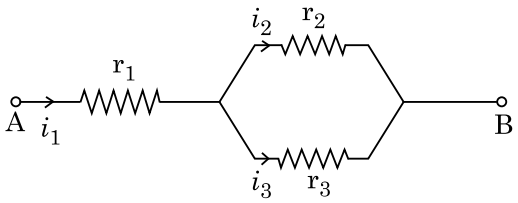
49. Three resistors having resistances r_1, r_2 and r_3 are connected as shown in the given circuit. The ratio $\frac{i_3}{i_1}$ of currents in terms of resistances used in the circuit is :



(1) $\frac{r_1}{r_2+r_3}$

(2) $\frac{r_2}{r_2+r_3}$

(3) $\frac{r_1}{r_1+r_2}$

(4) $\frac{r_2}{r_1+r_3}$

50. From a circular ring of mass 'M' and radius 'R' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is 'K' times 'MR^2'. Then the value of 'K' is :

(1) $\frac{3}{4}$

(2) $\frac{7}{8}$

(3) $\frac{1}{4}$

(4) $\frac{1}{8}$

Section - A (Chemistry)

51. 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) $C_V = RC_P$

52. 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

53. 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.

54. 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) Hofmann Rule

(4) Huckel's Rule

55. The compound which shows metamerism is :

(1) C_5H_{12}

(2) C_3H_8O

(3) C_3H_6O

(4) $C_4H_{10}O$

56. 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

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

(1) NaCl solution

(2) Glucose solution

(3) Starch solution

(4) Urea solution

58. 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

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

(1) Electrolysis

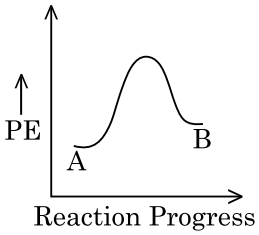
(2) Chromatography

(3) Distillation

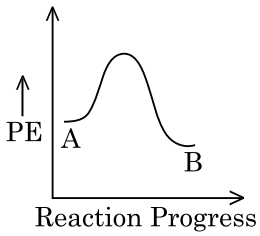
(4) Zone refining

60. 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)



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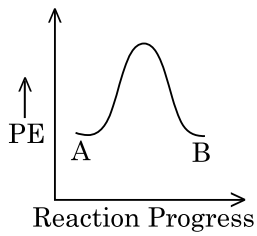

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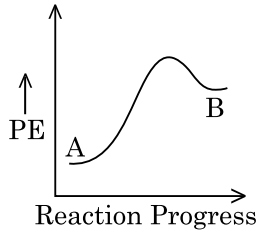


61. Which one of the following polymers is prepared by addition polymerisation ?

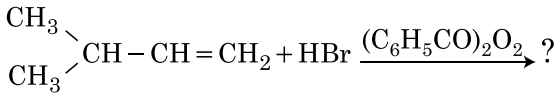
(1) Teflon

(2) Nylon-66

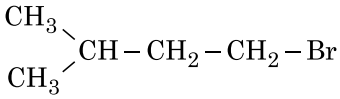
(3) Novolac

(4) Dacron

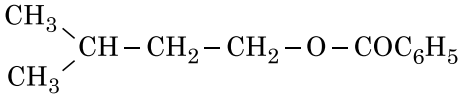
62. The major product of the following chemical reaction is :



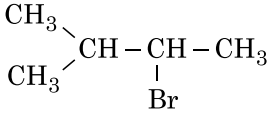
(1)



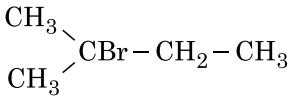
(2)



(3)

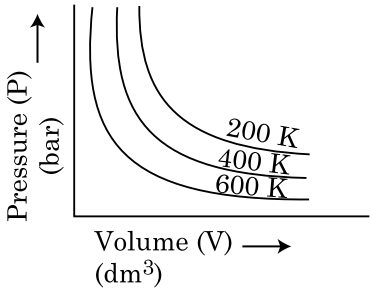


(4)

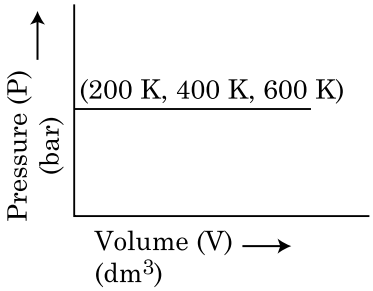


63. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures :

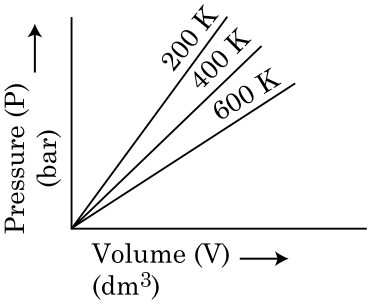
(1)



(2)



(3)



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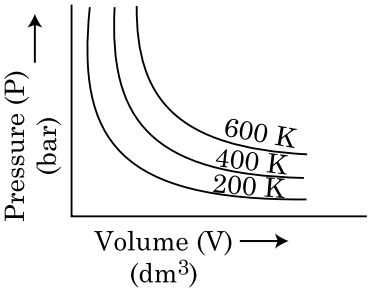


64. Dihedral angle of least stable conformer of ethane is :

(1) 120°
(2) 180°
(3) 60°
(4) 0°

65. An organic compound 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

66. 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

67. 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) $P_3 > P_1 > P_2$

68. 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

69. 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}

70. 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

71. 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

72. 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

73. 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) $CH_3-Cl > CH_3-F > CH_3-Br > CH_3-I$

74. 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

75. 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

76. 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.

77. 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)

78. **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.

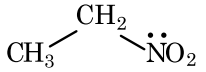
(1) Both **Statement I** and **Statement II** are true.

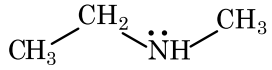
(2) Both **Statement I** and **Statement II** are false.

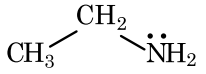
(3) **Statement I** is correct but **Statement II** is false.

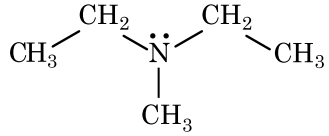
(4) **Statement I** is incorrect but **Statement II** is true.

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

(1) 

(2) 

(3) 

(4) 

80. 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

81. 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) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2\uparrow$

Space For Rough Work

Space For Rough Work