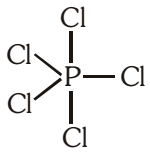
(2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

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

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

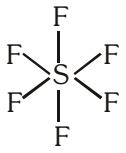
Ans. (1)

Sol. PCl_5 :



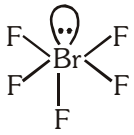
Trigonal bipyramidal sp^3d

SF_6 :



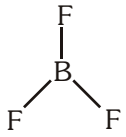
Octahedral sp^3d^2

BrF_5 :



Square pyramidal sp^3d^2

BF_3 :



Trigonal planar sp^2

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

(1) Electrolysis

(2) Chromatography

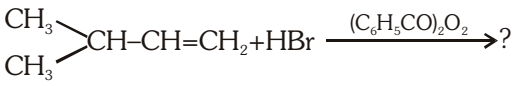
(3) Distillation

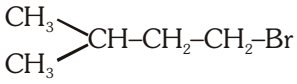
(4) Zone refining

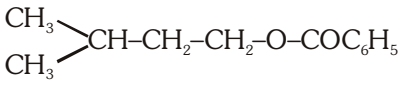
Ans. (3)

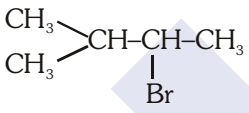
Sol. At room temperature Hg is liquid and it is purified by 'Distillation method'.

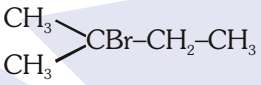
66. The major product of the following chemical reaction is:



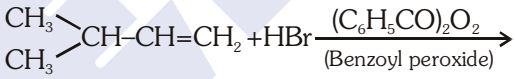
(1) 

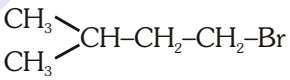
(2) 

(3) 

(4) 

Ans. (1)

Sol. 



In the presence of peroxide, addition of HBr to unsymmetrical alkenes take place by anti-Markovnikov's rule/Peroxide effect/Kharash effect.

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

(1) Beta(β^-)

(2) Alpha (α)

(3) Gamma (γ)

(4) Neutron (n)

Ans. (1)

Sol. Tritium is radioactive and emits low energy β^- particles ($_{-1}e^0$)

68. The correct sequence of bond enthalpy of 'C-X' bond is

(1) $CH_3–F < CH_3–Cl < CH_3–Br < CH_3–I$

(2) $CH_3–F > CH_3–Cl > CH_3–Br > CH_3–I$

(3) $CH_3–F < CH_3–Cl > CH_3–Br > CH_3–I$

(4) $CH_3–Cl > CH_3–F > CH_3–Br > CH_3–I$

Ans. (2)

Sol. Correct sequence of bond enthalpy of C–X bond is $CH_3–F > CH_3 – Cl > CH_3 – Br > CH_3 – I$

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

(1) 8, 4
(2) 6, 12
(3) 2, 1
(4) 12,6

Ans. (4)

Sol. No. of atoms in Hexagonal primitive unit cell = 6

No. of Tetrahedral voids = 2 × No. of atoms per unit cell

$= 2 \times 6$

$= 12$

No. of Octahedral voids = No. of atoms per unit cell

$= 6$

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

(1) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$

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

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

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

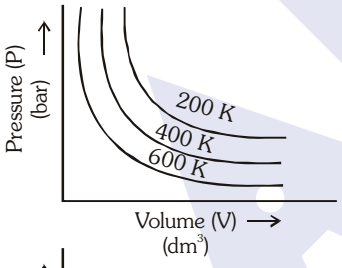
Ans. (2)

Sol. Aluminium is more electropositive than Cr, so it displaced chromium from Cr_2O_3.

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

71. 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:

(1)



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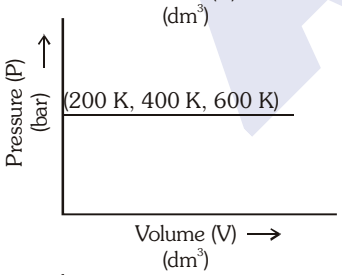
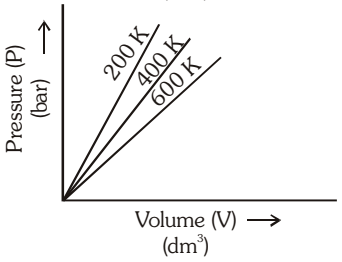
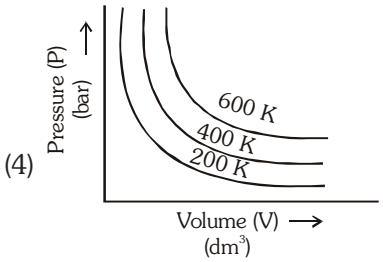


(3)



(4)



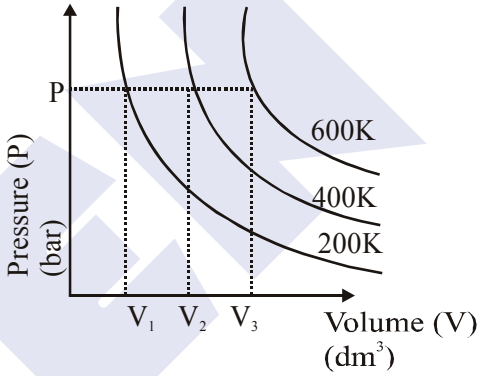
Ans. (4)

Sol. According to Boyle's law

$$P \propto \frac{1}{V}$$

At a given pressure,

$V \propto T$



72. 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:

(1) 8.50 (2) 5.50
(3) 7.75 (4) 6.25

Ans. (3)

Sol. Dimethylammonium acetate is a weak acid & weak base type of salt

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

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

$= 7.75$

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

(1) Calcium chloride
(2) Strontium chloride
(3) Magnesium chloride
(4) Beryllium chloride

Ans. (4)

Sol. $BeCl_2$ is covalent and soluble in a organic solvent.

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

(1) upto 1200 K

(2) upto 2200 K

(3) upto 1900 K

(4) upto 5000 K

Ans. (2)

Sol. The maximum temperature that can be achieved in blast furnace is upto 2200 K.

75. Ethylene diaminetetraacetate (EDTA) ion is :

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

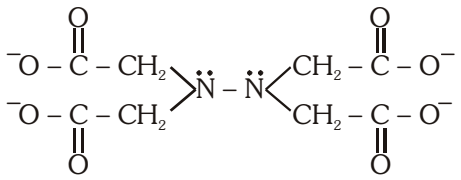
(2) Unidentate ligand

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

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

Ans. (1)

Sol.



Donar atom (N, N, O, O, O, O)

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

(1) $P_2 > P_1 > P_3$

(2) $P_1 > P_2 > P_3$

(3) $P_2 > P_3 > P_1$

(4) $P_3 > P_1 > P_2$

Ans. (1)

Sol. $\pi = iCRT$

$$P_1 = 1 \times \frac{10}{180} \times R \times T \quad \text{(For Glucose)}$$

$$P_2 = 1 \times \frac{10}{60} \times R \times T \quad \text{(For Urea)}$$

$$P_3 = 1 \times \frac{10}{342} \times R \times T \quad \text{(For Sucrose)}$$

$\therefore P_2 > P_1 > P_3$

77. **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.

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is correct but **Statement II** is false.

(4) **Statement I** is incorrect but **Statement II** is true.

Ans. (1)

Sol.

H–F	H–Cl	H–Br	H–I
1s–2p	1s–3p	1s–4p	1s–5p

→ Down the group size increases

Overlapping decreases

Acidic strength increases

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

(1) Chain and dimer, respectively

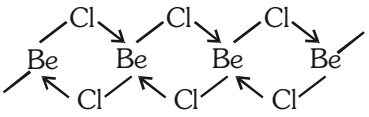
(2) Linear in both

(3) Dimer and Linear, respectively

(4) Chain in both

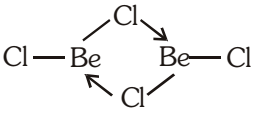
Ans. (1)

Sol. $BeCl_2$ in solid state exist in a polymeric form & in a vapour state in exist in a dimeric form.

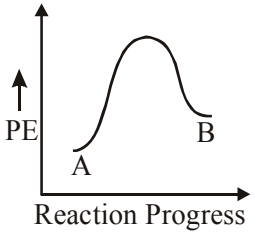


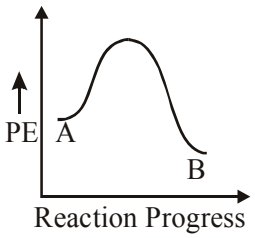
chain polymeric structure

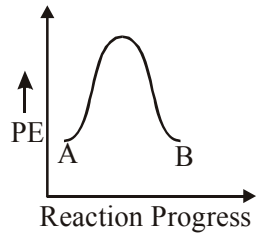
Vapour state exist in a dimeric form

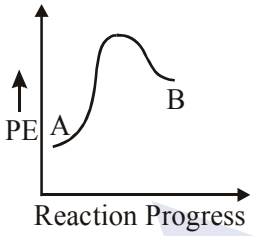


79. For a reaction A → B, enthalpy of reaction is –4.2 kJ mol^{-1} and enthalpy of activation is 9.6 kJ mol^{-1}. The correct potential energy profile for the reaction is shown in option.

(1) 

(2) 

(3) 

(4) 

Ans. (2)

Sol. For a given reaction ΔH is negative. Hence, potential energy profile is of an exothermic reaction.

80. Zr (Z =40) and Hf (Z =72) have similar atomic and ionic radii because of :

(1) belonging to same group

(2) diagonal relationship

(3) lanthanoid contraction

(4) having similar chemical properties

Ans. (3)

Sol. Due to lanthanoid contraction Zr and Hf has similar atomic and ionic radii.

81. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is :

[speed of light $c = 3.0 \times 10^8$ ms^{-1}]

(1) 219.3 m (2) 219.2 m

(3) 2192 m (4) 21.92 cm

Ans. (1)

Sol. $\lambda = \frac{c}{\nu}$

$$\lambda = \frac{3\times10^8}{1368\times10^3} = 219.298\text{m} \simeq 219.3\text{m}$$

82. An organic comopound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is [Atomic wt. of C is 12, H is 1]

(1) CH (2) CH_2

(3) CH_3 (4) CH_4

Ans. (3)

Sol.

Element	%	At.weight	$\frac{\%}{\text{At.weight}}$	simplest ratio
C	78	12	6.5	1
H	22	1	22	≃ 3

Empirical formula of this compound is CH_3

83. The compound which shows metamerism is :

(1) C_5H_{12} (2) C_3H_8O

(3) C_3H_6O (4) $C_4H_{10}O$

Ans. (4)

Sol. (4) $C_4H_{10}O$ will have different alkyl group attached with polyvalent functional group that's why show metamerism

$CH_3–CH_2–O–CH_2–CH_3$

$CH_3–O–CH_2–CH_2–CH_3$

(3) $C_3H_6O \Rightarrow CH_3–\underset{\underset{O}{\|}}{C}–CH_3$

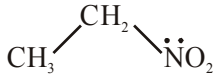
Only one arrangement possible so can not show metamerism.

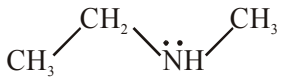
(2) $C_3H_8O \Rightarrow CH_3–O–CH_2–CH_3$

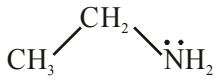
Only one arrangement possible so can not show metamerism.

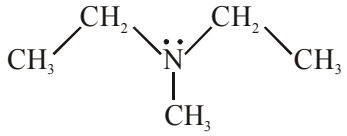
(1) No polyvalent functional group in C_5H_{12}, so can not show metamerism.

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

(1) 

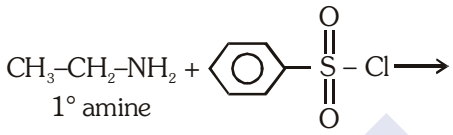
(2) 

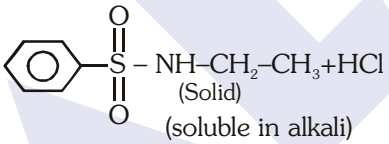
(3) 

(4) 

Ans. (3)

Sol. 1° amines react with Hingsberg's reagent to give a solid, which dissolve in alkali.





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

(1) 7 (2) 5

(3) 2 (4) 3

Ans. (4)

Sol. The number of Body centred unit cells in all 14 types of Bravais lattice unit cells is 3.

SECTION-B

86. 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

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

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

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

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

Ans. (4)

Sol. $[Fe(CN)_6]^{-3}$ $Fe^{+3} = 3d^5$

Unpaired electron = 1, μ = 1.7 BM

$[Fe(H_2O)_6]^{+3}$ $Fe^{+3} = 3d^5$ 

Unpaired electrons = 5, μ = 5.9 BM

$[Fe(CN)_6]^{-4}$ $Fe^{+2} = 3d^6$ 

Unpaired electron = 0, μ = 0 BM

$[Fe(H_2O)_6]^{+2}$ $Fe^{+2} = 3d^6$ 

Unpaired electrons = 4, μ = 4.9 BM

87. Choose the correct option for the total pressure (in atm.) in a mixture of 4 g O_2 and 2 g H_2 confined in a total volume of one litre at 0°C is: [Given R = 0.082 L atm $mol^{-1}K^{-1}$, T=273K]

(1) 2.518 (2) 2.602

(3) 25.18 (4) 26.02

Ans. (3)

Sol. $n_{O_2} = \frac{4}{32} = \frac{1}{8}$ mol

$n_{H_2} = \frac{2}{2} = 1$ mol

$n_{Total} = n_{O_2} + n_{H_2} = \frac{1}{8} + 1 = \frac{9}{8}$ mol

$PV = nRT$

$P_{Total} \times 1 = \frac{9}{8} \times 0.082 \times 273$

$P_{Total} = 25.18$ atm

88. $CH_3CH_2COO^-Na^+ \xrightarrow[\text{Heat}]{NaOH, +?} CH_3CH_3 + Na_2CO_3$.

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

(1) B_2H_6 (2) Red Phosphorus

(3) CaO (4) DIBAL-H

Ans. (3)

Sol. $CH_3–CH_2–COO^- Na^+ \xrightarrow[\text{Heat}]{NaOH+?}$

$CH_3–CH_3 + Na_2CO_3$

Decarboxylation takes place by soda-lime (NaOH + CaO)

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

(1) $\Delta U = 0$, $\Delta S_{total} = 0$ (2) $\Delta U \neq 0$, $\Delta S_{total} \neq 0$

(3) $\Delta U = 0$, $\Delta S_{total} \neq 0$ (4) $\Delta U \neq 0$, $\Delta S_{total} = 0$

Ans. (3)

Sol. For irreversible expansion of an ideal gas under isothermal condition

$\Delta U = 0$, $\Delta S_{Total} \neq 0$

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

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

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

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

(4) $CO_2 < SiO_2 < SnO_2 < PbP_2$: Increasing oxidizing power

Ans. (2)

Sol. $H_2O < H_2S < H_2Se < H_2Te$

$\longrightarrow$

Down the group acidic strength increases

So pK_a value decreases

91. 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.

$$\begin{bmatrix} \Lambda^\circ_{H^+} = 350\,S\,cm^2mol^{-1} \\ \Lambda^\circ_{CH_3COO^-} = 50\,S\,cm^2mol^{-1} \end{bmatrix}$$

(1) 1.75×10^{-4} mol L^{-1}

(2) 2.50×10^{-4} mol L^{-1}

(3) 1.75×10^{-5} mol L^{-1}

(4) 2.50×10^{-5} mol L^{-1}

Ans. (3)

Sol. $\Lambda^0_{M(CH_3COOH)} = \Lambda^0_{M_{(H^+)}} + \Lambda^0_{M_{(CH_3COO^-)}}$

$= 350 + 50 = 400\ Scm^2mol^{-1}$

$$\alpha = \frac{\Lambda^C_M}{\Lambda^0_M}$$

$$\alpha = \frac{20}{400} = 5 \times 10^{-2}$$

$$K_{a(CH_3COOH)} = C\alpha^2$$

$= 0.007 \times (5 \times 10^{-2})^2$

$= 1.75 \times 10^{-5}$ mol L^{-1}

92. The slope of Arrhenius Plot $\left(\ln k\ v/s\ \frac{1}{T}\right)$ of first order reaction is -5×10^3 K. The value of E_a of the reaction is. Choose the correct option for your answer.

[Given R=8.314 JK^{-1} mol^{-1}]

(1) 41.5 kJ mol^{-1} (2) 83.0 kJ mol^{-1}

(3) 166 kJ mol^{-1} (4) –83 kJ mol^{-1}

Ans. (1)

Sol. $\ell nK = \ell nA - \frac{Ea}{R}\left(\frac{1}{T}\right)$

In ℓnk v/s $\frac{1}{T}$ graph

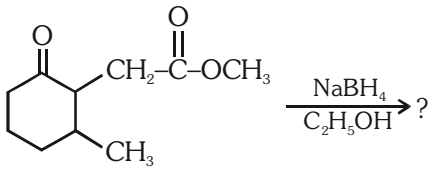
$$\text{Slope} = -\frac{Ea}{R}$$

$$-5\times10^3 = \frac{-Ea}{8.314}$$

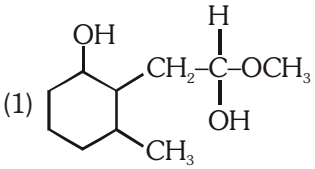
$Ea = 5 \times 10^3 \times 8.314$

$= 41500$ J mol^{-1} or 41.5 kJ mol^{-1}

93. The product formed in the following chemical reaction is



(1)



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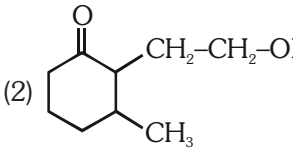

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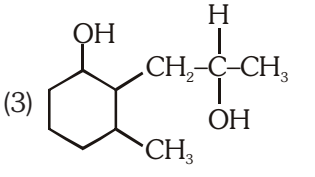

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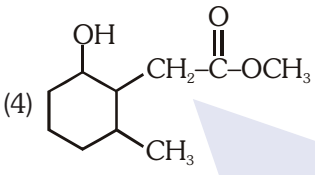
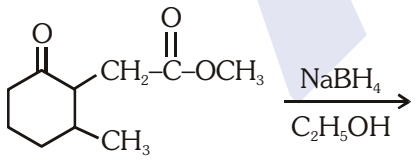
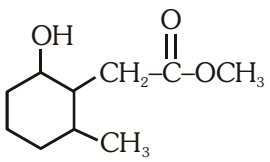


Ans. (4)

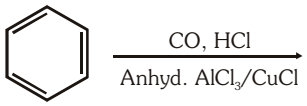
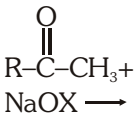
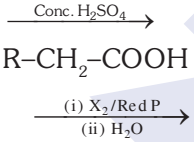
Sol.





$NaBH_4$ reduces aldehyde/ketone but does not reduce ester.

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

List-I	**List-II**
(a) 	(i) Hell-Volhard-Zelinsky reaction
(b) 	(ii) Gattermann-Koch reaction
(c) $R-CH_2-OH + R'COOH \xrightarrow{Conc.\ H_2SO_4}$	(iii) Haloform reaction
(d) 	(iv) Esterification

Choose the **correct** answer from the options given below.

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

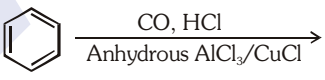
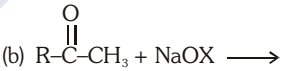
(2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

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

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

Ans. (4)

Sol.

List-I	**List-II**
(a) 	(ii) Gattermann-Koch reaction
(b) 	(iii) Haloform reaction
(c) $R-CH_2OH + R'COOH \xrightarrow{conc.\ H_2SO_4}$	(iv) Esterification
(d) $R-CH_2COOH \xrightarrow[(ii)\ H_2O]{(i)\ X_2/Red\ P}$	(i) Hell-Volhard Zelinsky reaction

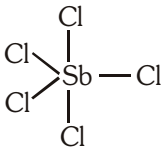
95. Which of the following molecules is non-polar in nature ?

(1) $POCl_3$ (2) CH_2O

(3) $SbCl_5$ (4) NO_2

Ans. (3)

Sol.



sp^3d Dipole moment (μ) = 0

Trigonal bipyramidal Non-polar

96. From the following pairs of ions which one is not an iso-electronic pair ?
(1) O^{2-}, F^-
(2) Na^+, Mg^{2+}
(3) Mn^{2+}, Fe^{3+}
(4) Fe^{2+}, Mn^{2+}

Ans. (4)

Sol.

		Total no. of e^-
$_{26}Fe \rightarrow 3d^6 4s^2$,	$Fe^{+2} \rightarrow 3d^6$	24
$_{25}Mn \rightarrow 3d^5 4s^2$,	$Mn^{+2} \rightarrow 3d^5$	23

97. 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 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]
(1) 160 mm of Hg (2) 168 mm of Hg
(3) 336 mm of Hg (4) 350 mm of Hg

Ans. (3)

Sol. $\frac{n_B}{n_O} = \frac{3}{2}$

$n_B = 3$, $n_O = 2$

$n_{Total} = 3 + 2 = 5$

$$X_B = \frac{n_B}{n_T} = \frac{3}{5}$$

$$X_O = \frac{n_O}{n_T} = \frac{2}{5}$$

$$P_S = P_B^\circ \times_B + P_O^\circ \times_O$$

$$P_S = 280 \times \frac{3}{5} + 420 \times \frac{2}{5}$$

= 336 mm of Hg

98. 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)	$HOCl(g) \xrightarrow{h\nu} \dot{O}H + \dot{C}l$	(ii)	Smog
(c)	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	(iii)	Ozone depletion
(d)	$NO_2(g) \xrightarrow{h\nu} NO(g) + O(g)$	(iv)	Tropospheric pollution

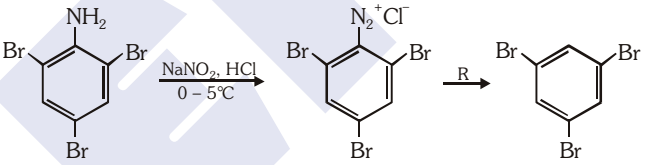
Choose the **correct** answer from the options given below.
(1) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(3) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(4) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Ans. (3)

Sol.

	List-I		**List-II**
(a)	$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$	(iv)	Tropospheric pollution
(b)	$HOCl(g) \xrightarrow{h\nu} \dot{O}H + \dot{C}l$	(iii)	Ozone depletion
(c)	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	(i)	Acid rain
(d)	$NO_2(g) \xrightarrow{h\nu} NO(g) + O(g)$	(ii)	Smog

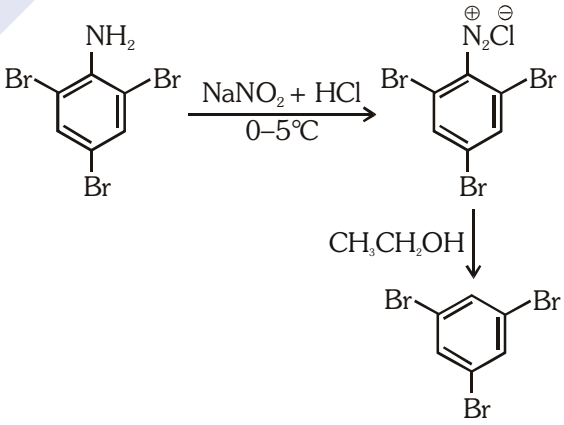
99. The reagent 'R' in the given sequence of chemical reaction is :



(1) H_2O (2) CH_3CH_2OH
(3) HI (4) CuCN/KCN

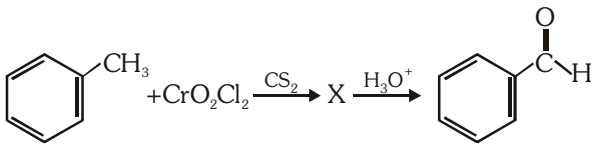
Ans. (2)

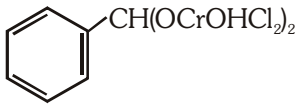
Sol.

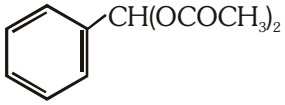


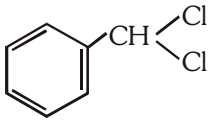
R : CH_3CH_2OH
Certain mild reducing agents like hypophosphorus acid or ethanol reduce diazonium salts to arene and themselves get oxidised to phosphorous acid and ethanal respectively.

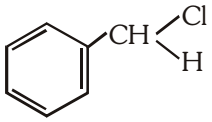
100. The intermediate compound 'X' in the following chemical reaction is :



(1) 

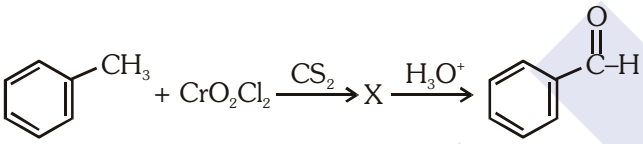
(2) 

(3) 

(4) 

Ans. (1)

Sol.



Toluene Benzaldehyde

X =