

PART-B : CHEMISTRY

41. If the edge length of a body centred unit cell is 400pm, what will be the approximate radius of the atom present in it? (in pm)
- (A) 173 (B) 141
(C) 200 (D) 924

Answer (A)

Sol. $a = 400\text{pm}$

For Body centered unit cell ;

$$\sqrt{3}a = 4r$$

$$\therefore \frac{\sqrt{3}(400)}{4} = r \quad r = 173.2 \text{ pm}$$

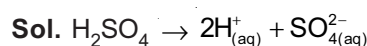
42. Which of the following is Ferromagnetic?
- (A) MnO (B) CrO_2
(C) O_2 (D) Fe_3O_4

Answer (B)

Sol. Fe, Co, Ni and CrO_2 are ferromagnetic in nature

43. What is the normality of aqueous solution of H_2SO_4 having $\text{pH} = 1$.
- (A) 0.1 N (B) 0.05 N
(C) 1 N (D) 0.5 N

Answer (A)



For $[\text{H}^+] = 0.1\text{M}$; the $\text{pH} = 1$

Molarity of $\text{H}_2\text{SO}_4 = 0.05 \text{ M}$

$$\begin{aligned} \therefore \text{Normality of } \text{H}_2\text{SO}_4 &= M_{\text{H}_2\text{SO}_4} \times n_f \\ &= 0.05 \times 2 \\ &= 0.1 \text{ N} \end{aligned}$$

44. Which of the following mixture is non-ideal solution?
- (A) Chlorobenzene and bromobenzene
(B) Benzene and toluene
(C) Chloroform and acetone
(D) Bromoethane and chloroethane

Answer (C)

Sol. $(\text{CHCl}_3 + \text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3)$ forms a non-ideal solution showing negative deviation

45. Which solution is isotonic with 6% w/v aqueous solution of urea? [Mole mass of Urea = 60 gm. mol^{-1}]
- (A) 0.1 M NaCl (B) 0.5 M NaCl
(C) 0.25 M NaCl (D) 1 M NaCl

Answer (B)

Sol. Isotonic solution means $(\pi_1 = \pi_2)$

Isotonic pressure for 6% w/v aqueous solution of urea $(\pi_1) = icRT$

6 gms of urea is present in 100ml solution

$$\therefore C = \frac{6}{60} \times \frac{1000}{100} = 1$$

$$\therefore \pi_1 = (1)(1)RT \quad (\because i \text{ of urea} = 1)$$

$$\pi_1 = RT$$

$$\therefore \text{For } 0.5 \text{ M NaCl solution, } i = 2$$

$$\text{so } \pi_2 = (2)(0.5RT)$$

$$\pi_2 = RT$$

46. In which metal container, the aqueous solution of CuSO_4 can be stored?

$$E^0_{\text{Cu}^{3+}/\text{Cu}} = 0.34\text{V}$$

$$E^0_{\text{Fe}/\text{Fe}^{2+}} = 0.44\text{V}, E^0_{\text{Al}/\text{Al}^{3+}} = 1.66\text{V}$$

$$E^0_{\text{Ni}/\text{Ni}^{2+}} = 0.25\text{V}, E^0_{\text{Ag}^+/\text{Ag}} = 0.80\text{V}$$

- (A) Fe (B) Ni
(C) Ag (D) Al

Answer (C)

Sol. Since the SRP value of $\text{Ag}^+/\text{Ag} = 0.80 \text{ V}$

\therefore aq solution of CuSO_4 can be stored in Ag as

$$E^0_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{V}$$

47. For how much time, 10 ampere electric current should be passed through a dilute aqueous NiSO_4 solution during electrolysis using inert electrode, in order to get 5.85 gm Nickel? [At. mass of Ni = 58.5gm]
- (A) 1930 sec. (B) 3860 sec.
(C) 965 sec. (D) 9650 sec.

Answer (A)

Sol. By Faraday's 1st law of electrolysis $m = zit$

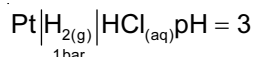
$$5.85 = \frac{E}{F}(i)(t)$$

($\because E =$ Equivalent mass of Ni)

$$E = \frac{58.5}{2} \quad 5.85 = \frac{58.5}{2} \frac{(10)}{(96500)}(t)$$

$$\therefore t = 1930 \text{ sec.}$$

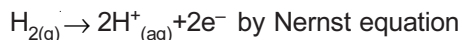
48. What will be the oxidation potential for the following hydrogen half cell at 1 bar pressure and 25°C temperature?



- (A) 0.177 V (B) 0.188 V
(C) 0.059 V (D) 0.000 V

Answer (A)

Sol. For the half cell; $\text{Pt} \left| \text{H}_{2(g)} \right| \text{HCl}_{(aq)} \text{pH} = 3$



$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0591}{n} \log \frac{[\text{H}^+]^2}{p_{\text{H}_2}}$$

$$E_{\text{cell}} = 0 - \frac{0.0591}{2} \log \frac{(10^{-3})^2}{1} \quad [\because [\text{H}^+] = 10^{-3} \text{M}]$$

$$E_{\text{cell}} = - \frac{0.0591}{2} (-6)$$

$$E_{\text{cell}} = 0.177 \text{ V}$$

49. Which ore does not contain carbonate?

- (A) Malachite (B) Ciderite
(C) Calamine (D) Zincite

Answer (D)

Sol. Zincite is ZnO, so does not contain carbonate

50. Which is the correct order of metallurgy for the extraction of copper metal?

- (A) Concentration → roasting → smelting → bessimerisation
(B) Concentration → smelting → roasting → bessimerisation
(C) Concentration → smelting → bessimerisation → roasting
(D) Concentration → roasting → bessimerisation → smelting

Answer (A)

Sol. In the extraction of copper metal; the correct order is

Concentration → Roasting → Smelting → Bessimerisation

51. How many grams of Cl_2 gas will be obtained by the complete reaction of 31.6 gm of potassium permanganate with hydrochloric acid?

[Mole mass of $\text{KMnO}_4 = 316 \text{ gm/mol}$]

- (A) 35.5 (B) 17.75
(C) 71 (D) 142

Answer (B)



2 moles KMnO_4 produces 5 moles of Cl_2

1 mole of KMnO_4 will produce $\frac{5}{2}$ molles of Cl_2

$\therefore \frac{31.6}{316}$ moles of KMnO_4 will produce $\frac{1}{4}$ moles of Cl_2

\therefore Mass of Cl_2 gas = $\frac{71}{4} = 17.75 \text{ gms.}$

52. What is the structure of XeOF_4 ?

- (A) Pyramidal (B) Trigonal bipyramidal
(C) Square pyramidal (D) Square bipyramidal

Answer (C)

Sol. XeOF_4

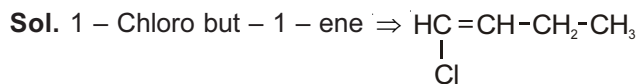
$$\begin{aligned} \text{Hybridisation of Xe} &= 5 + \frac{1}{2}[8 - 6] \\ &= 5 + 1 \\ &= \text{sp}^3\text{d}^2 \end{aligned}$$

Hence by the VSEPR theory, due to 5 bond pair & 1 lone pair of e^- . The shape of XeOF_4 is square pyramidal

53. Which one is not an allylic halide?

- (A) 1 - Chloro but - 2 - ene
(B) 1 - Chloro but - 1 - ene
(C) 3 - Chloro cyclo hex - 1 - ene
(D) 3 - Chloro prop - 1 - ene.

Answer (B)



Hence the above is not an allylic halide but vinylic halide

54. Which is the main organic product obtained by the reaction of 2, 2, 2 trichloro ethanal with calcium hydroxide?

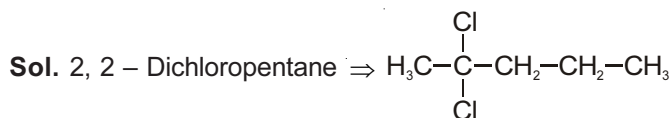
- (A) Chloroform
(B) Carbon tetrachloride
(C) Methylene chloride
(D) Trichloro ethane

Answer (A)

Sol. On reaction of 2,2,2 - trichloro ethanal (Chloral) with $\text{Ca}(\text{OH})_2$; chloroform (CHCl_3) is the main organic product obtained.

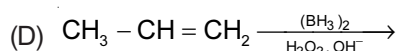
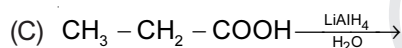
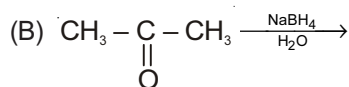
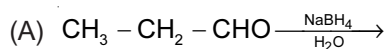
55. Which of the following compound is optically inactive?
- (A) 2 – Hydroxy propanoic acid
(B) 2, 3 – Dichloro butane
(C) 3 – Chloro but – 1 – ene
(D) 2, 2 – Dichloro pentane

Answer (D)



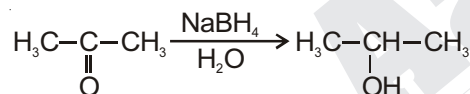
\therefore The above compound is optically inactive

56. Which of the organic products of the following reactions has the least boiling point?



Answer (B)

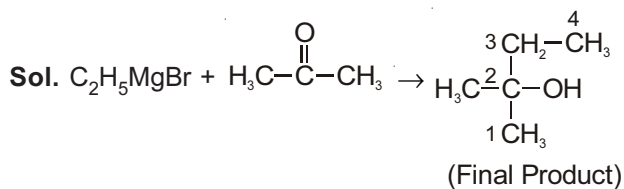
Sol. In the reaction A,C,D the product formed is propan-1-ol. whereas in the reaction – B



\therefore Due to weaker force of attraction in Propan-2-ol; it has least boiling point.

57. Which is the final product obtained by the reaction of a grignard reagent ethyl Magnesium bromide with propanone?
- (A) Pentane – 2 – ol
(B) 2 – Methyl – butane – 2 – ol
(C) Pentane – 1 – ol
(D) 3 – Methyl – butane – 2 – ol

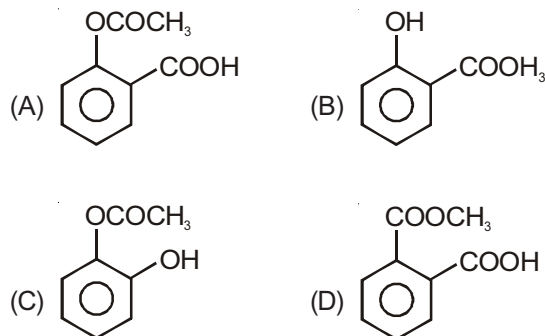
Answer (B)



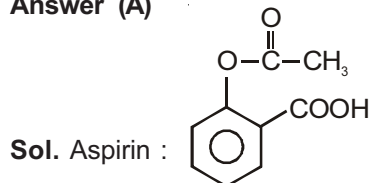
+ Mg(OH)Br

\therefore Final product formed is 2-Methyl - butan-2-ol

58. Which is the correct structural formula of Aspirin?



Answer (A)



59. The units for the rate constant and the rate of reaction are same for a reaction. What will be the order of the reaction?

- (A) First (B) Zero
(C) Second (D) Third

Answer (B)

Sol. Unit of rate constant $(k) = (\text{conc})^{1-n} (\text{s})^{-1}$

n = order of the reaction

The rate law of the reaction is

$$\text{Rate} = K [\text{Reactant}]^n$$

For unit of Rate = Rate constant (k); n should be equal to 0

\therefore Order is zero

60. At 27° C temperature, time required for 75% completion of a first order reaction is 20 seconds. What will be its rate constant?

- (A) 0.693 sec⁻¹ (B) 0.0693 sec⁻¹
(C) 0.693 sec⁻¹ mole⁻¹ l (D) 0.0693 sec⁻¹ mole⁻¹ l

Answer (B)

Sol. For 1st order reaction ;

$$Kt = \ln \left(\frac{A_0}{A_t} \right)$$

$$K (20) = \ln \left(\frac{A_0}{0.25A_0} \right)$$

$$K (20) = \ln (4)$$

$$K = \frac{2 \ln 2}{20} = \frac{0.693}{10} = 0.0693 \text{ s}^{-1}$$

61. Which statement is incorrect for a catalyst?
 (A) It decreases the activation energy of a reaction
 (B) It increases the proportion of products in less time
 (C) It does not affect the equilibrium constant
 (D) It increases the free energy change for the reaction

Answer (D)

Sol. A Catalyst can,

- (i) Increase the rate of reaction by decreasing the activation energy
- (ii) Also increase the proportion of products per unit time.
- (iii) Does not alter equilibrium established reaction. Hence does not alter equilibrium constant.
- (iv) Does not alter the value of ΔG and ΔH
Hence the correct answer is (D)

62. During electrophoresis of colloidal sol of $\text{Fe}(\text{OH})_3$, the colloidal particles
 (A) Move towards anode
 (B) Move towards cathode
 (C) Move towards anode and cathode both
 (D) Do not move

Answer (B)

Sol. $\text{Fe}(\text{OH})_3$ is a positively charged colloid. Hence under the influence of electricity these particles can migrate towards cathode.

63. In manufacturing of sulphuric acid in presence of platinum catalyst, which metal impurity acts as catalytic poison?
 (A) Cu (B) Cr
 (C) Fe (D) V

Answer (A)

Sol. In production of sulphuric acid, in the presence of platinum catalyst, the impurity of copper decreases the efficiency of the catalyst. It is called catalytic poison.

64. Which ion has the least value of theoretical magnetic moment?
 (A) Ti^{3+} (B) Co^{3+}
 (C) Cr^{3+} (D) V^{3+}

Answer (A)

Sol. Magnetic moment $\mu = \sqrt{n(n+2)} \text{ BM}$

where $n = \text{no. of unpaired electrons}$

As the number of unpaired electrons increases, magnetic moment also increases.

In the given options.

$\text{Ti}^{3+} = [\text{Ar}]3d^14s^0; n=1$

$\text{Co}^{3+} = [\text{Ar}]3d^64s^0; n=4$

$\text{Cr}^{3+} = [\text{Ar}]3d^34s^0; n=3$

$\text{V}^{3+} = [\text{Ar}]3d^2 4s^0; n=2$

Hence the correct answer is (A)

65. Which of the following mixture can form an alloy?

- (A) Fe, Mn, Mg
- (B) Cr, Co, Na
- (C) Fe, Ni, Cr
- (D) Ni, Mg, Na

Answer (C)

Sol. Alloy is the combination of two or more metals.

According to Hume-Rothery ratio, metals which have

- (i) Similar electronic structure in the valence shell
- (ii) Similar crystal structure and
- (iii) Difference in the radius should be less than 15% can form alloy.

Hence Fe, Ni, Cr – belongs to 3d – series can form alloy.

66. Which of the following statements is incorrect?

- (A) $\text{K}_4[\text{Ni}(\text{CN})_4]$ is square planar while $\text{K}_2[\text{Ni}(\text{CN})_4]$ is paramagnetic.
- (B) $\text{K}_2[\text{Ni}(\text{CN})_4]$ is diamagnetic while $\text{K}_2[\text{NiCl}_4]$ is paramagnetic.
- (C) $\text{K}_4[\text{Ni}(\text{CN})_4]$ and $\text{K}_2[\text{Ni}(\text{CN})_4]$ both have same magnetic moment
- (D) $\text{K}_2[\text{NiCl}_4]$ and $\text{K}_4[\text{Ni}(\text{CN})_4]$ both have same geometrical shapes

Answer (A)

Sol. Incorrect option is (A) where

$\text{K}_4[\text{Ni}(\text{CN})_4] \text{ sp}^3 \text{ Tetrahedron (Diamagnetic)}$

$\text{K}_2[\text{Ni}(\text{CN})_4] \text{ dsp}^2 \text{ square planar (Diamagnetic)}$

$\text{K}_2[\text{NiCl}_4] \text{ sp}^3 \text{ Tetrahedron (Paramagnetic)}$

67. The aqueous solution of which of the following complex has the least conductivity under identical conditions.

- (A) Hexa aqua chromium (III) chloride
- (B) Tetra aqua dichlorido chromium (III) chloride
- (C) Penta aqua chlorido chromium (III) chloride
- (D) Tri aqua trichlorido chromium (III)

Answer (D)

Sol. The complex which produce least number of ions in aqueous solution will show least conductivity.

- (A) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$; 4 ions
- (B) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}$; 2 ions
- (C) $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2$; 3 ions
- (D) $[\text{Cr}(\text{H}_2\text{O})_3\text{Cl}_3]$; No ions.

68. Which complex possess facial isomer?

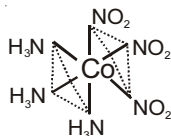
- (A) $[\text{Co}(\text{NH}_3)_4\text{CO}_3]\text{Cl}$
 (B) $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$
 (C) $\text{K}[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]$
 (D) $[\text{Ni}(\text{H}_2\text{O})_4(\text{NH}_3)_2]\text{SO}_4$

Answer (B)

Sol. Facial and Meridional isomers shown by the complex

$[\text{MA}_3\text{B}_3]$ type

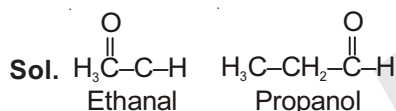
Ex:- $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$



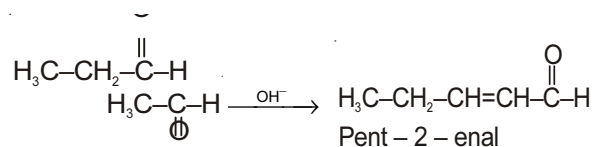
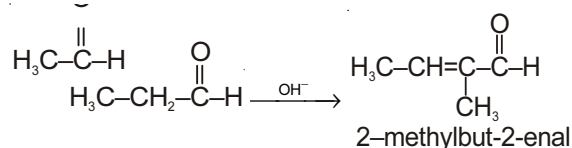
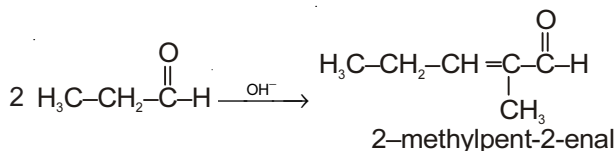
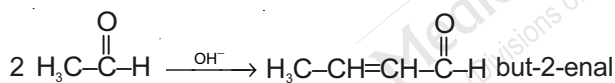
69. Which of the following is not a final product obtained by cross aldol condensation of ethanal and propanal?

- (A) But-2-enal
 (B) 2-Methyl-pent-2-enal
 (C) 3-Methyl-but-2-enal
 (D) Pent-2-enal

Answer (C)



on crossed aldol condensation gives.



70. Which is the main functional group in Acrolein?

- (A) Nitrile (B) Alkene
 (C) Aldehyde (D) Ester

Answer (C)

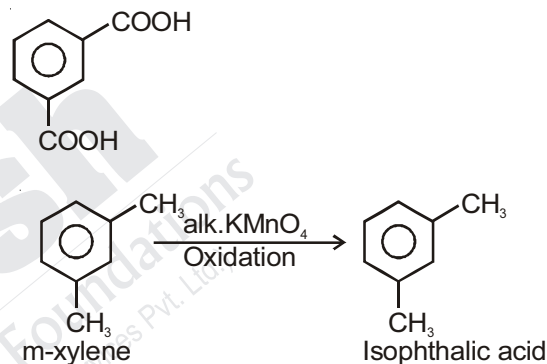
Sol. Acrolein $\text{H}_2\text{C}=\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$ Hence the main functional group is aldehyde

71. Which of the following compound upon oxidation gives isophthalic acid?

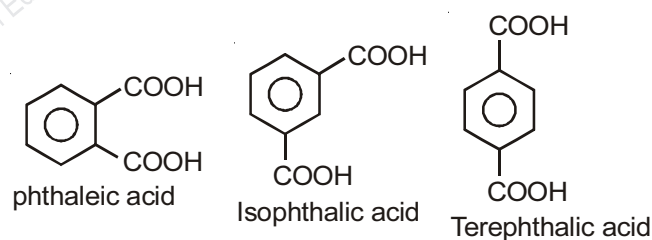
- (A) o-Xylene (B) m-Xylene
 (C) p-Xylene (D) m-Cresol

Answer (B)

Sol. Isophthalic acid is



Note :

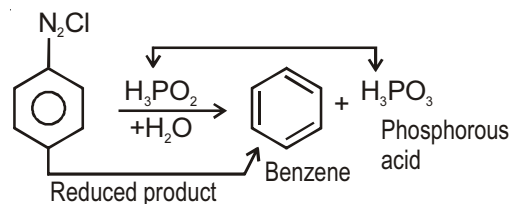


72. Which is the oxidized product obtained when benzene diazonium chloride reacts with phosphonic acid in presence of water?

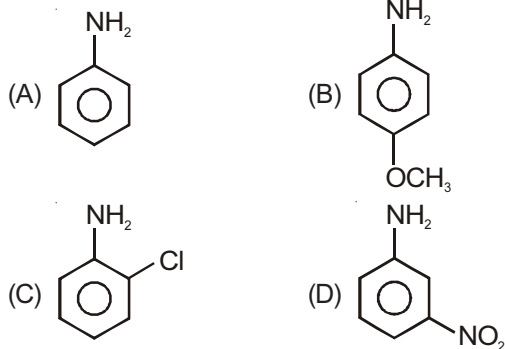
- (A) Benzene (B) Phenol
 (C) Chloro benzene (D) Phosphorus acid

Answer (D)

Sol.

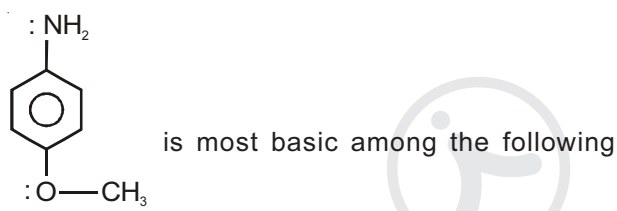


73. Which of the following compound is the most basic?



Answer (B)

Sol.



because of more pronounced + R effect of $-\ddot{O}-CH_3$ group.

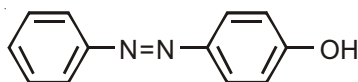
* Basic strength \propto EDG.

74. The number of σ and π bonds in orange azo dye is _____ and _____ respectively.

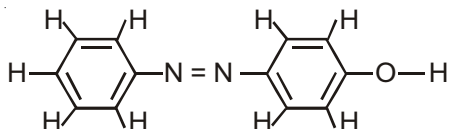
- (A) 26 and 7 (B) 24 and 7
(C) 27 and 7 (D) 26 and 6

Answer (A)

Sol. Orange dye is



It is obtained by the reaction between B.D.C and phenol.



Total σ bonds = 26

Total π bonds = 7

75. Which one is a purine base?

- (A) Cytosine (B) Thymine
(C) Uracil (D) Guanine

Answer (D)

Sol. [Guanine and adenine] are purine bases

Cytosine, Uracil, Thymine are pyrimidine bases.

76. Which of the following amino acid has pH greater than 7?

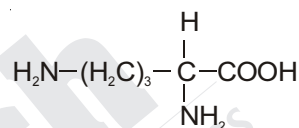
- (A) Glycine
(B) Lysine
(C) Glutamic acid
(D) Alanine

Answer (B)

Sol. pH should be more for basic amino acids.

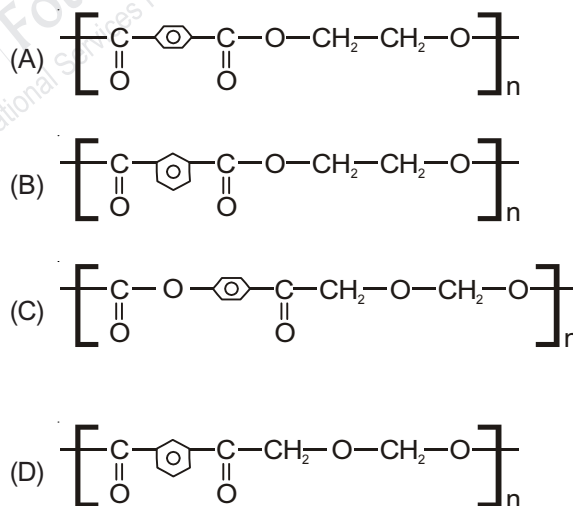
Lysine is basic amino acid.

Hence, its $pH > 7$.



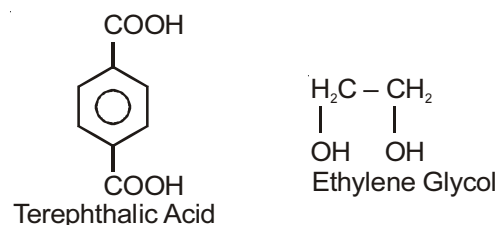
Lysine

77. Which is the correct structural formula for terylene?



Answer (A)

Sol. Terylene is the co-polymer of terephthalic acid and Ethylene glycol

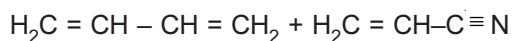


78. Which are the monomers of Buna – N?
 (A) Buta - 1, 3-diene and prop -2-ene-1-nitrile
 (B) Buta - 1, 2-diene and acrylonitrile
 (C) Buta - 1, 3-diene and prop-1-ene-1-nitrile
 (D) Buta - 1, 2-diene and prop-2-ene-1-nitrile

Answer (A)

Sol. Buna – N

Butadiene + Prop – 2 – en – 1 – nitrile



79. Choose the correct option for the suitable match between Column I and Column II

Column - I

(P) Artificial Sweetner

(Q) Food Preservative

(R) Anti Oxidants

(S) Food colours

Column - II

(L) Caramel

(M) Ascorbic acid

(N) Alitame

- (A) P → N, Q → O, R → M, S → L
 (B) P → N, Q → M, R → O, S → L
 (C) P → N, Q → O, R → L, S → M
 (D) P → L, Q → O, R → M, S → N

Answer (A)

Sol. Artificial sweetner – Alitame

Food Preservative - Sorbic acid

Anti oxidant – Ascorbic acid

Food Colour – Caramel.

80. Which of the following drugs gives relief from anxiety and stress?

(A) Luminal

(C) Ofloxacin

(B) Aspirin

(D) Mestranol

Answer (A)

Sol. Barbiturates can release from stress and anxiety.

