CHEMISTRY

SECTION-A

51. Which of the following statements are **NOT** correct?

A. Hydrogen is used to reduce heavy metal oxides to metals.

B. Heavy water is used to study reaction mechanism.

C. Hydrogen is used to make saturated fats from oils.

D. The H–H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any elements.

E. Hydrogen reduces oxides of metals that are more active than iron.

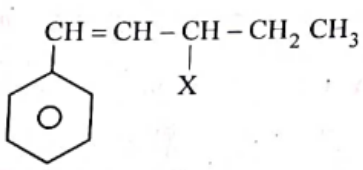
Choose the **most appropriate** answer from the options given below:

(1) B, C, D, E only (2) B, D only

(3) D, E only (4) A, B, C only

Answer (3)

52. The given compound



is an example of _____.

(1) Benzylic halide (2) Aryl halide

(3) Allylic halide (4) Vinylic halide

Answer (3)

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

	List-I		**List-II**
A.	Coke	I.	Carbon atoms are sp^3 hybridised
B.	Diamond	II.	Used as a dry lubricant
C.	Fullerene	III.	Used as a reducing agent
D.	Graphite	IV.	Cage like molecules

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

(1) A-II, B-IV, C-I, D-III (2) A-IV, B-I, C-II, D-III

(3) A-III, B-I, C-IV, D-II (4) A-III, B-IV, C-I, D-II

Answer (3)

54. In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of

(1) $Fe_4[Fe(CN)_6]_3 \cdot xH_2O$ (2) NaSCN

(3) $[Fe(CN)_5NOS]^{4-}$ (4) $[Fe(SCN)]^{2+}$

Answer (4)

55. Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

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

(1) Both **A** and **R** are true and **R** is the correct explanation of **A**

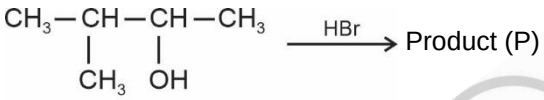
(2) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**

(3) **A** is true but **R** is false

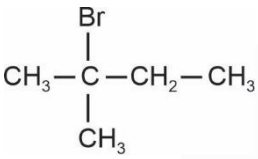
(4) **A** is false but **R** is true

Answer (2)

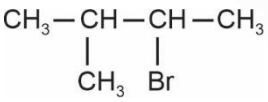
56. Consider the following reaction and identify the product (P).

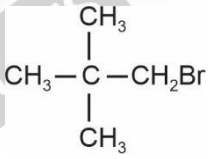


3-Methylbutan-2-ol

(1) 

(2) $CH_3CH = CH - CH_3$

(3) 

(4) 

Answer (1)

57. Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $T\ell Cl_3 > T\ell Cl$

(2) $InI_3 > InI$

(3) $AlCl > AlCl_3$

(4) $T\ell I > T\ell I_3$

Answer (4)

58. The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is

(1) $l = \frac{n_m - 1}{2}$

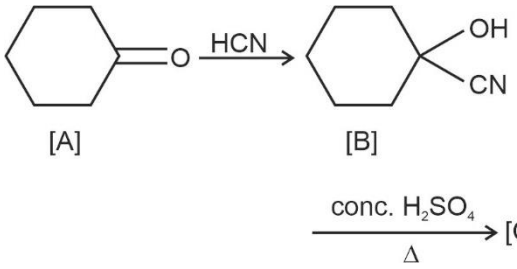
(2) $l = 2n_m + 1$

(3) $n_m = 2l^2 + 1$

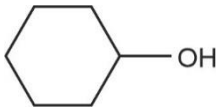
(4) $n_m = l + 2$

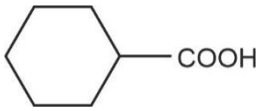
Answer (1)

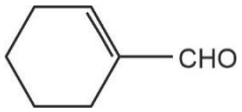
59. Complete the following reaction

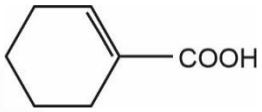


[C] is _____

(1) 

(2) 

(3) 

(4) 

Answer (4)

60. The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40) $\left[CaCO_3 \xrightarrow{1200\ K} CaO + CO_2\right]$

(1) 1.12 g
(2) 1.76 g
(3) 2.64 g
(4) 1.32 g

Answer (2)

61. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : In equation $\Delta_rG = -nFE_{cell}$, value of Δ_rG depends on n.

Reasons R : E_{cell} is an intensive property and Δ_rG is an extensive property.

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

(1) Both **A** and **R** are true and **R** is the correct explanation of **A**
(2) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**
(3) **A** is true but **R** is false
(4) **A** is false but **R** is true

Answer (2)

62. Amongst the given options which of the following molecules/ ion acts as a Lewis acid?

(1) NH_3
(2) H_2O
(3) BF_3
(4) OH^-

Answer (3)

63. Homoleptic complex from the following complexes is

(1) Potassium trioxalatoaluminate (III)
(2) Diamminechloridonitrito-N-platinum (II)
(3) Pentaamminecarbonatocobalt (III) chloride
(4) Triamminetriaquachromium (III) chloride

Answer (1)

64. The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(1) 11, 2, 0 (2) 12, 3, 0

(3) 11, 3, 1 (4) 12, 2, 1

Answer (3)

65. Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :

A. dipole - dipole forces

B. dipole - induced dipole forces

C. hydrogen bonding

D. covalent bonding

E. dispersion forces

Choose the **most appropriate** answer from the options given below :

(1) B, C, D, E are correct (2) A, B, C, D are correct

(3) A, B, C, E are correct (4) A, C, D, E are correct

Answer (3)

66. Select the **correct** statements from the following

A. Atoms of all elements are composed of two fundamental particles.

B. The mass of the electron is 9.10939×10^{-31} kg.

C. All the isotopes of a given element show same chemical properties:

D. Protons and electrons are collectively known as nucleons.

E. Dalton's atomic theory, regarded the atom as an ultimate particles of matter

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

(1) A, B and C only (2) C, D and E only

(3) A and E only (4) B, C and E only

Answer (4)

67. Some tranquilizers are listed below. Which one from the following belongs to barbiturates?

(1) Chlordiazepoxide (2) Meprobamate

(3) Valium (4) Veronal

Answer (4)

68. Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reason R : Helium has high solubility in O_2.

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

(1) Both **A** and **R** are true and **R** is the correct explanation of **A**

(2) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**

(3) **A** is true but **R** is false

(4) **A** is false but **R** is true

Answer (2)

69. Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.

Reason R : The deep blue solution is due to the formation of amide.

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

(1) Both **A** and **R** are true and **R** is the correct explanation of **A**

(2) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

(3) **A** is true but **R** is false

(4) **A** is false but **R** is true

Answer (3)

70. Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 16 (2) 32

(3) 30 (4) 18

Answer (2)

71. The **correct** order of energies of molecular orbitals of N_2 molecule, is

(1) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

(3) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$

(4) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma 2p_z < \sigma^* 2p_z$

Answer (1)

72. Amongst the following, the total number of species NOT having eight electrons around central atom in its outermost shell, is

NH_3, $AlCl_3$, $BeCl_2$, CCl_4, PCl_5 :

(1) 3 (2) 2

(3) 4 (4) 1

Answer (1)

73. Which one is an example of heterogenous catalysis?

(1) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen

(2) Hydrolysis of sugar catalysed by H^+ ions

(3) Decomposition of ozone in presence of nitrogen monoxide

(4) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron

Answer (4)

74. Which one of the following statements is **correct**?

(1) The daily requirement of Mg and Ca in the human body is estimated to be 0.2-0.3 g

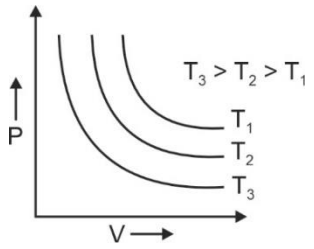
(2) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor

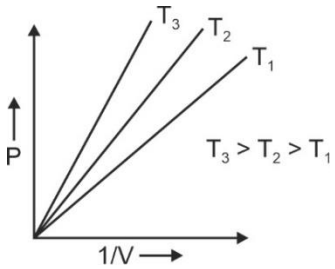
(3) The bone in human body is an inert and unchanging substance

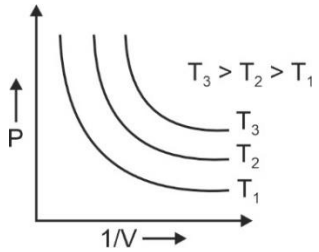
(4) Mg plays roles in neuromuscular function and interneuronal transmission

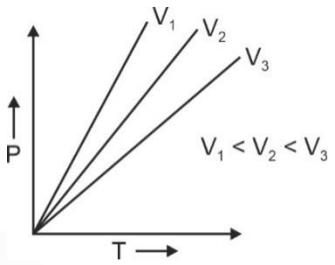
Answer (1)

75. Which amongst the following options are **correct** graphical representation of Boyle's law?

(1) 

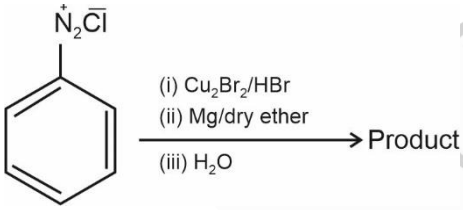
(2) 

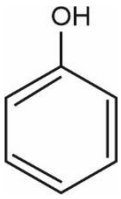
(3) 

(4) 

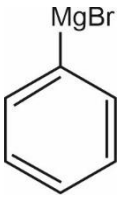
Answer (2)

76. Identify the product in the following reaction:



(1) 

(2) 

(3) 

(4) 

Answer (2)

77. Which amongst the following molecules on polymerization produces neoprene?

(1) $H_2C = CH - CH = CH_2$

(2) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

(3) $H_2C = CH - C \equiv CH$

(4) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

Answer (2)

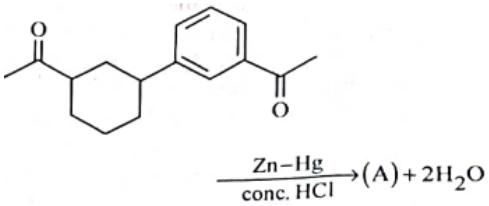
78. The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm^{-1} cm^{-1} and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is

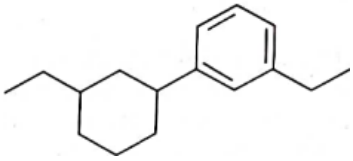
(1) 1.34 cm^{-1} (2) 3.28 cm^{-1}

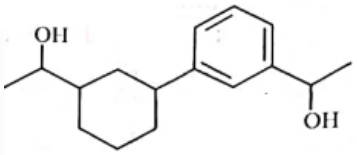
(3) 1.26 cm^{-1} (4) 3.34 cm^{-1}

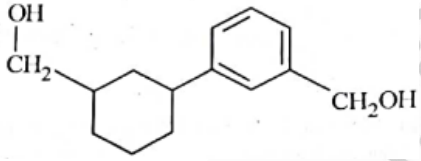
Answer (3)

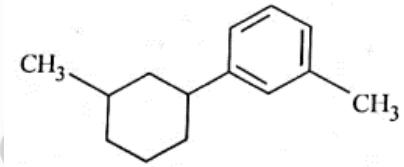
79. Identify product (A) in the following reaction:



(1) 

(2) 

(3) 

(4) 

Answer (1)

80. The stability of Cu^{2+} is more than Cu^{+} salts in aqueous solution due to

(1) First ionisation enthalpy (2) Enthalpy of atomization

(3) Hydration energy (4) Second ionisation enthalpy

Answer (3)

81. For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

(1) Decrease by a factor of nine (2) Increase by a factor of six

(3) Increase by a factor of nine (4) Increase by a factor of three

Answer (3)

82. Given below are two statements :

Statement I : A unit formed by the attachment of a base to 1′ position of sugar is known as nucleoside.

Statement II : When nucleoside is linked to phosphorous acid at 5′ -position of sugar moiety, we get nucleotide.

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 true but Statement **II** is false (4) Statement **I** is false but Statement **II** is true

Answer (3)

83. Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3CONH_2 \xrightarrow{Br_2/KOH} Product$

(2) $CH_3CN \xrightarrow[(ii)\ H_3O^{\oplus}]{(i)\ LiAlH_4} Product$

(3) $CH_3NC \xrightarrow[(ii)\ H_3O^{\oplus}]{(i)\ LiAlH_4} Product$

(4) $CH_3CONH_2 \xrightarrow[(ii)\ H_3O^{\oplus}]{(i)\ LiAlH_4} Product$

Answer (3)

84. The element expected to form largest ion to achieve the nearest noble gas configuration is

(1) O

(2) F

(3) N

(4) Na

Answer (3)

85. A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of x + y is in option

(1) 5

(2) 4

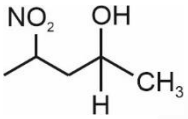
(3) 3

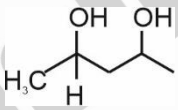
(4) 2

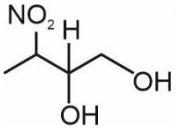
Answer (1)

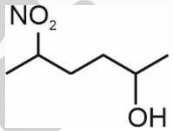
SECTION-B

86. Which amongst the following will be most readily dehydrated under acidic conditions?

(1) 

(2) 

(3) 

(4) 

Answer (2)

87. Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

(1) $\Delta H = \Delta U - \Delta n_g RT$

(2) $\Delta H = \Delta U + \Delta n_g RT$

(3) $\Delta H - \Delta U = -\Delta nRT$

(4) $\Delta H + \Delta U = \Delta nR$

Answer (2)

88. Match **List-I** with **List-II** :

	List-I (Oxoacids of Sulphur)		**List-II (Bonds)**
A.	Peroxodisulphuric acid	I.	Two S–OH, Four S=O, One S–O–S
B.	Sulphuric acid	II.	Two S–OH, One S=O
C.	Pyrosulphuric acid	III.	Two S–OH, Four S=O, One S–O–O–S
D.	Sulphurous acid	IV.	Two S–OH, Two S=O

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

(1) A–I, B–III, C–II, D–IV

(2) A–III, B–IV, C–I, D–II

(3) A–I, B–III, C–IV, D–II

(4) A–III, B–IV, C–II, D–I

Answer (2)

89. Which of the following statements are **INCORRECT**?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

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

(1) A and E only

(2) B and D only

(3) C and D only

(4) B and C only

Answer (3)

90. Which complex compound is most stable?

(1) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

(2) $\left[Co(NH_3)_3(NO_3)_3\right]$

(3) $\left[CoCl_2(en)_2\right]NO_3$

(4) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

Answer (3)

91. The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

(1) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

(2) $FeO + CO \rightarrow Fe + CO_2$

(3) $C + CO_2 \rightarrow 2CO$

(4) $CaO + SiO_2 \rightarrow CaSiO_3$

Answer (1)

92. The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. ΔG^o for the reaction is (R = 2 cal/mol K)

(1) 1372.60 cal

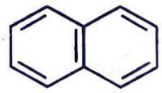
(2) –137.26 cal

(3) –1381.80 cal

(4) –13.73 cal

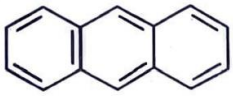
Answer (3)

93. Consider the following compounds/species:

i.  ii. 

iii.  iv. 

v.  vi. 

vii. 

The number of compounds/species which obey Huckel's rule is _____.

(1) 4 (2) 6

(3) 2 (4) 5

Answer (1)

94. On balancing the given redox reaction,

$$aCr_2O_7^{2-} + bSO_3^{2-}(aq) + cH^+(aq) \rightarrow 2aCr^{3+}(aq) + bSO_4^{2-}(aq) + \frac{c}{2}H_2O(l)$$

the coefficients a, b and c are found to be, respectively-

(1) 1, 3, 8 (2) 3, 8, 1

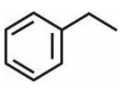
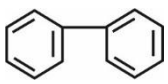
(3) 1, 8, 3 (4) 8, 1, 3

Answer (1)

95. Identify the final product [D] obtained in the following sequence of reactions.

$$CH_3CHO \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4} [A] \xrightarrow[\Delta]{H_2SO_4} [B]$$

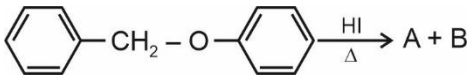
$$\xrightarrow{HBr} [C] \xrightarrow[Na/dry\ ether]{Br} [D]$$

(1)  (2) 

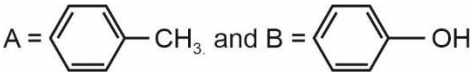
(3) C_4H_{10} (4) $HC \equiv C^{\ominus}Na^+$

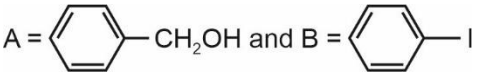
Answer (1)

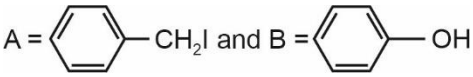
96. Consider the following reaction :

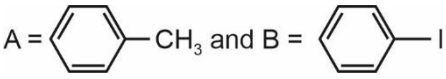


Identify products A and B.

(1) 

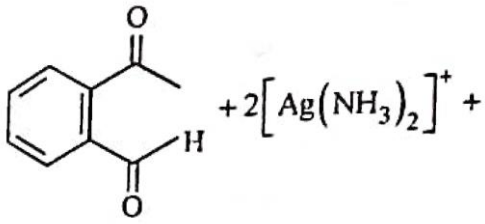
(2) 

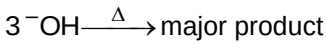
(3) 

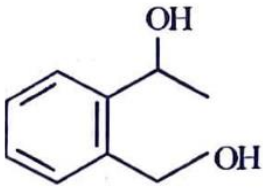
(4) 

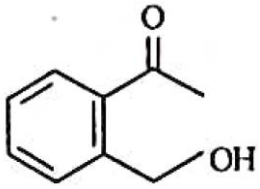
Answer (3)

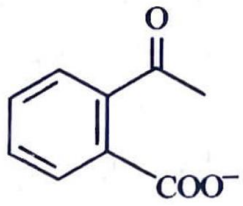
97. Identify the major product obtained in the following reaction:

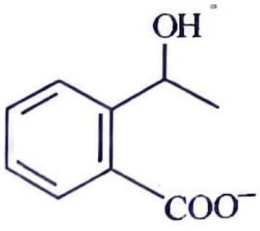




(1) 

(2) 

(3) 

(4) 

Answer (3)

98. Given below are two statements :

Statement I : The nutrient deficient water bodies lead to eutrophication

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

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.

Answer (4)

99. What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{2}$

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

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

(4) $\frac{1}{12}$

Answer (3)

100. Pumice stone is an example of

(1) Sol

(2) Gel

(3) Solid sol

(4) Foam

Answer (3)