NEET 2020 Paper

Date : 13ᵗʰ September 2020

Time : 02 : 00 pm - 5 : 00 pm

Subject : Chemistry

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46. Identify compound X in the following sequences of reactions :

Sol. **1**

47. Identify a molecule which does not exist.

(1) C_2 (2) O_2 (3) He_2 (4) Li_2

Sol. **3**

Diatomic molecule for which bond order is zero or negative does not exist.

Molecule	BO
C_2	2
O_2	2
He_2	Zero
Li_2	1

48. Which of the following is a natural polymer ?

(1) polybutadiene   (2) poly (Butadiene-acrylonitrile)

(3) cis-1,4-polyisoprene   (4) poly (Butadiene-styrene)

Sol. **3**

49. An increase in the concentration of the reactants of a reaction leads to change in :
(1) threshold energy
(2) collision frequency
(3) activation energy
(4) heat of reaction

Sol. **2**

Collision frequency, as number of molecules per unit volume increases.

50. Anisole on cleavage with HI gives :

(1)

+C_2H_5I

(2)

+C_2H_5OH

(3)

+CH_3I

(4)

+CH_3OH

Sol. **3**

Anisole $\xrightarrow{HI}$ +CH_3I

51. The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are :

(1) 71, 71 and 104
(2) 175, 104 and 71
(3) 71, 104 and 71
(4) 104, 71 and 71

Sol. **3**

$^{(n+p)=175}_{(p)=71}Lu$

∴   no. of protons   =   71
     no. of neutrons   =   175 – 71 = 104
     no. of electrons   =   71

52. The calculated spin only magnetic moment of Cr^{2+} ion is :
(1) 5.92 BM
(2) 2.84 BM
(3) 3.87 BM
(4) 4.90 BM

Sol. **4**

$Cr^{2+} \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4$

∴   n (number of unpaired electrons) = 4

∴   μ   = $\sqrt{n(n+2)}$

             = $\sqrt{4(4+2)}$

             = 4.8989
             = 4.9 B.M.

53. Match the following :

	Oxide		Nature
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is correct option ?

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

Sol. **4**

CO   Neutral

BaO   Basic

Al_2O_3 Amphoteric

Cl_2O_7 Acidic

54. Urea reacts with water to form A which will decompose to form B. B when passed through Cu^{2+} (aq), deep blue colour solution C is formed. What is the formula of C from the following ?

(1) $Cu(OH)_2$ (2) $CuCO_3.Cu(OH)_2$

(3) $CuSO_4$ (4) $[Cu(NH_3)_4]^{2+}$

Sol. **4**

$$NH_2CONH_2 + H_2O \longrightarrow NH_4OH + CO_2 \xrightarrow[\text{decompose}]{\Delta} NH_3 + H_2O$$

(Urea)   (A)   (B)

                       (Ammonium   Ammonia
                        hydroxide)

$$4NH_3 + Cu^{2+}(aq.) \longrightarrow [Cu(NH_3)_4]^{2+}$$

                              (C)
                          (deep blue
                          colour solution)

55. Match the following and identify the correct option.

(a)	$CO(g) + H_2(g)$	(i)	$Mg(HCO_3)_2 + Ca(HCO_3)_2$
(b)	Temporary hardness of water	(ii)	An electron deficient hydride
(c)	B_2H_6	(iii)	Synthesis gas
(d)	H_2O_2	(iv)	Non-planar structure

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(ii)	(i)
(2)	(i)	(iii)	(ii)	(iv)
(3)	(iii)	(i)	(ii)	(iv)
(4)	(iii)	(ii)	(i)	(iv)
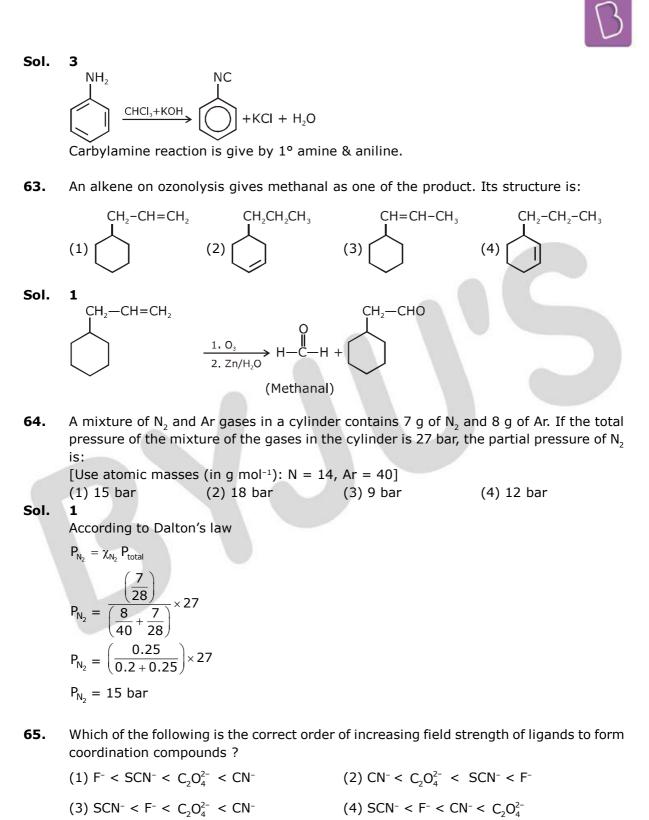
Sol. **3**

$\Rightarrow$ $CO(g) + H_2(g)$ = Water gas or synthesis gas

$\Rightarrow$ Temporary hardness of water is due to bicarbonates of Ca^{2+} & Mg^{2+}

$\Rightarrow$ B_2H_6 is a electron deficient compound due to presence of banana bond.

$\Rightarrow$ H_2O_2 open book like structure which is non-planar

56. The mixture which shows positive deviation from Raoult's law is :
(1) Acetone + Chloroform
(2) Chloroethane + Bromoethane
(3) Ethanol + Acetone
(4) Benzene + Toluene

Sol. **3**

Acetone + ethanol shows positive deviation from Raoult's law. Pure ethanol possesses H-bonding and adding acetone to ethanol causes breaking of some H-bonds.
This causes increase in observed vapour pressure.

57. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-1}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places) :
(1) 0.40 K
(2) 0.60 K
(3) 0.20 K
(4) 0.80 K

Sol. **1**

$\Delta T_f = ik_f m$

$\Rightarrow$ ΔT_f $= 1 \times 5.12 \times 0.078$

ΔT_f $= 0.3993$

ΔT_f $= 0.40$ K

58. Which of the following set of molecules will have zero dipole moment ?
(1) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
(2) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
(3) Ammonia, beryllium difluoride, water 1,4-dichlorobenzene
(4) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

Sol. **2**

Boron trifluoride $\mu = 0$ Non-polar molecule

Beryllium difluoride $\mu = 0$ Non-polar molecule

Carbon dioxide $\mu = 0$ Non-polar molecule

1,4-dichlorobenzene $\mu = 0$ Non-polar molecule

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59. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?

(1) –R effect of –CH_3 groups   (2) Hyperconjugation

(3) –I effect of –CH_3 groups   (4) + R effect of –CH_3 groups

Sol. **2**

$$CH_3-\overset{\oplus}{\underset{\underset{CH_3}{|}}{C}}-CH_3 \qquad\qquad CH_3-\overset{\oplus}{CH}-CH_2-CH_3$$

Tert butyl carbocation stable due to 9 α — H Hyperconjugation

sec. butyl carbocation Stable due to 5 α — H Hyperconjugation

60. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 1×10^{-13} M   (2) 1×10^8 M

(3) 2×10^{-13} M   (4) 2×10^{-8} M

Sol. **3**

$Ni(OH)_2 \quad\rightleftharpoons\quad Ni^{2+} \quad + \quad 2OH^-$

$\qquad\qquad\qquad\qquad\quad s \qquad\qquad 0.1\ M$

$\therefore \qquad K_{sp} = [Ni^{2+}][OH^-]^2$

$\Rightarrow \qquad k_{sp} = s \times (0.1)^2$

$\Rightarrow \qquad s = \dfrac{2 \times 10^{-15}}{0.1^2}$

$\Rightarrow \qquad s = 2 \times 10^{-13}$ M

61. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give:

(1) Tert. butyl alcohol   (2) Isobutyl alcohol

(3) Isopropyl alcohol   (4) Sec. butyl alcohol

Sol. **1**

$$CH_3-\overset{\overset{O}{||}}{C}-CH_3 \xrightarrow{CH_3MgCl} CH_3-\overset{\overset{OMgCl}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_3 \xrightarrow{H_2O} CH_3-\overset{\overset{OH}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_3$$

Tertbutylalcohol

62. Which of the following amine will give the carbylamine test?

(1) $N(CH_3)_2$ (2) NHC_2H_5 (3) NH_2 (4) $NHCH_3$

Sol. 3

Carbylamine reaction is give by 1° amine & aniline.

63. An alkene on ozonolysis gives methanal as one of the product. Its structure is:

Sol. 1

(Methanal)

64. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is:

[Use atomic masses (in g mol^{-1}): N = 14, Ar = 40]

(1) 15 bar   (2) 18 bar   (3) 9 bar   (4) 12 bar

Sol. 1

According to Dalton's law

$$P_{N_2} = \chi_{N_2} P_{total}$$

$$P_{N_2} = \frac{\left(\frac{7}{28}\right)}{\left(\frac{8}{40}+\frac{7}{28}\right)} \times 27$$

$$P_{N_2} = \left(\frac{0.25}{0.2+0.25}\right) \times 27$$

$$P_{N_2} = 15 \text{ bar}$$

65. Which of the following is the correct order of increasing field strength of ligands to form coordination compounds ?

(1) $F^- < SCN^- < C_2O_4^{2-} < CN^-$ (2) $CN^- < C_2O_4^{2-} < SCN^- < F^-$

(3) $SCN^- < F^- < C_2O_4^{2-} < CN^-$ (4) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

Sol. 3

Fact from spectrochemical series.

66. Paper chromatography is an example of :
(1) Thin layer chromatography
(2) Column chromatography
(3) Adsorption chromatography
(4) Partition chromatography

Sol. **4**

It is an example of partition chromatography as mixture of substance are separated by partition.

67. Sucrose on hydrolysis gives:
(1) α-D-Glucose + β-D-Fructose
(2) α-D-Fructose + β-D-Fructose
(3) β-D-Glucose + α-D-Fructose
(4) α-D-Glucose + β-D-Glucose

Sol. **1**

Sucrose $\xrightarrow{\text{H}_3\text{O}^+}$ α - D-Glucose + β - D - Fructose
$(C_6H_{12}O_6)$ $(C_6H_{12}O_6)$

68. The rate constant for a first order reaction is 4.606×10^{-3} s^{-1}. The time required to reduce 2.0 g of the reactant to 0.2 g is:
(1) 500 s
(2) 1000 s
(3) 100 s
(4) 200 s

Sol. **1**

$$t = \frac{1}{K} \ln \frac{C_o}{C_t}$$

$$= \frac{1}{4.606 \times 10^{-3}} \times 2.303 \log \frac{2}{0.2}$$

$$= \frac{1}{2 \times 10^{-3}} \log 10$$

$$= 500 \text{ sec}$$

69. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as:
(1) Cross Cannizzaro's reaction
(2) Cross Aldol condensation
(3) Aldol condensation
(4) Cannizzaro's reaction

Sol. **2**

Two different carbonyl compound is treated with base known as cross-aldol condensation.

70. Which of the following is not correct about carbon monoxide?
(1) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.
(2) It is produced due to incomplete combustion.
(3) It forms carboxyhaemoglobin.
(4) It reduces oxygen carrying ability of blood.

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Sol. **1**

CO when combine with haemoglobin it forms carboxyhaemoglobin which more stable than oxyhaemoglobin thats why it reduces oxygen carring ability of blood.

71. Hydrolysis of sucrose is given by the following reaction.

Sucrose + $H_2O \rightleftharpoons$ Glucose + Fructose

If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^o$ at the same temperature will be:

(1) 8.314 J mol^{-1} K^{-1} × 300 K × ln(3 × 10^{13})

(2) −8.314 J mol^{-1} K^{-1} × 300 K × ln(4 × 10^{13})

(3) −8.314 J mol^{-1} K^{-1} × 300 K × ln(2 × 10^{13})

(4) 8.314 J mol^{-1} K^{-1} × 300 K × ln(2 × 10^{13})

Sol. **3**

ΔG^o = −RT ln K

$\Rightarrow \Delta G^o$ = − 8.314 J mol^{-1} K^{-1} × 300 K × ln (2 × 10^{13})

72. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s)?

(1) only $MgCl_2$ (2) NaCl, $MgCl_2$ and $CaCl_2$

(3) Both $MgCl_2$ and $CaCl_2$ (4) Only NaCl

Sol. **1**

$MgCl_2$ has least solubility among $CaCl_2$, $MgCl_2$ & NaCl thats why it crystallise first on passing HCl.

73. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:

(1) $\dfrac{4}{\sqrt{3}}$ × 288 pm   (2) $\dfrac{4}{\sqrt{2}}$ × 288 pm   (3) $\dfrac{\sqrt{3}}{4}$ × 288 pm   (4) $\dfrac{\sqrt{2}}{4}$ × 288 pm

Sol. **3**

For bcc

$\sqrt{3}\, a = 4r$
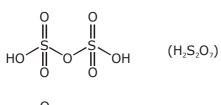
$\Rightarrow r = \dfrac{\sqrt{3}}{4} \times 288$ pm

74. Which of the following oxoacid of sulphur has −O−O− linkage?

(1) $H_2S_2O_8$, peroxodisulphuric acid   (2) $H_2S_2O_7$, pyrosulphuric acid

(3) H_2SO_3, sulphurous acid   (4) H_2SO_4, sulphuric acid

Sol. **1**

$(H_2S_2O_7)$

(H_2SO_3)

(H_2SO_4)

75. Identify the incorrect statement.

(1) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

(2) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.

(3) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

(4) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

Sol. **2**

(1) Interstitial compounds are those compounds that are formed when small atoms like H, B, C or N are trapped inside crystal lattices of metals.

(2) Oxidation state of chromium in CrO_4^{2-} & $Cr_2O_7^{2-}$ are +6 (same)

(3) Fact

Cr^{2+} is stronger reducing agent than Fe^{2+} in water on the basis of standard reduction potential.

(4) Transition metals are one of the best available catalyst due to their ability to adopt multiple oxidation states & to form complexes.

76. Which of the following is a cationic detergent?

(1) Cetyltrimethyl ammonium bromide   (2) Sodium dodecylbenzene sulphonate

(3) Sodium lauryl sulphate   (4) Sodium stearate

Sol. **1**
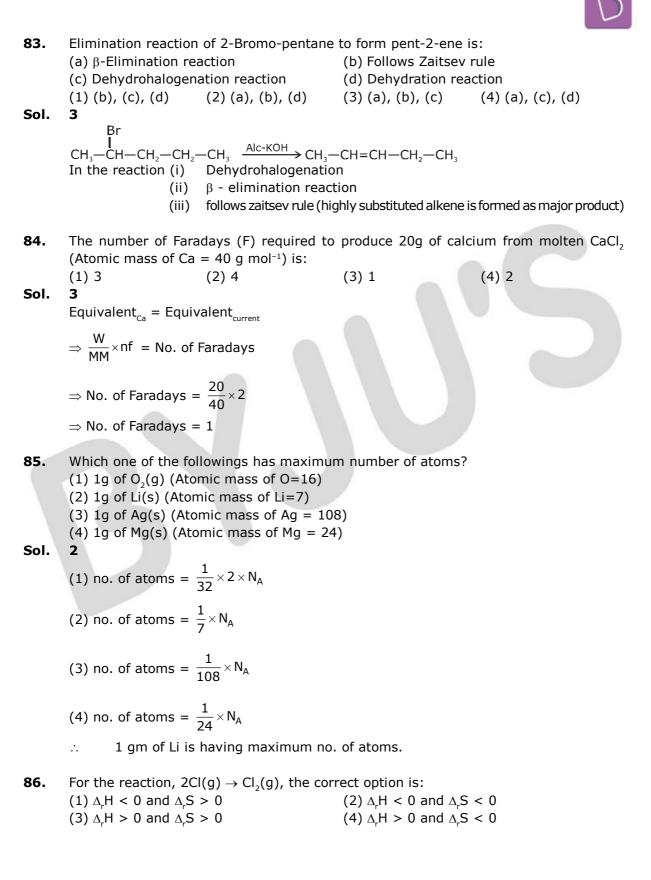
Cetyltrimethyl ammonium bromide is a cationic detergent as it's hydrophillic part is a quaternary ammonium ion.

77. The correct option for free expansion of an ideal gas under adiabatic condition is:

(1) $q < 0$, $\Delta T = 0$ and $w = 0$ (2) $q > 0$, $\Delta T > 0$ and $w > 0$

(3) $q = 0$, $\Delta T = 0$ and $w = 0$ (4) $q = 0$, $\Delta T < 0$ and $w > 0$

Sol. **3**

For an adiabatic process, $q = 0$

for free expansion, $P_{ext} = 0$

$\therefore \qquad w = 0$

& from First law of Thermodynamics, $\qquad \Delta E = 0$

or $\qquad \Delta T = 0$

78. On electrolysis of dil. sulphuric acid using platinum (Pt) electrode, the product obtained at anode will be:

(1) H_2S gas   (2) SO_2 gas   (3) Hydrogen gas   (4) Oxygen gas

Sol. **4**

Anode : $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$

Cathode : $2H^+ + 2e^- \longrightarrow H_2(g)$

$\therefore$ oxygen gas will be obtained at anode.

79. Identify the correct statement from the following:

(1) Vapour phase refining is carried out for Nickel by Van Arkel method.

(2) Pig iron can be moulded into a variety of shapes.

(3) Wrought iron is impure iron with 4% carbon.

(4) Blister copper has blistered appearance due to evolution of CO_2.

Sol. **2**

(1) Vapour phase refining is carried out for nickel by Mond process.

(2) Pig iron is molten iron obtained from blast furnace after smelting it can be moulded into variety of shapes.

(3) Wrought iron is the purest form of iron which has less than 4% carbon.

(4) Blister copper has blistered appearance due to evolution of SO_2.

80. Which of the following is a basic amino acid?

(1) Tyrosine   (2) Lysine   (3) Serine   (4) Alanine

Sol. **2**

$$NH_2-(CH_2)_4-\underset{\underset{NH_2}{|}}{CH}-COOH \text{ (Lysine)}$$

Basic part is more than acidic part so lysine is basic amino acid.

81. Identify the incorrect match.

Name	IUPAC Official Name
(a) Unnilunium	(i) Mendelvium
(b) Unniltrium	(ii) Lawrencium
(c) Unnilhexium	(iii) Seaborgium
(d) Unununnium	(iv) Darmstadtium

(1) (c), (iii)   (2) (d), (iv)   (3) (a), (i)   (4) (b), (ii)

Sol. **2**

101 - Unnilunium - Mendelevium

103 - Unniltrium - Lawrencium

106 - Unnilhexium - Seaborgium

111 - Unununium - Roentgenium

110 - Ununnilium - Darmstadtium

82. Which of the following alkane cannot be made in good yield by Wurtz reaction?

(1) n-Heptane   (2) n-Butane

(3) n-Hexane   ((4) 2,3-Dimethylbutane

Sol. **1**

Wurtz reaction is used to prepare symmetrical alkane.

83. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is:
(a) β-Elimination reaction (b) Follows Zaitsev rule
(c) Dehydrohalogenation reaction (d) Dehydration reaction
(1) (b), (c), (d) (2) (a), (b), (d) (3) (a), (b), (c) (4) (a), (c), (d)

Sol. **3**

$$CH_3-\overset{\overset{\displaystyle Br}{|}}{CH}-CH_2-CH_2-CH_3 \xrightarrow{Alc-KOH} CH_3-CH=CH-CH_2-CH_3$$

In the reaction (i) Dehydrohalogenation
(ii) β - elimination reaction
(iii) follows zaitsev rule (highly substituted alkene is formed as major product)

84. The number of Faradays (F) required to produce 20g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is:
(1) 3 (2) 4 (3) 1 (4) 2

Sol. **3**

$Equivalent_{Ca} = Equivalent_{current}$

$\Rightarrow \dfrac{W}{MM} \times nf$ = No. of Faradays

$\Rightarrow$ No. of Faradays = $\dfrac{20}{40} \times 2$

$\Rightarrow$ No. of Faradays = 1

85. Which one of the followings has maximum number of atoms?
(1) 1g of $O_2(g)$ (Atomic mass of O=16)
(2) 1g of Li(s) (Atomic mass of Li=7)
(3) 1g of Ag(s) (Atomic mass of Ag = 108)
(4) 1g of Mg(s) (Atomic mass of Mg = 24)

Sol. **2**

(1) no. of atoms = $\dfrac{1}{32} \times 2 \times N_A$

(2) no. of atoms = $\dfrac{1}{7} \times N_A$

(3) no. of atoms = $\dfrac{1}{108} \times N_A$

(4) no. of atoms = $\dfrac{1}{24} \times N_A$

∴ 1 gm of Li is having maximum no. of atoms.

86. For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, the correct option is:
(1) $\Delta_r H < 0$ and $\Delta_r S > 0$ (2) $\Delta_r H < 0$ and $\Delta_r S < 0$
(3) $\Delta_r H > 0$ and $\Delta_r S > 0$ (4) $\Delta_r H > 0$ and $\Delta_r S < 0$

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Sol. **2**

$2Cl(g) \longrightarrow Cl_2(g) + Heat$

Due to bond formation stability increases which results in release of heat.

$\therefore \quad \Delta H_r = -ve$ or exothermic process

$\Delta H_r < O$

$\& \quad \Delta S < O$, because number of Cl atoms decreases in the formation of $Cl_2(g)$

87. Identify the correct statements from the following:

(a) $CO_2(g)$ is used as refrigerant for ice-cream and frozen food.

(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.

(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.

(d) CO is colourless and odourless gas.

(1) (b) and (c) only   (2) (c) and (d) only

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

Sol. **2**

$\Rightarrow CO_2(s)$ is not used as refrigerant for ice-cream & frozen food.

$\Rightarrow C_{60}$ ┌─ six carbon rings – 20
└─ five carbon rings – 12

$\Rightarrow$ ZSM-5 zeolite used to convert alcohols into gasoline

$\Rightarrow$ CO is colourless & odourless gas

88. Measuring Zeta potential is useful in determining which property of colloidal solution?

(1) Stability of the colloidal particles   (2) Size of the colloidal particles

(3) Viscosity   (4) Solubility

Sol. **1**

A large +ve or –ve value of Zeta potential indicate good stability of the colloidal particles.

89. What is the change in oxidation number of carbon in the following reaction?

$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$

(1) –4 to +4   (2) 0 to –4   (3) +4 to +4   (4) 0 to +4

Sol. **1**

$\overset{-4}{C}H_4(g) + 4Cl_2 \longrightarrow \overset{+4}{C}Cl_4(l) + 4HCl(g)$

90. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals.

(1) Calcium   (2) Potassium   (3) Iron   (4) Copper

Sol. **2**

Potassium