69. A ray of light is incident on a 60° prism at the minimum deviation position. The angle of refraction at the first face (i.e., incident face) of the prism is

(1) Zero (2) 30°

(3) 45° (4) 60°

Ans. (2)

Sol. In minimum deviation

$r_1 = r_2 = r$

$A = 2r$

$r = \frac{60}{2} = 30°$

70. For transistor action

(a) Base, emitter and collector regions should have similar size and doping concentrations.

(b) The base region must be very thin and lightly doped.

(c) The emitter-base junction is forward biased and base-collector junction is reverse baised.

(d) Both the emitter-base junction as well as the base collector junction are forward biased

Which one of the following pairs of statements is correct?

(1) (d), (a) (2) (a), (b)

(3) (b), (c) (4) (c), (d)

Ans. (3)

71. The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M, to transfer it from a circular orbit of radius R_1 to another of radius R_2 $(R_2 > R_1)$ is

(1) $GmM\left(\frac{1}{R_1^2} - \frac{1}{R_2^2}\right)$ (2) $GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(3) $2GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ (4) $\frac{1}{2}GmM\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

Ans. (4)

Sol. $-\frac{GMm}{2R_1} + KE = -\frac{GMm}{2R_2}$

$KE = \frac{GMm}{2}\left|\frac{1}{R_1} - \frac{1}{R_2}\right|$

72. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is

(1) 60° (2) 15°

(3) 30° (4) 45°

Ans. (1)

Sol. $v' = v_0\cos\theta$

$\frac{v_0}{2} = v_0\cos\theta$

$\cos\theta = \frac{1}{2}$

$\theta = 60°$

73. From a circular disc of radius R and mass $9M$, a small disc of mass M and radius $\frac{R}{3}$ is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is

(1) $\frac{40}{9}MR^2$ (2) MR^2

(3) $4\ MR^2$ (4) $\frac{4}{9}MR^2$

Ans. (1)

Sol. $I = I_1 - I_2$

$= \frac{9MR^2}{2} - \frac{MR^2}{18}$

$= \frac{81MR^2 - MR^2}{18}$

$= \frac{40\ MR^2}{9}$

74. A particle moves in x-y plane according to rule $x = a\sin\omega t$ and $y = a\cos\omega t$. The particle follows

(1) An elliptical path

(2) A circular path

(3) A parabolic path

(4) A straight line path inclined equally to x and y-axes

Ans. (2)

Sol. $\frac{x}{a} = \sin\omega t$

$\frac{y}{a} = \cos\omega t$

$\frac{y^2}{a^2} + \frac{x^2}{a^2} = 1$

$y^2 + x^2 = a^2$

75. A closely wound solenoid of 2000 turns and area of cross-section 1.5×10^{-4} m^2 carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be

(1) 3×10^{-3} N.m (2) 1.5×10^{-3} N.m

(3) 1.5×10^{-2} N.m (4) 3×10^{-2} N.m

Ans. (3)

Sol. $M = 2000 \times 1.5 \times 10^{-4} \times 2$

$= 6 \times 10^{-1}$

$\tau = MB\sin 30$

$= 0.6 \times 5 \times 10^{-2} \times \frac{1}{2}$

$\tau = 1.5 \times 10^{-2}$ Nm

76. The decay constant of a radio isotope is λ. If A_1 and A_2 are its activities at times t_1 and t_2 respectively, the number of nuclei which have decayed during the time $(t_1 - t_2)$

(1) $A_1 t_1 - A_2 t_2$ (2) $A_1 - A_2$

(3) $(A_1 - A_2)/\lambda$ (4) $\lambda(A_1 - A_2)$

Ans. (3)

Sol. $A_1 = \lambda N_1$

$A_2 = \lambda N_2$

$N_1 - N_2 = \left[\frac{A_1 - A_2}{\lambda}\right]$

77. A particle having a mass of 10^{-2} kg carries a charge of 5×10^{-8} C. The particle is given an initial horizontal velocity of 10^5 ms^{-1} in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that

(a) $\vec{B}$ should be perpendicular to the direction of velocity and $\vec{E}$ should be along the direction of velocity

(b) Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity

(c) Both $\vec{B}$ and $\vec{E}$ are mutually perpendicular and perpendicular to the direction of velocity

(d) $\vec{B}$ should be along the direction of velocity and $\vec{E}$ should be perpendicular to the direction of velocity

Which one of the following pairs of statements is possible?

(1) (a) and (c) (2) (c) and (d)

(3) (b) and (c) (4) (b) and (d)

Ans. (3)

78. The binding energy per nucleon in deuterium and helium nuclei are 1.1 MeV and 7.0 MeV, respectively. When two deuterium nuclei fuse to form a helium nucleus the energy released in the fusion is

(1) 23.6 MeV (2) 2.2 MeV

(3) 28.0 MeV (4) 30.2 MeV

Ans. (1)

Sol. $\Delta E = (28 - 4.4)$ MeV

$\Delta E = 23.6$ MeV

79. The electron in the hydrogen atom jumps from excited state ($n = 3$) to its ground state ($n = 1$) and the photons thus emitted irradiate a photosensitive material. If the work function of the material is 5.1 eV, the stopping potential is estimated to be (the energy of the electron in n^{th} state $E_n = -\frac{13.6}{n^2} eV$)

(1) 5.1 V (2) 12.1 V

(3) 17.2 V (4) 7 V

Ans. (4)

Sol. $V = (12.1 - 5.1)$ volt

$V_{stopping} = 7$ V

80. If c_p and c_v denote the specific heats (per unit mass) of an ideal gas of molecular weight M

(1) $C_p - C_v = R/M^2$ (2) $C_p - C_v = R$

(3) $C_p - C_v = R/M$ (4) $C_p - C_v = MR$

where R is the molar gas constant

Ans. (3)

Sol. $C_p - C_v = R$

$MC_p - MC_v = R$

$C_p - C_v = \frac{R}{M}$

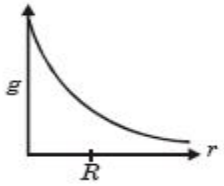
81. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is

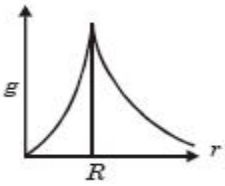
(1) $\left(\frac{C(V_1 - V_2)^2}{L}\right)^{\frac{1}{2}}$ (2) $\frac{C(V_1^2 - V_2^2)}{L}$

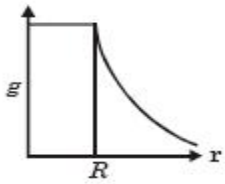
(3) $\frac{C(V_1^2 + V_2^2)}{L}$ (4) $\left(\frac{C(V_1^2 - V_2^2)}{L}\right)^{\frac{1}{2}}$

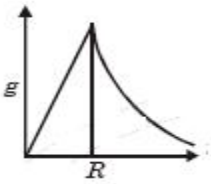
Ans. (4)

82. The dependence of acceleration due to gravity g on the distance r from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in figures below

(a) 

(b) 

(c) 

(d) 

The correct figure is

(1) (d) (2) (a)

(3) (b) (4) (c)

Ans. (1)

83. A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on a inclined plane. Both roll down without slipping. Which one will reach the bottom first?

(1) Both together only when angle of inclination of plane is 45°

(2) Both together

(3) Hollow cylinder

(4) Solid cylinder

Ans. (4)

Sol. $t = \sqrt{\dfrac{2\ell\left(1+\dfrac{k^2}{R^2}\right)}{g\sin\theta}}$

ℓ = length of incline plane

84. The thermo e.m.f. E in volts of a certain thermo-couple is found to vary with temperature difference θ in °C between the two junctions according to the relation

$$E = 30\theta - \frac{\theta^2}{15}$$

The neutral temperature for the thermo-couple will be

(1) 450°C (2) 400°C

(3) 225°C (4) 30°C

Ans. (3)

Sol. At neutral temperature

$$\frac{dE}{d\theta} = 0$$

$$30 - \frac{2\theta}{15} = 0$$

$$\theta = 225\ °C$$

85. (a) Centre of gravity (C.G.) of a body is the point at which the weight of the body acts

(b) Centre of mass coincides with the centre of gravity if the earth is assumed to have infinitely large radius

(c) To evaluate the gravitational field intensity due to anv body at an external point, the entire mass of the body can be considered to be concentrated at its C.G.

(d) The radius of gyration of any body rotating about an axis is the length of the perpendicular dropped from the C.G. of the body to the axis

Which one of the following pairs of statements is correct?

(1) (d) and (a) (2) (a) and (b)

(3) (b) and (c) (4) (c) and (d)

Ans. (1)

86. The magnetic moment of a diamagnetic atom is

(1) Much greater than one

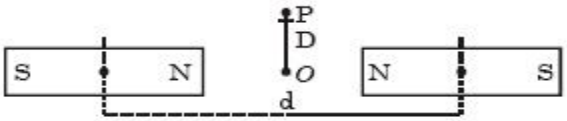
(2) 1

(3) Between zero and one

(4) Equal to zero

Ans. (4)

87. Two identical bar magnets are fixed with their centres at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at a distance D from the centre O as shown in the figure



The force on the charge Q is

(1) Zero

(2) Directed along OP

(3) Directed along PO

(4) Directed perpendicular to the plane of paper

Ans. (1)

88. A particle of mass M starting from rest undergoes uniform acceleration. If the speed acquired in time T is V, the power delivered to the particle is

(1) $\frac{MV^2}{T}$ (2) $\frac{1}{2}\frac{MV^2}{T^2}$

(3) $\frac{MV^2}{T^2}$ (4) $\frac{1}{2}\frac{MV^2}{T}$

Ans. (4)

89. A thin circular ring of mass M and radius r is rotating about its axis with constant angular velocity ω. Two objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring now rotates with angular velocity given by

(1) $\frac{(M+2m)\omega}{2m}$ (2) $\frac{2M\omega}{M+2m}$

(3) $\frac{(M+2m)\omega}{M}$ (4) $\frac{M\omega}{M+2m}$

Ans. (4)

Sol. $MR^2\omega = (M + 2m)R^2\omega'$

$$\boxed{\omega' = \frac{m\omega}{(M+2m)}}$$

90. A monoatomic gas at pressure P_1 and V_1 is compressed adiabatically to $\frac{1}{8}$th its original volume. What is the final pressure of the gas?

(1) $64\,P_1$ (2) P_1

(3) $16\,P_1$ (4) $32\,P_1$

Ans. (4)

Sol. $PV^{5/3} = P'\left(\frac{V}{8}\right)^{5/3}$

$P' = P(8)^{5/3}$

$= P \times 2^5$

$P' = 32P$

91. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is

(1) Mg < Ca < Cl < P (2) Cl < P < Mg < Ca

(3) P < Cl < Ca < Mg (4) Ca < Mg < P < Cl

Ans. (2)

Sol. In a period size decreases from left to right.

92. The reaction

$$2A(g) + B(g) \rightleftharpoons 3C(g) + D(g)$$

is begun with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression

(1) $[(0.75)^3(0.25)] + [(1.00)^2(1.00)]$

(2) $[(0.75)^3(0.25)] + [(0.50)^2(0.75)]$

(3) $[(0.75)^3(0.25)] + [(0.50)^2(0.25)]$

(4) $[(0.75)^3(0.25)] + [(0.75)^2(0.25)]$

Ans. (2)

Sol.

	2A	+ B	⇌ 3C	+ D
Initial	1	1	0	0
Eq.	1 – 0.50	1 – 0.25	0.75	0.25

$$K = \frac{(0.75)^3(0.25)}{(0.50)^2(0.75)}$$

93. Which of the following expressions correctly represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$. Given that $\Lambda^\circ_{Al^{3+}}$ and $\Lambda^\circ_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

(1) $2\Lambda^\circ_{Al^{3+}} + 3\Lambda^\circ_{SO_4^{2-}}$ (2) $\Lambda^\circ_{Al^{3+}} + \Lambda^\circ_{SO_4^{2-}}$

(3) $(\Lambda^\circ_{Al^{3+}} + \Lambda^\circ_{SO_4^{2-}}) \times 6$ (4) $\frac{1}{3}^{\Lambda^\circ} Al^{3+} + \frac{1}{2}^{\Lambda^\circ} SO_4^{2-}$

Ans. (2)

Sol. As equivalent conductance are given for ions.

94. The pressure exerted by 6.0 g of methane gas in a 0.03 m^3 vessel at 129°C is (Atomic masses : C = 12.01, H = 1.01 and R = 8.314 JK^{-1} mol^{-1})

(1) 215216 Pa (2) 13409 Pa

(3) 41648 Pa (4) 31684 Pa

Ans. (3)

Sol. PV = nRT

$$P = \frac{6}{16.05} \times \frac{8.314 \times 402}{0.03} = 41648 \text{ Pa}$$

95. Match List-I (Equations) with List-II (Type of process) and select the correct option

List-I Equations	List-II Type of processes
a. $K_p > Q$	(i) Non-spontaneous
b. $\Delta G^\circ < RT \ln Q$	(ii) Equilibrium
c. $K_p = Q$	(iii) Spontaneous and endothermic
d. $T > \frac{\Delta H}{\Delta S}$	(iv) Spontaneous

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

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

Ans. (3)

Sol. $K_p > Q \rightarrow$ Reaction moves in forward direction.

$\Delta G < RT\ln Q$, ΔG = +ve = reaction non-spontaneous

$K_p = Q$ = Reaction is equilibrium

$T > \frac{\Delta H}{\Delta S} = \Delta H$ = +ve, endothermic

Thus, $\Delta H < T\Delta S$ spontaneous

96. Among the following four compounds

a. Phenol b. Methyl phenol

c. Metanitrophenol d. Paranitrophenol

The acidity order is

(1) d > c > a > b (2) c > d > a > b

(3) a > d > c > b (4) b > a > c > d

Ans. (1)

Sol. Withdrawing group increasing the acidic character and electron donating group decreases the acidic characters.

97. Among the following which one has the highest cation to anion size ratio?

(1) CsI (2) CsF

(3) LiF (4) NaF

Ans. (2)

Sol. $Cs^+ > Li^+ \rightarrow$ atomic radii

$I^- > F^- \rightarrow$ atomic radii

$\therefore$ CsF has highest cation to anion size ratio

98. Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be

(1) Infinite (2) 3 Joules

(3) 9 Joules (4) Zero

Ans. (4)

Sol. In vacuum, $P_{ext} = 0$

$W = 0$

99. Which of the following species is not electrophilic in nature?

(1) $\overset{\oplus}{C}l$ (2) BH_3

(3) $H_3\overset{\oplus}{O}$ (4) $\overset{\oplus}{N}O_2$

Ans. (3)

Sol. Cl^+, BH_3, $\overset{\oplus}{N}O_2$ are electron deficient.

100. A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be

($h = 6.6 \times 10^{-34}$ Js)

(1) 6.6×10^{-32} m (2) 6.6×10^{-34} m

(3) 1.0×10^{-35} m (4) 1.0×10^{-32} m

Ans. (3)

Sol. $\lambda = \frac{h}{mv}$

$= \frac{6.6\times10^{-34}}{0.66\times100} = 10^{-35}$ m

101. Consider the following relations for emf of a electrochemical cell

(a) emf of cell = (Oxidation potential of anode) – (Reduction potential of cathode)

(b) emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)

(c) emf of cell = (Reductional potential of anode) + (Reduction potential of cathode)

(d) emf of cell = (Oxidation potential of anode) – (Oxidation potential of cathode)

Which of the above relations are correct?

Options:

(1) (c) and (a) (2) (a) and (b)

(3) (c) and (d) (4) (b) and (d)

Ans. (4)

Sol. $E_{cell} = E^\circ_{cathode\ (Red)} - E^\circ_{Anode\ (Red)}$

or

$E_{cell} = E^\circ_{cathode\ (Red)} - E^\circ_{Anode\ (oxid)}$

or

$E_{cell} = E^\circ_{Anode\ (oxid)} - E^\circ_{cathode\ (oxid)}$

102. In which of the following molecules the central atom does not have sp^3 hybridization?

(1) CH_4 (2) SF_4

(3) BF_4^- (4) NH_4^+

Ans. (2)

Sol. $SF_4 = sp^3d$

103. For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8 JK^{-1} mol^{-1}, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is

(1) 273.4 K (2) 393.4 K

(3) 373.4 K (4) 293.4 K

Ans. (3)

Sol. $\Delta G = \Delta H - T\Delta S$

$\Delta G = 0$

$\Delta H = T\Delta S$,

$$T = \frac{40.63 \times 10^3}{108.8} = 373.4\,K$$

104. Match List-I (substances) with List-II (process) employed in the manufacture of the substances and select the correct option

List-I Substances	List-II Processes
a. Sulphuric acid	(i) Haber's Process
b. Steel	(ii) Bessemer's Process
c. Sodium hydroxide	(iii) Leblanc Process
d. Ammonia	(iv) Contact Process

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

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

Ans. (4)

Sol. Fact.

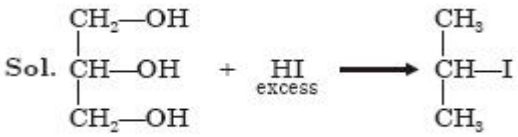
105. When glycerol is treated with excess of HI, it produces

(1) 2-iodopropane (2) Allyl iodide

(3) Propene (4) Glycerol triiodide

Ans. (1)

Sol.



106. Some statements about heavy water are given below

a. Heavy water is used as a moderator in nuclear reactors

b. Heavy water is more associated than ordinary water

c. Heavy water is more effective solvent than ordinary water

Which of the above statements are correct?

(1) a and b (2) a, b and c

(3) b and c (4) a and c

Ans. (1)

Sol. Dielectric constant of $H_2O > D_2O$. Therefore, H_2O is more effective solvent.

B.P. of D_2O > B.P. of H_2O.

107. The compound A on heating gives a colourless gas and a residue that is dissolved in water to obtain B. Excess of CO_2 is bubbled through aqueous solution of B, C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound is

(1) $CaCO_3$ (2) Na_2CO_3

(3) K_2CO_3 (4) $CaSO_4.2H_2O$

Ans. (1)

Sol. A $\rightarrow$ $CaCO_3$

B $\rightarrow$ $Ca(OH)_2$

C $\rightarrow$ $Ca(HCO_3)_2$

108. Match the compounds given in List-I with their characteristic reactions given in List-II. Select the correct option

List-I (Compounds)	List-II (Reactions)
a. $CH_3CH_2CH_2CH_2NH_2$	(i) Alkaline hydrolysis
b. $CH_3C{\equiv}CH$	(ii) With KOH (alcohol) and $CHCl_3$ produces bad smell
c. $CH_3CH_2COOCH_3$	(iii) Gives white ppt. with ammoniacal $AgNO_3$
d. $CH_3CH(OH)CH_3$	(iv) With Lucas reagent cloudiness appears after 5 minutes

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

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

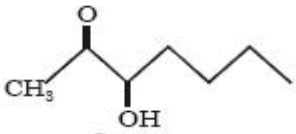
(3) a(ii), b(iii), c(i), d(iv)

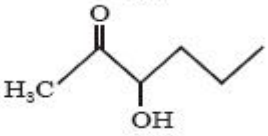
(4) a(iv), b(ii), c(iii), d(i)

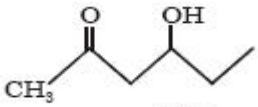
Ans. (3)

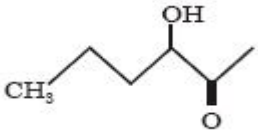
Sol. Fact.

109. Which one of the following compounds will be most readily dehydrated?

(1) 

(2) 

(3) 

(4) 

Ans. (3)

Sol. As carbocation intermediate, more the stability of carbocation, faster the rate of dehydration.

110. The rate of the reaction

$2NO + Cl_2 \rightarrow 2NOCl$ is given by the rate equation

rate = $k[NO]^2[Cl_2]$

The value of the rate constant can be increased by

(1) Increasing the temperature

(2) Increasing the concentration of NO

(3) Increasing the concentration of the Cl_2

(4) Doing all of these

Ans. (1)

Sol. Concentration do not affect rate constant.

111. Which one of the following complexes is **not** expected to exhibit isomerism?

(1) $[Ni(NH_3)_4 (H_2O)_2]^{2+}$

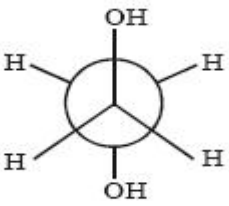
(2) $[Pt (NH_3)_2 Cl_2]$

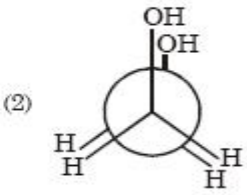
(3) $[Ni (NH_3)_2 Cl_2]$

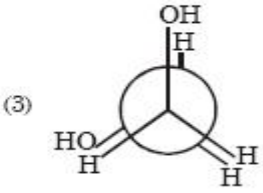
(4) $[Ni (en)_3]^{2+}$

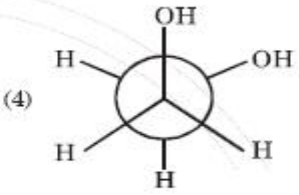
Ans. (3)

112. Which of the following conformers for ethylene glycol is most stable?

(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. Intramolecular H-bonding.

113. The IUPAC name of the compound $CH_3CH{=}CHC{\equiv}CH$ is

(1) Pent-4-yn-2-ene (2) Pent-3-en-1-yne

(3) Pent-2-en-4-yne (4) Pent-1-yn-3-ene

Ans. (2)

Sol. Fact.

114. Which of the following oxidation states is the most common among the lanthanoids?

(1) 4 (2) 2

(3) 5 (4) 3

Ans. (4)

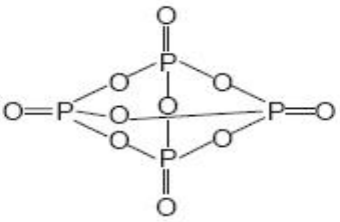
Sol. Fact

115. How many bridging oxygen atoms are present in P_4O_{10}?

(1) 6 (2) 4

(3) 2 (4) 5

Ans. (1)

Sol. 

116. Some of the properties of the two species, NO_3^- and H_3O^+ are described below. Which one of them is correct?

(1) Dissimilar in hybridization for the central atom with different structures

(2) Isostructural with same hybridization for the central atom

(3) Isostructural with different hybridization for the central atom

(4) Similar in hybridization for the central atom with different structures

Ans. **(1)**

Sol. $NO_3^{\ominus} = sp^2$

$H_3O^+ = sp^3$

117. The following two reactions are known :

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$;

$\Delta H = -26.8$ kJ

$FeO(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$;

$\Delta H = -16.5$ kJ

The value of ΔH for the following reaction

$Fe_2O_3(s) + CO(g) \rightarrow 2FeO(s) + CO_2(g)$ is

(1) +10.3 kJ (2) – 43.3 kJ

(3) –10.3 kJ (4) +6.2 kJ

Ans. (4)

Sol. (1) – 2(2)

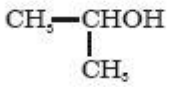
i.e. – 26.8 – (2)(–16.5)

= 6.2 kJ

118. Following compounds are given

a. CH_3CH_2OH

b. CH_3COCH_3

c. 

d. CH_3OH

Which of the above compound(s), on being warmed with iodine solution and NaOH, will give iodoform?

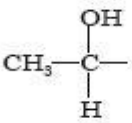
(1) a, c and d

(2) Only b

(3) a, b and c

(4) a and b

Ans. **(3)**

Sol. Terminal  or  show positive iodoform test.

119. Fructose reduces Tollen's reagent due to

(1) Asymmetric carbons

(2) Primary alcoholic group

(3) Secondary alcoholic group

(4) Enolisation of fructose followed by conversion to aldehyde by base

Ans. **(4)**

Sol. Fact.

120. In the following reaction

$$C_6H_5CH_2Br \xrightarrow[2.\ H_3O^+]{1.\ Mg,\ Ether} X,$$

the product 'X' is

(1) $C_6H_5CH_2OCH_2C_6H_5$

(2) $C_6H_5CH_2OH$

(3) $C_6H_5CH_3$

(4) $C_6H_5CH_2CH_2C_6H_5$

Ans. **(3)**

Sol. $C_6H_5CH_2Br \xrightarrow{Mg,\ ether} C_6H_5CH_2MgBr \xrightarrow{H_3O^+} C_6H_5CH_3 + Mg(Br)(OH)$