✍ Microanalysis is for products available is small then boiling point can be determined by Siwolowoff's method.

✍ Carius method does not give satisfactory results with iodine as silver iodide is slightly soluble in nitric acid and some iodine is also produced even in the presence of excess of silver nitrate.

✍ Beilestein's test is not given by fluorine because copper fluoride is not volatile.

✍ **Nitrogen rule :** All compounds containing an odd number of nitrogen atoms (*i.e.* 1, 3, 5, 7..... etc.) have odd molecular masses while those compounds which contain an even number of nitrogen atoms (*i.e.* 2, 4, 6, 8..... etc.) have even molecular masses.

✍ Boiling point is not as reliable test of purity as is the melting point for the solid.

✍ In the messenger's method for estimation of sulphur. The given organic compound is heated with alkaline $KMnO_4$ solution when the sulphur present in the compound is oxidised to K_2SO_4 which is then estimated as $BaSO_4$.

✍ Name of an amine is always written as one word for *e.g.* CH_3NH_2 is written as methylamine and not methyl amine.

Ordinary Thinking

Objective Questions

Chemical analysis of organic compounds

1. Formula which represents a simple ratio of atoms of different elements present in a molecule of the substance is called

(a) Molecular formula (b) Empirical formula

(c) Structural formula (d) Condensed formula

2. Actual number of atoms of different elements present in a molecule of a compound is given by

(a) Molecular formula (b) Structural formula

(c) Empirical formula (d) None of these

3. A compound contains $C = 90\%$ and $H = 10\%$. Empirical formula of the compound is **[NCERT 1976; EAMCET 1978]**

(a) C_3H_{10} (b) CH_2

(c) C_3H_2 (d) C_3H_4

4. An organic compound contains $C = 36\%$ $H = 6\%$ and rest oxygen. Its Empirical formula is

(a) CH_2O (b) $C_2H_3O_3$

(c) CH_2O_2 (d) $C_2H_2O_2$

5. Empirical formula of a compound is CH_2O and its vapour density is 30. Molecular formula of the compound is **[MP PMT 1993; AIIMS 1998; CBSE PMT 2000; KCET (Med.) 2000; Pb. PMT 2000]**

(a) $C_3H_6O_3$ (b) $C_2H_4O_2$

(c) C_2H_4O (d) CH_2O

6. An organic compound on analysis gave *C* = 48 *gm*, *H* = 8 *gm* and *N* = 56 *gm*. Volume of 1.0 *g* of the compound was found to be 200 *ml* at NTP. Molecular formula of the compound is **[MP PET 1986]**

(a) $C_4H_8N_4$ (b) $C_2H_4N_2$

(c) $C_{12}H_{24}N_{12}$ (d) $C_{16}H_{32}N_{16}$

7. Insulin contains 3.4% sulphur. The minimum molecular weight of insulin is **[MP PET 1993]**

(a) 350 (b) 470

(c) 560 (d) 940

8. Which element is estimated by Carius method

(a) Carbon (b) Hydrogen

(c) Halogen (d) Nitrogen

9. On complete combustion 1.4 *g* hydrocarbon gave 1.8 g water. Empirical formula of the hydrocarbon is

(a) CH (b) CH_2

(c) CH_3 (d) CH_4

10. In the estimation of sulphur organic compound on treating with conc. HNO_3 is converted to

(a) SO_2 (b) H_2S

(c) H_2SO_4 (d) SO_3

11. In Carius method 0.099 *g* organic compound gave 0.287 *g* $AgCl$. The percentage of chlorine in the compound will be

(a) 28.6 (b) 71.7

(c) 35.4 (d) 64.2

12. 0.24 *g* of an organic compound gave 0.22 *g* CO_2 on complete combustion. If it contains 1.66 % hydrogen, then the percentage of *C* and *O* will be **[MP PET**

(a) 12.5 and 36.6 (b) 25 and 75

(c) 25 and 36.6 (d) 25 and 80

13. An organic compound contains $C = 74.0\%$, $H = 8.65\%$ and $N = 17.3\%$. Its Empirical formula is **[MP PMT 1986]**

(a) C_5H_8N (b) $C_{10}H_{12}N$

(c) C_5H_7N (d) $C_{10}H_{14}N$

14. An appropriate method for molecular weight determination of chloroform is

(a) Regnault's method

(b) Diffusion method

(c) Vapour pressure method

(d) Victor Meyer's method

15. Molecular weight of an organic acid is given by

(a) Equivalent weight × basicity

(b) $\frac{\text{Equivalent weight}}{\text{Basicity}}$

(c) $\frac{\text{Basicity}}{\text{Equivalent weight}}$

(d) Equivalent weight × valency

16. If two compounds have the same empirical formula but different molecular formulae they must have **[IIT-JEE 1987; Kurukshetra CEE 1998]**

(a) Different percentage composition

(b) Different molecular weight

(c) Same viscosity

(d) Same vapour density

17. Empirical formula of a compound is C_2H_5O and its molecular weight is 90. Molecular formula of the compound is **[NCERT 1971]**

(a) C_2H_5O (b) $C_3H_6O_3$

(c) $C_4H_{10}O_2$ (d) $C_5H_{14}O$

18. 60 *g* of a compound on analysis gave $C = 24\ g$, $H = 4\ g$ and O = 32 *g*. Its Empirical formula is **[CPMT 1971, 81]**

(a) $C_2H_4O_2$ (b) C_2H_2O

(c) CH_2O_2 (d) CH_2O

19. An organic compound contains $C = 38.8\%$, $H = 16\%$ and $N = 45.2\%$. Empirical formula of the compound is **[CPMT 1973, 83]**

(a) CH_3NH_2 (b) CH_3CN

(c) C_2H_5CN (d) $CH_2(NH)_2$

20. In Kjeldahl's method for the estimation of nitrogen, the formula used is

(a) $\%N = \frac{1.4\ VW}{N}$ (b) $\%N = \frac{1.4\ NW}{V}$

(c) $\%N = \frac{V\ N\ W}{1.8}$ (d) $\%N = \frac{1.4\ V\ N}{W}$

21. An organic compound on analysis gave the following results : *C* = 54.5%, *O* = 36.4%, *H* = 9.1%. The Empirical formula of the compound is **[CPMT 1977; KCET 1998; MP PET 2003; UPSEAT 2004; IIT-JEE (Screening) 2004]**

(a) CH_3O (b) C_2H_4O

(c) C_3H_4O (d) C_4H_8O

22. An organic compound gave *C* = 92.31% and $H = 7.69\%$. If molecular weight of the compound is 78, its molecular formula is

(a) C_6H_6 (b) C_7H_7

(c) C_6H_{18} (d) C_8H_{20}

23. An organic compound gave the following results $C = 53.3\%, H = 15.6, N = 31.1\%,$ mol. wt. = 45,

What is molecular formula of the compound ?

(a) $C_2H_5N_2$ (b) C_2H_5N

(c) C_2H_7N (d) C_2H_6N

24. A compound gave 80% carbon and 20 % hydrogen on analysis. The compound is possibly **[MADT Bihar 1984; MP PMT 1986]**

(a) C_6H_6 (b) C_2H_5OH

(c) C_2H_6 (d) $CHCl_3$

25. A compound has 50% carbon, 50% oxygen and approximate molecular weight is 290. Its molecular formula is **[MP PET 1995]**

(a) CO (b) C_4O_3

(c) $C_{12}O_9$ (d) C_3O_3

26. On analysis, a saturated hydrocarbon is found to contain 83.70 percent carbon and 16.30% hydrogen. The empirical formula will be (at. wt. of *C*=12, at. wt. of *H* = 1) **[MP PMT 1995]**

(a) C_3H_6 (b) C_3H_8

(c) C_3H_7 (d) C_6H_{12}

27. An organic compound has *C* = 60%, H = 13.3% and *O* = 26.7%. Its empirical formula will be

(a) C_3H_6O (b) $C_2H_6O_2$

(c) $C_4H_8O_2$ (d) C_3H_8O

28. A hydrocarbon has *C*=85.72% and remaining *H*. The hydrocarbon is **[MP PET 1996]**

(a) C_2H_4 (b) C_2H_6

(c) C_2H_2 (d) CH_4

29. 64 *gm* of an organic compound contains 24 *gm* of carbon, 8 *gm* of hydrogen and the rest oxygen. The empirical formula of the compound is **[MP PMT 1996]**

(a) CH_2O (b) C_2H_4O

(c) CH_4O (d) $C_2H_8O_2$

30. An organic compound contains *C*, *H* and *O* in the proportion of 6 : 1 : 8 by weight, respectively. Its vapour density is 30. Its molecular formula will be

(a) $C_2H_4O_2$ (b) CH_4O

(c) CH_2O (d) C_3HO

31. The vapour density of the methyl ester of an organic monocarboxylic acid is 37. What is the molecular weight of the acid

(a) 46 (b) 60

(c) 70 (d) 74

32. Empirical formula of a hydrocarbon containing 80% carbon and 20% hydrogen is **[MP PET 1997; EAMCET 1998; JIPMER 2002]**

(a) CH (b) CH_2

(c) CH_3 (d) CH_4

33. An organic compound with *C* = 40% and *H* = 6.7% will have the empirical formula **[MP PET 1999; JIPMER 2002]**

(a) CH_2 (b) CH_2O

(c) $C_3H_6O_3$ (d) $C_2H_4O_2$

34. Which of the following relations gives the value of n =

[Bihar MEE 1996]

(a) $\frac{\text{Moleculer Mass}}{\text{Atomic Mass}}$ (b) $\frac{\text{Molecular Mass}}{\text{Empirical Mass}}$

(c) $\frac{\text{Empirical Mass}}{\text{Molecular Mass}}$ (d) None of these

35. An organic compound containing C, H and N gave following analysis : C = 40%, H = 13.33% and N = 46.67%. Its empirical formula would be

[CBSE PMT 1998, 99; AFMC 2000; KCET 2002; Pb. PMT 2004]

(a) $C_2H_7N_2$ (b) CH_5N

(c) CH_4N (d) C_2H_7N

36. If a compound on analysis was found to contain C = 18.5%, H = 1.55%, Cl = 55.04% and O = 24.81%, then its empirical formula is **[AIIMS 1998]**

(a) $CHClO$ (b) CH_2ClO

(c) C_2H_2OCl (d) $ClCH_2O$

37. An organic compound has % of C and % of H in the ratio 6 : 1 and % of C and % of O in the ratio 3 : 4. The compound is **[Roorkee 1999]**

(a) $HCHO$ (b) CH_3OH

(c) CH_3CH_2OH (d) $(COOH)_2$

38. 0.2595g of an organic substance in a quantitative analysis yielded 0.35 g of the barium sulphate. The percentage of sulphur in the substance is

[CPMT 2000; AFMC 2001; Pb. CET 2000]

(a) 18.52g (b) 182.2 g

(c) 17. 5 g (d) 175.2g

39. In kjeldahl's method, $CuSO_4$ acts as **[AFMC 2001]**

(a) Oxidising agent (b) Reducing agent

(c) Hydrolysing agent (d) Catalytic agent

40. In the qualitative analysis of nitrate a brown ring is formed due to the formation of **[AMU 2001]**

(a) NO_2 (b) $FeSO_4NO_2$

(c) $N_2O.FeSO_4$ (d) $FeSO_4.NO$

41. Percentage composition of an organic compounds is as follows:

C = 10.06, H = 0.84, Cl = 89.10. Which of the following corresponds to its molecular formula if the vapour density is 60.0

(a) CH_2Cl_2 (b) $CHCl_3$

(c) CH_3Cl (d) None of these

42. The percentage of N_2 in urea is about **[KCET (Med.) 2001]**

(a) 18.05 (b) 28.29

(c) 46.66 (d) 85.56

43. A compound of carbon hydrogen and nitrogen contains three elements in the respective ratio of 9 : 1 : 35 *grams*. The Empirical formula for the compound is **[DCE 2001]**

(a) C_2H_4N (b) C_3H_4N

(c) C_3H_6N (d) C_2H_6N

44. Which of the following is the best scientific method to test the presence of water in a liquid **[JIPMER 20**

(a) Use of anhydrous copper sulphate

(b) Use of litmus paper

(c) Taste

(d) Smell

45. Chromatography is a valuable method for the separation, isolation, purification and identification of the constituents of a mixture and it is based on general principle of

[Kerala (Med.) 2002]

(a) Phase rule

(b) Phase distribution

(c) Interphase separation

(d) Phase operation

46. To differentiate between carbon-12, carbon-13 and carbon-14, the instrument that you would use in

[Kerala (Engg.) 2002]

(a) Infra-red spectrometer

(b) Atomic absorption spectrometer

(c) Mass spectrometer

(d) Ultraviolet spectrometer

47. Chromatography is used for the purification of

[KCET 2002]

(a) Solids (b) liquids

(c) Gases (d) All of these

48. An organic compound has been found to possess the Empirical formula CH_2O and molecular weight 90. The molecular formula of it is $(C = 12, H = 1, \text{and } O = 16)$

[CPMT 2000; MP PET 2002]

(a) $C_3H_6O_3$ (b) CH_2O

(c) $C_2H_6O_2$ (d) C_2H_2O

49. An organic compound containing carbon hydrogen and oxygen contains 52.20% carbon and 13.04% hydrogen. Vapour density of the compound is 23. Its molecular formula will be **[MP PMT 2002]**

(a) C_2H_6O (b) C_3H_8O

(c) C_4H_8O (d) $C_5H_{10}O$

[AMU 2001]

50. Lassaigne's test is used to detect **[Kerala (Engg.) 2002]**

(a) Nitrogen and halogens (b)Sodium and halogens

(c) Halogens and sulphur (d)Nitrogen and sulphur

(e) All of the above

51. In Lassaigne's test the organic compound is fused with Na followed by extraction with distilled water. Which of the following is not the possible product of this fusion reaction

[AMU 2002]

(a) NaX (b) $NaCN$
(c) $NaNC$ (d) Na_2S

52. The Empirical formula of a compound is CH_2O and its molecular weight is 120. The molecular formula of the compound is **[Kerala (Med.) 2003]**
(a) $C_2H_4O_2$ (b) $C_3H_6O_3$
(c) $C_4H_8O_4$ (d) CH_2O

53. In Victor Mayer's method 0.2 *gm* of an organic substance displaced 56 *ml* of air at STP the molecular weight of the compound **[Kerala (Med.) 2003]**
(a) 56 (b) 112
(c) 80 (d) 28

54. If we want to study relative arrangement of atoms in a molecule we study **[Orissa JEE 2003]**
(a) Empirical formula (b) Molecular formula
(c) Structural formula (d) None of these

55. Which one of the following reagents is used for detection of unsaturation in alkenes **[EAMCET 2003]**
(a) $NaOH + CaO$
(b) Cold dilute alkaline $KMnO_4$
(c) Cl_2 / hv
(d) KOH / C_2H_5OH

56. The decomposition of organic compounds in the presence of oxygen and without formation of odoriferous substances, is called **[CBSE PMT 1999]**
(a) Decay (b) N_2 fixation
(c) Nitrification (d) Denitrification

57. Which of the following compounds is used as a refrigerants **[Bihar CEE 1995]**
(a) NH_3 (b) CH_2F_2
(c) CCl_4 (d) CH_3COONH_4

58. The latest technique for the purification of organic compounds is **[Pb. CET 2001]**
(a) Fractional distillation (b) Chromatography
(c) Vacuum distillation (d) Crystallisation

59. The presence of halogen, in an organic compounds, is detected by **[Pb. CET 2002]**
(a) Iodoform test (b) Silver nitrate test
(c) Beilstein's test (d) Millon's test

60. *p*-nitrophenol and o-nitrophenol are separated by **[BVP 2004]**
(a) Crystallisation (b) Fractional crystallisation
(c) Distillation (d) Steam distillation

61. Nitrating mixture is **[MH CET 2004]**
(a) Fuming nitric acid
(b) Mixture of conc. H_2SO_4 and conc. HNO_3
(c) Mixture of nitric acid and anhydrous zinc chloride
(d) None of these

62. Quantitative measurement of nitrogen in an organic compounds is done by the method **[CPMT 2004]**
(a) Berthelot method (b) Belstein method
(c) Lassaigne test (d) Kjheldahl's method

63. Which kind of fission is favoured by sunlight **[CPMT 2004]**
(a) Heterolytic fission (b) Homolytic fission
(c) Both (a) and (b) (d) None of these

64. The ammonia evolved from the treatment of 0.30 *g* of an organic compound for the estimation of nitrogen was passed in 100 *mL* of 0.1 *M* sulphuric acid. The excess of acid required 20 *mL* of 0.5 *M* sodium hydroxide solution for complete neutralization. The organic compound is **[AIEEE 2004]**
(a) Urea (b) Benzamide
(c) Acetamide (d) Thiourea

65. The best method for the separation of naphthalene and benzoic acid from their mixture is **[CBSE PMT 2005]**
(a) Chromatography (b) Crystallisation
(c) Distillation (d) Sublimation

66. A compound has an empirical formula C_2H_4O. An independent analysis gave a value of 132.16 for its molecular mass. What is the correct molecular formula **[Kerala PMT 2004]**
(a) $C_4H_4O_5$ (b) $C_{10}H_{12}$
(c) C_7O_3 (d) $C_6H_{12}O_3$
(e) $C_4H_8O_5$

67. An organic compound has an empirical formula CH_2O, its vapour density is 45. The molecular formula of the compounds is **[DCE 2004]**
(a) CH_2O (b) C_2H_5O
(c) C_2H_2O (d) $C_3H_6O_3$

68. The study of organic compounds even at present is done separate from other compounds because **[CPMT 19**
(a) The formation of organic compounds is not based on chemical combination
(b) Organic compounds are covalent
(c) Catenation is the main characteristics
(d) It is the easiest method of study

69. Which of the following pair of the species has the same percentage of carbon **[BHU 1999]**
(a) CH_3COOH and C_2H_5OH
(b) $C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$
(c) $HCOOCH_3$ and $C_{12}O_{22}O_{11}$
(d) CH_3COOH and $C_6H_{12}O_6$

70. In Kjeldahl's method of estimation of N, $CuSO_4$ acts as **[DCE 2002]**
(a) Oxidising agent (b) Reducing agent
(c) Catalytic agent (d) Hydrolysis agent

71. An organic compound having molecular mass 60 is found to contain C = 20%, H= 6.67% and N=46.67% while rest is oxygen. On heating it gives NH_3 alongwith a solid residue. The solid residue give violet colour with alkaline copper sulphate solution. the compound is **[AIEEE 2005]**

(a) CH_3NCO (b) CH_3CONH_2

(c) $(NH_2)_2CO$ (d) $CH_3CH_2CONH_2$

72. How will you separate a solution (miscible) of benzene $+CHCl_3$ **[AFMC 2005]**

(a) Sublimation (b) Filtration

(c) Distillation (d) Crystallisation

73. A mixture of camphor and benzoic acid can be separated by **[BHU 2005]**

(a) Chemical method (b) Sublimation

(c) Fractional distillation (d)Extraction with a solvent

74. Dumas method involves the determination of nitrogen content in the organic compound in the form of **[BHU 2005]**

(a) NH_3 (b) N_2

(c) $NaCN$ (d) $(NH_4)_2SO_4$

75. When 32.25gm ethyl chloride dehydro halogenated, if gives 50%. Alkene, what is the mass of product. (atomic mass of chlorine = 35.5) **[Kerala CET 2005]**

(a) 14 *gm* (b) 28 *gm*

(c) 64.5 *gm* (d) 56 *gm*

(e) 7 *gm*

76. How much sulphur is present in organic compound if on analysis 0.53 *gm* of this compound gives 1.158 *gm* of $BaSO_4$ **[Kerala CET 2005]**

(a) 10% (b) 15%

(c) 20% (d) 25%

(e) 30%

Classification and nomenclature of organic compounds

1. The systematic name of $CH_3-CHBr-CH_2OH$ is **[BHU 1982]**

(a) 3-hydroxy-2-bromopropane

(b) 2-bromopropanol-1

(c) 2-bromo-3-propanol

(d) 3-hydroxy isopropyl bromide

2. IUPAC name of acetyl salicylic acid is **[CPMT 1994]**

(a) *m*-benzoic acid (b) 2-acetoxy benzoic acid

(c) *p*-benzoic acid (d) *p*-acetyl benzoic acid

3. IUPAC name of CH_3CHO is **[NCERT 1981; CBSE PMT 1990; MP PMT 1989, 96]**

(a) Acetaldehyde (b) Methyl aldehyde

(c) Ethanol (d) Ethanal

4. IUPAC name of $CH_3CH(OH)CH_2CH_2COOH$ is **[MP PET 1990]**

(a) 4-hydroxy pentanoic acid

(b) 1-carboxy-3-butanoic acid

(c) 1-carboxy-4-butanol

(d) 4-carboxy-2-butanol

5. IUPAC name of $CH_3-O-C_2H_5$ is **[MNR 1986; MP PET 2000]**

(a) Ethoxymethane (b) Methoxyethane

(c) Methylethyl ether (d) Ethylmethyl ether

6. Which of the following compound has the functional group $-OH$

(a) 1, 2-ethandiol (b) 2-butanone

(c) Nitrobenzene (d) Ethanal

7. IUPAC name of the $(CH_3)_2CHCH(CH_3)_2$ is **[MP PMT 1986]**

(a) 1, 1, 2, 3-tetramethylethane

(b) 1, 2-di-isopropylethane

(c) 2, 3-dimethylbutane

(d) 2, 3, 3-trimethylbutane

8. IUPAC name of the compound is

$CH_3-\underset{\underset{\underset{CH_3}{|}}{CH_2}}{\overset{}{CH}}-CH_2-CH(OH)-CH_3$ is

[DPMT 1985; MP PMT 1987; AFMC 1997]

(a) 4-ethyl-2-pentanol (b) 4-methyl-2-hexanol

(c) 2-ethyl-2-pentanol (d) 3-methyl-2-hexanol

9. IUPAC name of the compound is

$CH_3-CH=\underset{\underset{CH_2-CH_2}{|}}{C}-CH_3$

[NCERT 1983; MP PMT 1989, 96; BHU 1997]

(a) 2-ethyl-2-butene (b) 3-ethyl-2-butene

(c) 3-Methyl-3-pentene (d) 3-methyl-2-pentene

10. The IUPAC name of $CH_3C\equiv N$ is **[CPMT 1990]**

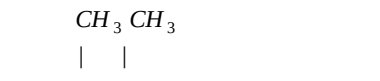
(a) Acetonitrile (b) Ethanenitrile

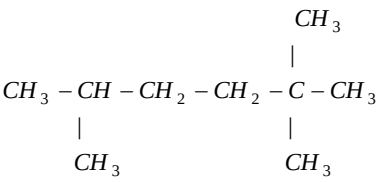
(c) Methyl cyanide (d) Cyanoethane

11. Which compound is 2, 2, 3-trimethylhexane **[IIT-JEE 1986]**

(a) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-\overset{\overset{CH_3}{|}}{CH}-CH_2-CH_3$

(b) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-\overset{\overset{CH_3}{|}}{CH}-CH_3$

(c) 

(d) 

12. The IUPAC name of $CH_3CH_2COCH_2CH_3$ is

[EAMCET 1992]

(a) 3-pentanone (b) 2-pentanone

(c) Diethyl ketone (d) All the above

13. The IUPAC name of $CH_3COOC_2H_5$ will be

[MP PMT/PET 1988; Kurukshetra CEE 1998]

(a) Ethyl acetate (b) Ethyl ethanoate

(c) Methyl propanoate (d) None of these

14. IUPAC name of $(CH_3)_2CH-CH=CH-CH_3$ is

[CPMT 1987; AMU 1985]

(a) 2-methyl-3-pentene

(b) 4-methyl-2-pentene

(c) 1, 2-isopropyl-1-propene

(d) 3-isopropyl-2-propene

15. IUPAC name of $CH_2=CH-CH(CH_3)_2$ is

[IIT-JEE 1987; CBSE PMT 1988; CPMT 1989; MNR 1995; UPSEAT 2001; RPMT 2002]

(a) 1, 1-dimethyl-2-propene

(b) 3-methyl-1-butene

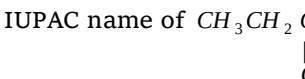
(c) 2-vinyl propane

(d) 1-isopropyl ethylene

16. Alicyclic compounds are **[CPMT 1976]**

(a) Aromatic (b) Aliphatic

(c) Heterocyclic (d) Aliphatic cyclic

17. The IUPAC name of  is

[EAMCET 1991]

(a) 4-methylhexane (b) 3-methylhexane

(c) 2-propylbutane (d) 2-ethylpentane

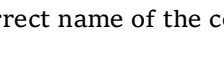
18. The most appropriate statement regarding organic compounds is

(a) They possess ionic and covalent bonds

(b) Presence of carbon is not essential

(c) They are found in a large number

(d) Their reactions are fast

19. Correct name of the compound  is

[CPMT 1973; MP PMT 1994]

(a) Butane (b) Isopropyl methane

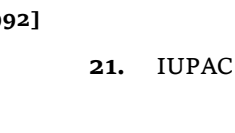
(c) 2-methyl propane (d) Dimethyl ethane

20. General formula of alkyne is

[MNR 1983; CPMT 1975, 93; MP PET 1999]

(a) C_nH_{2n+2} (b) C_nH_{2n}

(c) C_nH_{2n-2} (d) C_nH_n

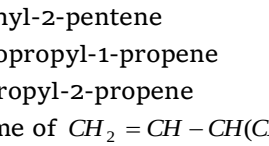
21. IUPAC name of  is **[CPMT 1973, 75, 85]**

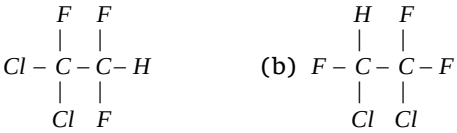
(a) 1, 2-dichloroethane (b) 2, 2-dichloroethane

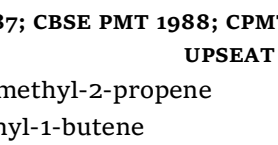
(c) 1, 1-dichloroethane (d) Dichloroethane

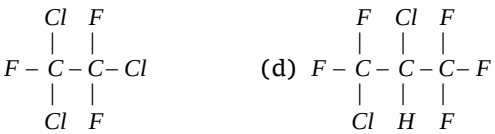
22. Freon-114 used in refrigerator and air conditioners is 1, 2-dichorotetrafluoroethane. Its structural formula is

[CPMT 1979, 81; NCERT 1975]

(a) 

(b) 

(c) 

(d) 

23. IUPAC name of  is

[CPMT 1983, 84]

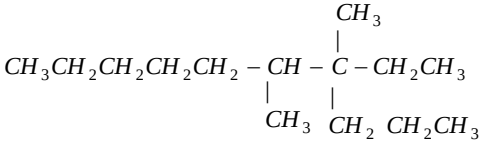
(a) 1-methyl-1-aminopropane

(b) 2-aminobutane

(c) 2-methyl-3-aminopropane

(d) None of the above

24. IUPAC name of the compound is



[NCERT 1982; MP PET 1994]

(a) 3, 4-dimethyl-3-n-propyl nonane

(b) 5, 7-dimethyl-7-n-propyl nonane

(c) 4, 5-dimethyl-4-ethyl decane

(d) 6, 7-dimethyl-7-ethyl decane

25. IUPAC name of $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH=CH_2$ is

[DPMT 1982, 83; Manipal MEE 1995]

(a) 2-methyl pentene (b) 4-methyl pentene-1

(c) 1-hexene (d) 2-methyl pentene-1

26. In the structure

$$^{1}H_3C-\underset{\displaystyle CH_3}{\overset{CH_3}{\overset{|}{\overset{|}{^{2}C}}}}-{}^{3}CH_2-{}^{4}CH_3$$

Which one is quarternary carbon atom

(a) *C* – 1 (b) *C* – 2

(c) *C* – 3 (d) *C* – 5

27. The IUPAC name of

$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH_2$ is **[EAMCET 1992; Pb. PMT 99]**

(a) 2-methylbutene-1

(b) 3-methylbutene-1

(c) Vinyl methylethane

(d) Propylethene-1

28. The IUPAC name of $CH_3C\equiv CCH(CH_3)_2$ is

[MNR 1993; Pb CET 2004]

(a) 4-methyl-2-pentyne

(b) 4, 4-dimethyl-2-butyne

(c) Methyl isopropyl acetylene

(d) 2-methyl-4-pentyne

29. The IUPAC name of the compound having structure

$C_2H_5-\underset{\displaystyle CH_2}{\underset{\|}{C}}-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$ is **[AFMC 1990]**

(a) 3-methyl-2-ethyl butene-1

(b) 2-ethyl-3-methyl butene-1

(c) 3-ethyl-3-methyl butene-1

(d) Ethyl isopropyl ethene

30. The IUPAC name of $(C_2H_5)_2CHCH_2OH$ is

[MP PMT 1986; AFMC 1990]

(a) 2-ethyl butanol-1

(b) 2-methyl pentanol-1

(c) 2-ethyl pentanol-1

(d) 3-ethyl butanol-1

31. IUPAC name of the following compound is

$$CH_3-\underset{\displaystyle C_6H_5}{\overset{H}{\overset{|}{\underset{|}{C}}}}-CH_2-CH_3$$ **[MP PMT 1986]**

(a) 2-cyclohexylbutane (b) 2-phenylbutane

(c) 3-cyclohexylbutane (d) 3-phenylbutane

32. The IUPAC name of $CH_3CH(CH_3)COOH$ is

[CPMT 1988; RPMT 2000]

(a) Dimethyl acetic acid (b) 2-methyl propanoic acid

(c) Propanoic acid (d) Butyric acid

33. IUPAC name of $CH_3-\underset{\displaystyle CH_2CH_3}{\underset{|}{CH}}-CHO$ is **[IIT-JEE 1993]**

(a) Butan-2-aldehyde

(b) 2-methylbutanal

(c) 3-methyl isobutyraldehyde

(d) 2-ethylpropanal

34. The IUPAC name of the compound

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CH_2-OH$ is **[KCET 1990]**

(a) 1-pentanol (b) Pentanol

(c) 2-methyl-4-butanol (d) 3-methyl-1-butanol

35. The IUPAC name of $CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CHO$

will be

[CBSE PMT 1992; JIPMER (Med.) 2002]

(a) 4-hydroxy-1-methylpentanal

(b) 4-hydroxy-2-methylpentanal

(c) 3-hydroxy-2-methylpentanal

(d) 3-hydroxy-3-methylpentanal

36. IUPAC name of tertiary butyl alcohol is

[CPMT 1994]

(a) Butan-1-ol (b) Butan-2-ol

(c) 2-methyl propan-1-ol (d) 2-methyl propan-2-ol

37. What is the correct IUPAC name for

$$CH_3-\underset{\displaystyle CH_3}{\overset{H}{\overset{|}{\underset{|}{C}}}}-CH=CH-CH_2-\overset{O}{\overset{\|}{C}}-OH$$ **[MP PET 1995]**

(a) 5-methyl-3-hexenoic acid

(b) 5-carboxyl-2-methylpentene

(c) 4-isopropyl-3-butenoic acid

(d) None of above

38. The IUPAC name of $CH_3-CH_2CH=\underset{\displaystyle CH_3}{\underset{|}{C}}CH_2OH$ will be

[MP PET/PMT 1988]

(a) 2-methyl pentyl alcohol

(b) 4-methyl-3-pentene-ol

(c) 2-methyl pent-2-ene-1-ol

(d) 4-methyl pentyl alcohol

39. The structure of 4-methyl pentene-2 is **[BHU 1988]**

(a) $(CH_3)_2CH-CH_2CH=CH_2$

(b) $(CH_3)_2CH-CH=CH-CH_3$

(c) $(CH_3)_2CH-CH_2CH=CH-CH_3$

(d) $(CH_3)_2C=CHCH_2CH_3$

40. 2-methyl-2-butene will be represented as **[CBSE PMT 1992]**

(a) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2-CH_3$

(b) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{C}}=CH-CH_3$

(c) $CH_3-CH_2-\underset{}{\overset{\displaystyle CH_3}{\overset{|}{C}}}=CH_2$

(d) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH=CH_2$

41. $Cl-C-Cl$ angle in 1, 1, 2, 2 - tetrachloroethene and tetrachloromethane respectively are about **[IIT-JEE 1988]**

(a) 120^o and 109.5^o (b) 90^o and 109.5^o

(c) 109.5^o and 90^o (d) 109.5^o and 120^o

42. The IUPAC name of succinic acid is **[IIT-JEE 1994]**

(a) 1, 4-butanedioic acid (b) Dimethyl-2-acid

(c) 1, 2-dimethyldioic acid (d) None of these

43. IUPAC name of $(CH_3)_2CH-CH_2-CH_2Br$ is **[CBSE PMT 1996]**

(a) 1-bromopentane

(b) 2-methyl-4-bromobutane

(c) 1-bromo-3-methylbutane

(d) 2-methyl-3-romopropane

44. The IUPAC name for

$CH_3CH=CHCH_2\,\underset{\displaystyle NH_2}{\overset{|}{C}}HCH_2\,COOH$ is **[CBSE PMT 1995]**

(a) 5-aminohex-2-ene carboxylic acid

(b) 5-amino-2-heptenoic acid

(c) 3-amino-5-heptenoic acid

(d) $\beta-$ amino-$\delta-$heptenoic acid

45. The IUPAC name of $CH_2=CH-CH_2Cl$ is **[MP PMT 1995]**

(a) Allyl chloride (b) 1-chloro-3-propene

(c) Vinyl chloride (d) 3-chloro-1-propene

46. The IUPAC name of CH_3CH_2COCl is

(a) Propanoyl chloride (b) Ethanoyl chloride

(c) Acetyl chloride (d) Chloroethane

47. IUPAC name of the compound

$\overset{4}{C}H_2=\overset{3}{C}H-\overset{2}{C}H_2-\overset{1}{C}H_2OH$ is

(a) 1-buten-4-ol (b) 3-buten-1-ol

(c) 4-hydroxy-1-butene (d) 1-butenol-4

48. Which is the correct structure of the compound 3-hexyn-1-oic acid

(a) $CH_3-CH_2-CH_2-C\equiv C-COOH$

(b) $CH_3-CH_2-C\equiv C-CH_2-COOH$

(c) $CH_3-C\equiv C-CH_2-CH_2-COOH$

(d) $CH_3-CH_2-CH=CH-CH_2-COOH$

49. The IUPAC name of

$CH_3-\underset{\displaystyle Cl}{\overset{|}{C}}=\underset{\displaystyle CH_3}{\overset{|}{C}}-\underset{\displaystyle C_2H_5}{\overset{|}{CH}}-CH_2-C\equiv CH$ is **[MP PET 1997]**

(a) 6-chloro-4-ethyl-5-methyl-hept-5-en-1-yne

(b) 6-chloro-4-ethyl-5-methyl-hept-1-yn-5-ene

(c) 2-chloro-4-ethyl-3-methyl-hept-2-en-6-yne

(d) 2-chloro-4-ethyl-3-methyl-hept-6-yn-2-ene

50. The IUPAC name of the compound having the formula $Cl_3C.CH_2CHO$ is **[MP PET/PMT 1998]**

(a) 3, 3, 3-trichloropropanal

(b) 1, 1, 1-trichloropropanal

(c) 2, 2, 2-trichloropropanal

(d) Chloral

51. The IUPAC name of the compound

$CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2-CH_2-Cl$ is **[MP PET 1999; MH CET 2001]**

(a) 1-chloro-3-methylbutane (b)2-methyl-4-chlorobutane

(c) 2-methyl-1-chlorobutane (d) 1-chloropentane

52. The IUPAC name of crotonaldehyde is **[MP PMT 1999]**

(a) Prop-2-ene-1-al (b) Propenal

(c) But-2-ene-1-al (d) Butenal

53. IUPAC name of the following compound will be

$CH_3-CH=\underset{\displaystyle CH_2-CH_2-CH_3}{\overset{|}{C}}-CH_2-CH_3$ **[CPMT 1999, 2002; Pb. CET 2001]**

(a) 3-ethyl-2-hexene (b) 3-propyl-2-hexene

(c) 3-propyl-3-hexene (d) 4-ethyl-4-hexene

54. The IUPAC name of the following compound is

$CH_3-\underset{\displaystyle CH(CH_3)_2}{\overset{|}{CH}}-CH_2CH_2CH_3$ **[Bihar CEE 1995]**

(a) 2-isopropylpentane (b) 2, 3-dimethylhexane

(c) Isononane (d) 2, 4-dimethylhexane

55. The IUPAC name of

$CH_3-\underset{\displaystyle OH}{\overset{\displaystyle Cl}{\overset{|}{C}}}-CH_2CH=CHCH_3$ is **[DPMT 1996]**

(a) 5-chloro-2-hydroxyhexene

(b) 2-chloro-5-hydroxyhexene

(c) 2-chloro-2-hydroxy-5-hexene

(d) 2-chloro-4-hexenol-2

56. IUPAC name of

$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH_3$ is **[CPMT 1996]**

(a) 2, 4-dimethyl pentanol-2
(b) 2, 4-dimethyl pentanol-4
(c) 2, 2-dimethyl butanol-2
(d) None of these

57. Which is correct IUPAC name of the following compound $CH_3-\underset{\underset{CH_2-CH_3}{|}}{\overset{\overset{CH_3}{|}}{CH}}-\overset{\overset{CH_3}{|}}{CH}-CH_3$ **[Orissa JEE 1997]**

(a) 3-isopropyl-2-methylpentane
(b) 3-ethyl-2,4-dimethylpentane
(c) 2,4-dimethyl-3-ethylpentane
(d) 3-isopropyl-4-methylpentane

58. IUPAC name of $CH_3-CH=CH-C\equiv CH$ is **[CPMT 1997]**

(a) Pent-2-en-4-yne
(b) Pent-3-en-1-yne
(c) Pent-3-yne-1-en
(d) Pent-2-yne-1-en

59. The IUPAC name for the formula

$CH_3-\underset{\underset{CH_3}{|}}{C}=\overset{\overset{H}{|}}{C}-COOH$ **[Pb. PMT 1998]**

(a) 2-methyl-2-butenoic acid
(b) 3-methyl-3-butenoic acid
(c) 3-methyl-2-butenoic acid
(d) 2-methyl-3-butenoic acid

60. IUPAC name of $CH_3-\underset{\underset{C_2H_5}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{CH_3}{|}}{\overset{\overset{C_4H_9}{|}}{C}}-CH_3$ is **[BHU 1998; KCET (Engg./Med) 2000]**

(a) 2-butyl-2-methyl-3-ethylbutane
(b) 2-ethyl-3, 3-dimethylheptane
(c) 3, 4, 4-trimethylheptane
(d) 3, 4, 4-trimethyloctane

61. The IUPAC name of the compound $CH_3-\underset{\underset{OH}{|}}{C}=CH-CH_2-COOH$ is

(a) Hydroxypentenoic acid
(b) 4-hydroxy-3-pentenoic acid
(c) 4-hydroxy-4-pentenoic acid
(d) 4-hydroxy-4-methyl-3-butenoic acid

62. Which is the IUPAC name of $CH_3-\underset{\underset{C_2H_5}{|}}{\overset{\overset{C_2H_5}{|}}{C}}-CH_2Cl$ **[KCET (Engg./Med.) 1999]**

(a) 1-chloro-2, 2-diethylpropane
(b) 3-chloro-2, 2-diethylpropane
(c) 1-chloro-2-ethyl-2 methylbutane
(d) 1-chloro-2, 2-diethyl-2 methylethane

63. The IUPAC name of the compound $CHO-(CH_2)_4-COOH$ **[DCE 1999]**

(a) Heaxan-1-al-6-oic acid
(b) Formyl-hexanoic acid
(c) Hexanal-1-carboxylic acid
(d) Hexanoic acid 5-al-1

64. IUPAC name of $CH_3-CH=CH-COOH$ **[RPET 2000]**

(a) 2-butenoic acid (b) 1-butenoic acid
(c) β-butenoic acid (d) 1-carboxy -1-propene

65. IUPAC name of $(CH_3)_2\,CH-CHO$ is: **[RPET 2000]**

(a) 2-methyl propanal
(b) 1-methyl-2 propanal
(c) 2, 2-dimethyl propanal
(d) None of these

66. IUPAC name of the compound $CH_3-CH_2-CH_2(CH_3)_2-C-CH_3$ **[RPET 2000]**

(a) 1, 1-dimethyl pentane
(b) 2, 2-dimethyl pentane
(c) 1, 2-dimethyl pentane
(d) None of these

67. IUPAC name of the following are

$CH_3-\underset{\underset{CH_3}{|}}{N}-\overset{\overset{CH_3}{|}}{\underset{\underset{C_2H_5}{|}}{C}}-CH_2-CH_3$ **[DCE 2000]**

(a) 3-dimethylamino-3-methyl pentane
(b) 3 (N, N-Trimethyl)-3-aminopentane
(c) 3, (N, N-Trimethyl) pentanammine
(d) 3-N, N dimethyl amino-3- methyl pentane

68. The correct IUPAC name of

$H_2C=CH-\underset{\underset{CH_3}{|}}{CH}-CH_2C\equiv CH$ **[Roorkee 2000]**

(a) 3-methyl-1-hexen-5-yne
(b) 4-methyl-5-hexen-1-yne
(c) 4-(ethenyl)-1-pentyne
(d) 3-(2-propenyl) butene-1 **[AIIMS 1998]**

69. The IUPAC name of $(CH_3)_2CH-CH_2-CH_2Br$ is **[MH CET 2001; CBSE PMT 2001; Pb. PMT 2004]**

(a) 1-bromo pentane
(b) 2-methyl and 4 bromo butane
(c) 1-bromo and 3-methyl butane

(d) 2-methyl and 3 bromo propane

70. Which *C*-atoms is the most electronegative in this structure $\overset{III}{C}H_3-\overset{II}{C}H_2-C\equiv\overset{I}{C}H$ **[CPMT 2001]**

(a) I

(b) II

(c) III

(d) All are equal electronegative

71. The IUPAC name of compound $CH_3-C(CH_3)_2-CH_2-CH=CH_2$ is **[CPMT 2001]**

(a) 2, 2-dimethyl pent-4-ene

(b) 2, 2 dimethyl-2-pentene

(c) 1, 1, 1-trimethyl but-3-ene

(d) 4, 4-dimethyl pent-1-ene

72. Which of the following alkanes contains primary, secondary, tertiary and quaternary carbon atoms together **[MP PET 2001]**

(a) $(CH_3)_3CH$

(b) $(C_2H_5)_3CH$

(c) $(CH_3)_3CCH_2CH(CH_3)_2$

(d) $(CH_3)_4C$

73. The number of tertiary carbon atoms in the compound $(CH_3)_2CHCH_2C(CH_3)_3$ is **[MP PMT 2001]**

(a) 2 (b) 3

(c) 1 (d) 4

74. The compound which has one isopropyl group is **[IIT-JEE 1989; MP PMT 2001]**

(a) 2, 2, 3, 3-tetramethyl pentane

(b) 3, 3-dimethyl pentane

(c) 2, 2, 3-trimethyl pentane

(d) 2-methyl pentane

75. Write the IUPAC name of

$$CH_3-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-CH_2-CH_2-CH_2-\underset{\underset{Br}{|}}{\overset{\overset{Br}{|}}{C}}-CH_3$$ **[DCE 2001]**

(a) 6, 6-dibromoheptane-2-ol

(b) 2, 2-dibromoheptane-6-ol

(c) 6, 6 dibromoheptane-2-ol

(d) None of these

76. The IUPAC name of

$$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_2-\overset{\overset{OH}{|}}{C}H-CH_3$$ is

[KCET (Med.) 2001; UPSEAT 1999, 2002]

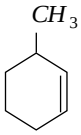
(a) 4-methyl-2, 4, pentanediol

(b) 1, 1-dimethyl 1, 1, 3 butanediol

(c) 2-methyl-2, 4 pentanediol

(d) 1, 2, 3-trimethyl-1, 3 propanediol

77. IUPAC name of the following compound is **[AIIMS 2003]**



(a) 3-methyl cyclohexene

(b) 1-methyl cyclohex-2-ene

(c) 6-methyl cyclohexene

(d) 1-methyl cyclohex-5-ene

78. The IUPAC name of the compound $CH_3-\underset{\underset{CH_3}{|}}{C}=CH_2CH_2OH$ is **[BHU 2001]**

(a) 2-methyl-2-butenol

(b) 2-methyl-3-butenol

(c) 3-methyl-2-butenol

(d) 3-methyl- but-2-ene-1-ol

79. The IUPAC name of $CH_3C\equiv CCH(CH_3)_2$ is **[UPSEAT 2001]**

(a) 4 methyl-2 pentyne

(b) 4, 4-dimethyl-2-butyne

(c) Methyl isopropyl acetylene

(d) 2-methyl-4-pentyne

80. Which of the following compound have wrong IUPAC name **[AIEEE 2002]**

(a) $CH_3-CH_2-CH_2-COO-CH_2CH_3$ → ethyl butanoate

(b) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-CHO$ →3-methyl-butanal

(c) $CH_3-\underset{\underset{OH}{|}}{CH}-\underset{\underset{CH_3}{|}}{CH}-CH_3$ → 2-methyl-3-butanol

(d) $CH_3-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{||}}{C}-CH_2-CH_3$ →2-methyl-3 pentanone

81. If CH_4 is known as methane, then C_9H_{20} is known as **[Kerala (Med.) 2002]**

(a) Hexane (b) Nonane

(c) Octane (d) Butane

82. The IUPAC name of *n*-butyl chloride is **[Kerala (Med.) 2002]**

(a) 1-chlorobutane (b) *n*-chlorobutane

(c) ter-butylchloride (d) 2-methylbutane

83. General formula of alkanes is **[MP PET/PMT 2002]**

(a) C_nH_{2n+1} (b) C_nH_{2n+2}

(c) C_nH_{2n-1} (d) C_nH_{2n}

84. General formula of alkene and alkane are **[MP PMT 2002]**

(a) C_nH_{2n} and C_nH_{2n+1}

(b) C_nH_{2n} and C_nH_{2n+2}

(c) C_nH_{2n-1} and C_nH_{2n}

(d) C_nH_{2n-1} and C_nH_{2n+2}

85. The IUPAC name of picric acid is **[KCET 2002]**

(a) 2,4,6-trinitrophenol

(b) 2,4,6-trinitrobenzoic acid

(c) 4-nitrophenol

(d) None of these

86. General formula of paraffin is **[RPMT 2002]**

(a) C_nH_{2n} (b) C_nH_{2n-2}

(c) C_nH_{2n+2} (d) $C_{2n}H_{2n}$

87. IUPAC name of compound is

$CH_3-CH_2-CH(CH_3)-CH_2-COCl$ **[RPMT 2002]**

(a) 3-methyl pentanoyl chloride

(b) 3-methyl butanoyl chloride

(c) 1-chloro-3-methyl pentanol

(d) None of these

88. The name of $H_3C-\underset{CH_3}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH}}-CH_3$

IUPAC nomenclature system is

[MP PMT 2002; MH CET 2002]

(a) Butanol (b) 2-methyl butanol-3

(c) 3-methyl butanol-2 (d) Pentanol

89. The name of $ClH_2C-\underset{Br}{\underset{|}{C}}=\underset{Br}{\underset{|}{C}}-CH_2Cl$ according to IUPAC nomenclature system is : **[MP PMT 2002]**

(a) 2,3 dibromo-1, 4-dichlorobutene-2

(b) 1, 4-dichloro-2, 3-bromobutene-2

(c) Dichlorodibromobutene

(d) Dichlorodibromobutane

90. The IUPAC name of acraldehyde is **[MP PMT 2000]**

(a) Prop-2-ene–1–al (b) Propenyl aldehyde

(c) But-2-ene–1–al (d) Propenal

91. IUPAC name of the compound

$CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-\underset{CH_3}{\underset{|}{CH}}-CH_3$ is..... **[Orissa JEE 2002]**

(a) 4-methyl pentene-2-*ol* (b)2-methyl pentanol-4

(c) 4, 4-dimethyl butan-2-*ol* (d)4-methyl pentane-2-*ol*

92. Cycloalkane has the formula **[Kerala (Engg.) 2002]**

(a) C_nH_{2n+2} (b) C_nH_{2n-2}

(c) C_nH_{2n} (d) $C_{2n}H_2$

93. The IUPAC name of the compound $CH_2=CH-CH_2-CH_2-C\equiv CH$ is

[CBSE PMT 2002; MP PMT 2003]

(a) 1, 5-hexenyne (b) 1-hexyne-5-ene

(c) 1, 5-hexynene (d) 1-hexene-5-yne

94. The IUPAC name of

$CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-\underset{}{\underset{|}{CHCHO}}$ with CH_3 is **[JIPMER 2002]**

(a) 4 Hydroxy-2-methylpentanal

(b) 2-hydroxy-4 methyl pentanal

(c) 2-methyl pent-4-ol-1-al

(d) None of these

95. The IUPAC name of the compound

$CH_3-CH(C_2H_5)-CH=CH-CH_3$ is **[BHU 2002]**

(a) 4-ethyl-2-pentene (b) 4-methyl 2-hexene

(c) 3-ethyl-2-pentene (d) 2-ethyl-3-pentene

96. IUPAC name of $CH_3-\underset{CH_3}{\underset{|}{CH}}-CH_2-\underset{CN}{\underset{|}{CH}}-CH_3$

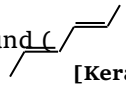
[AIIMS 2002]

(a) 2-cyno, 3-methyl, hexane

(b) 3-methyl, 5-cyanohexane

(c) 2-4 dimethyl, cyanopentane

(d) 2-cyno, 3-methylhexane

97. The IUPAC name of compound () is **[Kerala CET 2005]**

(a) (2Z, 4Z) –2, 4-hexa di-ene

(b) (2Z, 4E)–2, 4 hexa di ene

(c) (4Z, 4Z)–2, 4 hexa di ene

(d) (2E, 4Z)–2, 4 hexa di ene

(e) (2E, 4E)–2, 4 hexa di ene

98. Name the alkene with molecular formula $C_{10}H_{20}$

[Kerala (Med.) 2003]

(a) Dodecene (b) Undecene

(c) Decene (d) Heptene

99. The IUPAC name of following compounds is

$HOOC-CH_2-\underset{COOH}{\underset{|}{CH}}-CH_2-CH_2-COOH$

[Kerala CET 2005]

(a) 2-(Carboxy methyl)-pentane-1, 5-dioic acid

(b) 3-Carboxy hexane –1, 6 dioic acid

(c) Butane, 1, 2, 4,-Tricarboxylic acid

(d) 4-Carboxy hexane-1, 6 dioic acid

(e) 1, 2 dicarboxypentanoic acid

100. Names of some compounds are given. Which one is not in IUPAC system **[CBSE PMT 2005]**

(a) $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{CH_3}{\underset{|}{CH}}-CH_3$
3-Methyl-2-bulanol

(b) $CH_3-C\equiv C-CH(CH_3)_2$
4-Methyl-2-pentyne

(c) $CH_3-CH_2-\underset{CH_2}{\underset{||}{C}}-\underset{CH_3}{\underset{|}{CH}}-CH_3$
2-Ethyl-3-methyl-bul-1-ene

(d) $CH_3-CH_2-CH_2-\underset{\underset{CH_2CH_3}{|}}{CH}-\underset{|}{CH}-CH_2CH_3$ (CH_3 on the second CH)

3-Methyl-4-ethyl heptane

101. The IUPAC name of the compound

$CH_3-CH_2-\underset{|}{CH}(OCH_3)-CH_2-OH$ is **[BHU 2004]**

(a) 2-methoxy-1-butanol (b) 3-methoxy-1-butanol

(c) 2-methoxy-1-butanol (d) 1, 2-methoxy-butanol

102. IUPAC name of

$CH_3-\underset{\underset{NH_2}{|}}{CH}-CH_3$ is **[MH CET 2004]**

(a) Dimethyl amine (b) 2-aminopropane

(c) Isopropylamine (d) 2-propanamine

103. The compound having only primary hydrogen atoms is **[AIIMS 2004]**

(a) Isobutene (b) 2,3-Dimethylbutene

(c) Cyclohexane (d) Propyne

104. The compound formed in the positive test for nitrogen with the lassaigne solution of an organic compounds is **[AIEEE 2004]**

(a) $Fe(CN)_3$ (b) $Na_3[Fe(CN)_6]$

(c) $Fe_4[Fe(CN)_6]_3$ (d) $Na_4[Fe(CN)_5NOS]$

105. The IUPAC name of Gamaxene is **[MP PET 2004]**

(a) Benzene hexachloride

(b) Hexachlorobenzene

(c) 1, 2, 3, 4, 5, 6, hexachlorobenzene

(d) 1, 2, 3, 4, 5, 6, hexachlorocyclohexane

106. The IUPAC name of $CH_3-\underset{|}{CH}(Cl)-CH_3$ is **[Pb. CET 2000]**

(a) 2-chloropropane (b) Chloropropane

(c) 1-chloropropane (d) 2-chlorobutane

107. The IUPAC name of

$CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$ and $\underset{\underset{CN}{|}}{CH_2}-\underset{\underset{CN}{|}}{CH}-\underset{\underset{CN}{|}}{CH_2}$

[Pb. CET 2004; DCE 2002; MNR 1984; CPMT 1983, 93; RPMT 1999]

(a) 1, 1-dimethyl-1, 3-butanediol and propanetricarbyl amine

(b) 4-methyl-2, 4-pentanediol and 1, 2, 3 propanetrinitrile

(c) 2-methyl 2, 4-pentanediol and 3 cyano 1, 5-pentanedinitrile

(d) 1, 3, 3-trimethyl 1,3-propanediol and 1, 2, 3 tricyano propane

108. The IUPAC name of $CH_3CH_2C(Br)=CH-Cl$ is **[CPMT 2004]**

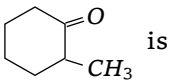
(a) 2-bromo-1-chloro butene

(b) 1-chloro-2-bromo-butene

(c) 3-chloro-2-bromo butene-2

(d) None of these

109. IUPAC name for the compounds



is **[DPMT 2004]**

(a) α-Methyl cyclohexanone

(b) 2-Methyl cyclohexanone

(c) Heptanone-2

(d) Methyl cyclo-hexanone

110. Which of the following compounds is not chiral **[AIEEE 2004]**

(a) 1-chloro-2-methyl pentane

(b) 2-chloropentane

(c) 1-chloropentane

(d) 3-chloro-2-methyl pentane

111. IUPAC name of

$CH_2=CH-CH(CH_3CH_2)\underset{\underset{Br}{|}}{C}=CH_2$ is .....

[JEE Orissa 2004]

(a) 4-bromo-3-ethyl-1, 4-pentadiene

(b) 2-bromo-3-ethyl-1, 4-pentadiene

(c) 2-bromo-3-ethyl-1, 5-pentadiene

(d) None of these

112. Write the IUPAC name of CH_3CH_2COOH **[AFMC 2004]**

(a) Ethyl formic acid

(b) Ethyl carboxylic acid

(c) Ethane methanoic acid

(d) Propanoic acid

113. IUPAC name of

$H_3C-\underset{\underset{C_2H_5}{|}}{CH}-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2Cl$ is **[CPMT 1988, 93]**

(a) 1-chloro-4-methyl -2-hexanal

(b) 1-chloro--4-ethyl-2-pentanol

(c) 1-chloro-4-methyl-2-hexanol

(d) 1-chloro--2-hydroxy-4-methyl hexane

114. IUPAC name of $(CH_3)_3C-CH=CH_2$ is **[NCERT 1978, 81; IIT-JEE 1984; DPMT 1986; CPMT 1989; CBSE PMT 1991; AIIMS 1997; MP PMT 2001; KCET 2003]**

(a) 3,3,3-trimethyl-1-propene

(b) 1,1,1-trimethyl-2-propene

(c) 3,3-dimethyl-1-butene

(d) 2,2-dimethyl-3-butene

115. The IUPAC name of $CH_3COCH(CH_3)_2$ is **[AIEEE 2003]**

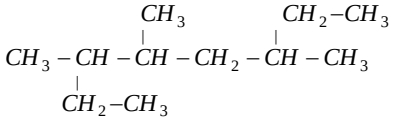
(a) Isopropylmethyl ketone

(b) 2-methyl-3-butanone

(c) 4-methylisopropyl ketone

(d) 3-methyl-2-butanone

116. What will be the IUPAC name of the given compound



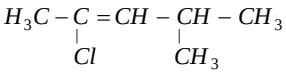
[BHU 2005]

(a) 2, 5 – diethyl – 4 – methylexane

(b) 3, 4, 6 – trimethyloctane

(c) 2, 5, 6 – trimethyloctane

(d) 3, 5 – dimethyl – 6 – ehtylheptane

117.  **[KCET 2005]**

(a) 2-chloro-4-methyl-2-pentene

(b) 4-chloro-2-methyl-3-pentene

(c) 4-methyl-2-chloro-2-pentene

(d) 2-chloro-4, 4-dimethyl-2-butene

118. The IUPAC name for CH_3CO-CH_3 is **[J & K 2005]**

(a) Dimethyl ketone (b) Acetone

(c) Propanal (d) Propanone

Critical Thinking

Objective Questions

1. $116\,mg$ of a compound on vaporisation in a Victor Meyer's apparatus displaces $44.8\,ml$ of air measured at S.T.P. The molecular weight of the compounds is **[Kerala PMT 2004]**

(a) 116 (b) 232

(c) 58 (d) 44.8

(e) 46.4

2. An organic compound contains 49.3% carbon 6.84% hydrogen and its vapour density is 73. Molecular formula of the compound is

[MP PET 2000; Kerala PMT 2004; Pb. CET 2004]

(a) $C_3H_5O_2$ (b) $C_6H_{10}O_4$

(c) $C_3H_{10}O_2$ (d) $C_4H_{10}O_2$

3. If 0.228 *g* of silver salt of dibasic acid gave a residue of 0.162*g* of silver on ignition then molecular weight of the acid is **[AIIMS 2000]**

(a) 70 (b) 80

(c) 90 (d) 100

4. $0.0833\,mol$ of carbohydrate of empirical formula CH_2O contain $1g$ of hydrogen. The molecular formula of the carbohydrate is **[DCE 2003; BVP 2004]**

(a) $C_5H_{10}O_5$ (b) $C_3H_4O_3$

(c) $C_{12}H_{22}O_{11}$ (d) $C_6H_{12}O_6$

5. A gas mixture contains 50% helium and 50% methane by volume. What is the percent by weight of methane in the mixture **[Kerala PMT 2004]**

(a) 19.97% (b) 20.05%

(c) 50% (d) 75%

(e) 80.03%

6. 0.5 *g* of hydrocarbon gave 0.9 *g* water on combustion. The percentage of carbon in hydrocarbon is

(a) 75.8 (b) 80.0

(c) 56.6 (d) 28.6

7. Lassaigne's test for the detection of nitrogen fails in

[CBSE PMT 1994]

(a) $NH_2CONHNH_2.HCl$

(b) $NH_2NH_2.HCl$

(c) NH_2CONH_2

(d) $C_6H_5NHNH_2.HCl$

8. Camphor is often used in molecular mass determination because **[CBSE PMT 2004]**

(a) It is volatile

(b) It is solvent for organic substances

(c) It is readily available

(d) It has a very high cryoscopic constant

9. In Kjeldahl's method, the nitrogen present in the organic compound is quantitatively converted into **[DCE 2003]**

(a) Gaseous ammonia

(b) Ammonium sulphate

(c) Ammonium phosphate

(d) Ammonia

10. How many H-atoms are present in 0.046 *g* of ethanol

[DCE 2003]

(a) 6×10^{20} (b) 1.2×10^{21}

(c) 3×10^{21} (d) 3.6×10^{21}

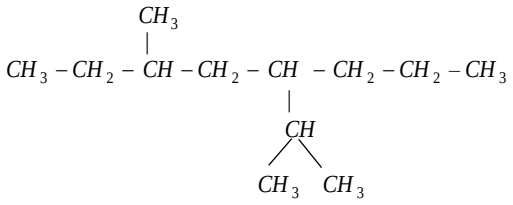
11. A hydrocarbon contains 10.5 *gm* carbon and 1*gm* hydrogen. Its 2.4 *gm* has 1 *litre* volume at 1 *atm* and 127^oC, hydrocarbon is

[UPSEAT 2003]

(a) C_6H_7 (b) C_6H_8

(c) C_5H_6 (d) None of these

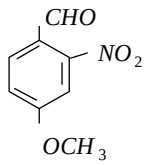
12. IUPAC name of the compound



[Orissa JEE 2003]

(a) 4-isopropyl 1-6-methyl octane
(b) 3- methyl-5-(1'-methylethyl) octane
(c) 3-methyl-5-isopropyl octane
(d) 6-methyl-4-(1'methylethyl) octane

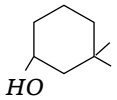
13. What is the correct IUPAC name of



[MP PMT 2003]

(a) 4-methoxy-2-nitrobenzaldehyde
(b) 4-formyl-3-nitro anisole
(c) 4-methoxy-6-nitrobenzaldehyde
(d) 2-formyl-5-methoxy nitrobenzene

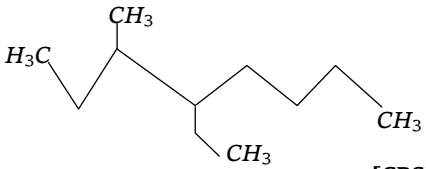
14. The IUPAC name of the compound is



[AIEEE 2004]

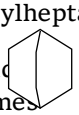
(a) 3, 3- dimethyl-1-cyclohexanol
(b) 1, 1-dimethyl-3-hydroxy cyclohexane
(c) 3, 3-dimethyl-1-hydroxy cyclohexane
(d) 1, 1-dimethyl-3-cyclohexanol

15. Name of the compound given below is



[CBSE PMT 2003]

(a) 5-ethyl-6-methyloctane
(b) 4-ethyl-3-methyloctane
(c) 3-methyl-4-ethyloctane
(d) 2, 3-diethylheptane

16. The compound  is known by which of the following names **[MP PET 1997]**

(a) Bicyclo-[2, 2, 2] octane (b)Bicyclo-[2, 2, 1] octane
(c) Bicyclo-[1, 2, 1] octane (d)Bicyclo-[1, 1, 1] octane

A R Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below :

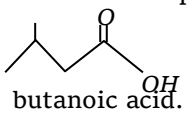
(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

1. Assertion : A mixture of plant pigments can be separated by chromatography.
Reason : Chromatography is used for the separation of coloured substances into individual components.

2. Assertion : Moving phase is liquid and stationary phase is solid in paper chromatography.
Reason : Paper chromatography is used for analysis of polar organic compounds.

3. Assertion : During digestion with concentrated H_2SO_4, nitrogen of the organic compound is converted into $(NH_4)_2SO_4$.
Reason : $(NH_4)_2SO_4$ on heating with alkali liberates NH_3.

4. Assertion : Thiophene present in commercial benzene as an impurity can be removed by shaking the mixture with cold concentrated H_2SO_4.
Reason : Thiophene is a heterocyclic aromatic compound.

5. Assertion :  is 3-methyl butanoic acid.
Reason : In poly functional group, the substituent should be given lower number than the principal functional group.

6. Assertion : Refining of petroleum involves fractional distillation.
Reason : Fractional distillation involves repeated distillation.

7. Assertion : Potassium can be used in lassaigne test.
Reason : Potassium reacts vigorously. **[AIIMS 1997]**

8. Assertion :  is 3-methyl cyclopentene.

Reason : In numbering, double bonded carbon atoms gets preference to the alkyl group in cycloalkenes.

9. Assertion : During test for nitrogen with Lassaigne extract on adding $FeCl_3$ solution sometimes a red precipitate is obtained.

Reason : Sulphur is also present. **[AIIMS 2001]**

Answers

Chemical analysis of organic compounds

1	b	2	a	3	d	4	a	5	b
6	a	7	d	8	c	9	b	10	c
11	b	12	b	13	c	14	d	15	a
16	b	17	c	18	d	19	a	20	d
21	b	22	a	23	c	24	c	25	c
26	c	27	d	28	a	29	c	30	a
31	d	32	c	33	b	34	b	35	c
36	a	37	a	38	a	39	d	40	d
41	b	42	c	43	b	44	a	45	a
46	c	47	d	48	a	49	a	50	e
51	c	52	c	53	c	54	c	55	b
56	a	57	a	58	b	59	c	60	d
61	b	62	d	63	b	64	a	65	b
66	d	67	d	68	c	69	d	70	c
71	c	72	c	73	a	74	b	75	e
76	e								

Classification and nomenclature of organic compounds

1	b	2	b	3	d	4	a	5	b
6	a	7	c	8	b	9	d	10	b
11	c	12	a	13	b	14	b	15	b
16	d	17	b	18	c	19	c	20	c
21	c	22	c	23	b	24	c	25	b
26	b	27	a	28	a	29	b	30	a
31	b	32	b	33	b	34	d	35	b
36	d	37	a	38	c	39	b	40	b
41	a	42	a	43	c	44	c	45	d
46	a	47	b	48	b	49	a	50	a
51	a	52	c	53	a	54	b	55	d
56	a	57	b	58	b	59	c	60	d
61	b	62	c	63	b	64	a	65	a
66	b	67	d	68	a	69	c	70	a
71	d	72	c	73	c	74	d	75	a
76	c	77	a	78	d	79	a	80	c
81	b	82	a	83	b	84	b	85	a
86	c	87	a	88	c	89	a	90	a
91	d	92	c	93	d	94	a	95	b
96	c	97	e	98	c	99	b	100	d
101	a	102	b	103	d	104	c	105	c
106	a	107	c	108	a	109	b	110	a
111	b	112	d	113	c	114	c	115	d
116	b	117	a	118	d				

Critical Thinking Questions

1	c	2	b	3	c	4	d	5	e
6	b	7	b	8	a	9	d	10	d
11	a	12	b	13	a	14	a	15	b
16	a								

Assertion & Reason

1	b	2	e	3	b	4	b	5	c
6	b	7	e	8	a	9	a		

AS Answers and Solutions

Chemical analysis of organic compounds

3. (d)

Elements	No. of Moles	Simple ratio
C = 90%	90/12 = 7.5	7.5/7.5 = 1 × 3 = 3
H = 10%	10/1 = 10	10/7.5 = 1.33 × 3 = 4

$\therefore$ Empirical formula = C_3H_4

4. (a)

Element	%	No. of Moles	Simple Ratio
C	36	36/12 = 3	3/3 = 1
H	6	6/1 = 6	6/3 = 2
O	58	58/16 = 3.62	3.62/3 = 1

Therefore, Empirical formula = CH_2O

5. (b) Empirical Formula = CH_2O

Empirical formula mass = 12 + 2 + 16 = 30

Mol. Mass = 2 × V.D. = 2 × 30 = 60

$$n = \frac{\text{Mol.mass}}{\text{Emperical mass}} = \frac{60}{30} = 2$$

Molecular formula = $(\text{Emperical formula})_n$

= $(CH_2O)_2 = C_2H_4O_2$.

6. (a)

Element	%	No. of Moles	Simple Ratio
C	48	48/12 = 4	1
H	8	8/1 = 8	2
N	56	56/14 = 4	1

Empirical formula = CH_2N

Empirical formula mass = 28

Now, 200 *ml* of compound = 1 *gm*

22400 *ml* of compound $\frac{1}{200} \times 22400 = 112$

$$n = \frac{\text{Mol. mass}}{\text{Emp formula mass}} = \frac{112}{28} = 4$$

Therefore, Molecular formula $= (CH_2N)_4 = C_4H_8N_4$.

7. (d) Minimum mass of sulphur = wt. of its one atom = 32

$\because$ 3.4 *gms* of sulphur present in 100 *gms*.

$\therefore$ 32 *gms* of sulphur present in $= \frac{100 \times 32}{3.4} = 940$

8. (c) Halogen is estimated by carius method.

9. (b) $\because$ 1.8*gm* water obtained from 1.4*gm* hydrocarbon

$\therefore$ 18*gm* water obtained from – $\frac{1.4}{1.8} \times 18 = 14$ *gm*.

Empirical formula Mass = 14

$\therefore$ Empirical formula = CH_2.

10. (c) In carius method sulphur of organic compound is converted in to H_2SO_4

$$S + H_2O + 3O \xrightarrow[HNO_3]{\Delta} H_2SO_4$$

11. (b) % of chlorine = $\frac{35.5}{143.5} \times \frac{\text{Mass of } AgCl}{\text{Mass of substance}} \times 100$

= $\frac{35.5}{143.5} \times \frac{0.287}{0.099} \times 100 = 71.71\%$.

12. (b) % of *C* = $\frac{12}{44} \times \frac{\text{Mass of } CO_2}{\text{Mass of substance}} \times 100$

= $\frac{12 \times 0.22}{44 \times 0.24} \times 100$ = 25; *C* = 25, *H* = 1.66

Total = 26.6 = 100 – 26.6 = 73.4.

13. (c)

Element	No. of Moles	Simple Ratio
C = 74	74/12 = 6.1	6.1/1.2 = 5.08 or 5
H = 8.65	8.65/1= 8.65	8.6/1.2 = 7.16 or 7
N = 17.3	17.3/14 = 1.2	1.2/1.2 = 1 or 1

Therefore Empirical formula $= C_5H_7N$.

15. (a) Mol. mass of an acid = Equivalent wt. × basicity.

16. (b) If molecular formula is different than molecular weight is also different.

17. (c) Empirical formula mass = C_2H_5O = 24+ 5 +16= 45.

$$n = \frac{\text{Mol.mass}}{\text{Emp. mass}} = \frac{90}{45} = 2$$

Mol. formula = $(C_2H_5O)_2 = C_4H_{10}O_2$.

18. (d)

Element	No. of Moles	Simple Ratio
C = 24	24/12 = 2	1
H = 4	4/1 = 4	2
O = 32	32/16 = 2	1

Therefore CH_2O.

19. (a)

Element	No. of Moles	Simple Ratio
C = 38.8	38.8/12 = 3.2	1
H = 16	16/1 = 16	5
N = 45.2	45.2/14 = 3.2	1

Therefore, Empirical formula = CH_5N

20. (d) % of $N = \frac{1.4 \times V \times N}{W}$

where *V* = Volume of acid used

N = Normality of acid, W = Weight of substance

21. (b)

Element	No. of Moles	Simple Ratio
C = 54.5	54.5/12 = 4.54	2
H = 9.1	9.1/1 = 9.1	4
O = 36.4	36.4/16 = 2.27	1

Hence, C_2H_4O.

22. (a)

Element	No. of Moles	Simple Ratio

C = 92.31	92.31/12 = 7.69	1
H = 7.69	7.69/1 = 7.69	1

Hence, *CH*

Empirical formula mass of *CH* = 13

$$n = \frac{\text{Mol.mass}}{\text{Emp. mass}} = \frac{78}{13} = 6$$

Molecular formula = $(CH)_6 = C_6H_6$.

23. (c)

Element	No. of Moles	Simple Ratio
C = 53.3	53.3/12 = 4.44	2
H = 15.6	15.6/1 = 15.6	7
N = 31.1	31.1/14 = 2.22	1

Hence, formula = C_2H_7N $(CH_3CH_2NH_2)$.

24. (c)

Element	No. of Moles	Simple Ratio
C = 80	80/12 = 6.66	1
H = 20	20/1 = 20	3

Hence formula = CH_3 or C_2H_6.

25. (c)

Elements	Simple ratio
$C = 50$	$50/12 = 4$
$O = 50$	$50/16 = 3$

Empirical formula = C_4O_3

Empirical formula mass = 96

$$n = \frac{290}{96} = 3$$

Molecular formula = $(C_4O_3)_3 = C_{12}O_9$.

26. (c)

Element	No. of moles	Simple ratio
C = 83.7%	83.7/12 = 6.9	6.9/6.9 = 1 × 3 = 3
H = 16.3%	16.3/1 = 16.3	16.3/0.9 = 2.3 × 3 = 7

Empirical formula = C_3H_7.

27. (d)

Elements		No. of moles	Simple ratio
C	60%	60/12 = 5	3.01
H	13.3%	13.3/1 = 13.3	8.01
O	26.7%	26.7/16 = 1.66	1

Empirical formula = C_3H_8O.

28. (a)

Element		No. of moles	Simple ratio
C	85.72%	85.72/12	7.14 = 1
H	14.18%	14.18/1	14.18 = 2

Empirical formula = C_2H_4.

29. (c)

Elements		No. of moles	Simple ratio
C	(24 *gm*)	24/12 = 2	1
H	(8 *gm*)	8/1 = 8	4
O	(32 *gm*)	32/16 = 2	1

Empirical formula = CH_4O

30. (a)

Elements		No. of moles	Simple ratio
C	6	6/12 = 0.5 = 1	1
H	1	1/1 = 1 = 2	2
O	8	8/16 = 0.5 = 1	1

Thus, Empirical formula = CH_2O

Empirical formula mass = 30

Mol. mass = 2 × V.D. = 2 × 30 = 60

$$n = \frac{60}{30} = 2$$

Mol. formula = $(CH_2O)_2 = C_2H_4O_2$.

31. (d) Molecular mass = $2 \times V.D. = 2 \times 37 = 74$.

32. (c)

Elements	No.of moles	Simple ratio
C = 80%	80/12 = 6.66	1
H = 20%	20/1 = 20	3

Hence, Empirical Formula = CH_3.

33. (b)

Elements	No. of moles	Simple ratio	
C = 40%	40/12	3.33	1
H = 6.7%	6.7/1	6.7	2
O = 53.3%	5.33/16	3.33	1

Thus, Empirical formula = CH_2O.

34. (b) $n = \frac{\text{Molecular mass}}{\text{Emperical mass}}$

35. (c)

Element	No. of moles	Simple ratio	
C = 40%	40/12	3.33	1
H = 13.33%	13.33/1	13.33	4
N = 46.67%	46.67/14	3.33	1

Thus formula CH_4N.

36. (a)

Elements	No. of moles	Simple ratio	
C = 18.5%	18.5/12	$\Rightarrow$1.54	1
H = 1.55%	1.55/1	$\Rightarrow$1.55	1
Cl = 55.04%	55.04/35.5	$\Rightarrow$1.55	1
O = 24.81%	24.81/16	$\Rightarrow$1.55	1

Hence, formula = $CHClO$.

38. (a) $\%\ \text{of S} = \frac{32}{233} \times \frac{\text{wt. of } BaSO_4}{\text{wt. of organic compound}} \times 100$

$$= \frac{32}{233} \times \frac{0.35}{0.2595} \times 100 = 18.52\%\ gm.$$

39. (d) Kjeldahl's method depends upon the fact that most of the organic compounds containing nitrogen are quantitatively decomposed to give $(NH_4)_2SO_4$ when heated strongly with conc. H_2SO_4. In this method $CuSO_4$ acts as catalytic agent.

40. (d) Nitrates on reaction with conc. H_2SO_4 and $FeSO_4$ give a brown ring due to formation of $FeSO_4.NO$ or $[Fe(H_2O)_5NO]SO_4$.

41. (b) Molecular of weight of $CHCl_3$ is 120

42. (c) Urea (NH_2CONH_2) has molecular wt. 60 and wt. of Nitrogen is 28

In 60 *gm* of urea nitrogen present = 28 *gm*

In 100 *gm* of urea nitrogen present $= \frac{2800}{60} = 46.66\%$

44. (a) Anhydrous $CuSO_4$ is used to test presence of water in any liquid because it changes its colour white to blue.

48. (a) Molecular weight of $C_3H_6O_3$ is 90.

49. (a) Molecular weight = V.D. $\times$ 2 = 23 $\times$ 2 = 46

Molecular weight of $C_2H_6O = 46$

52. (c) Molecular weight of $C_4H_8O_4$ is 120.

53. (c) Molecular mass

$$= \frac{\text{wt. of organic substance taken}}{\text{air displaced } at \text{ STP}} \times 22400$$

$$= \frac{0.2}{56} \times 22400 = 80 \text{ .}$$

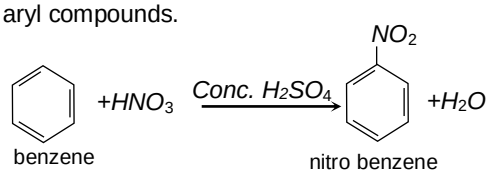
57. (a) Liquid ammonia is used as a coolant in ice factories and cold storages.

58. (b) Chromatography is the latest technique for the purification of organic compounds. Chromatography are of various type viz. Column chromatography, gas chromatography, paper chromatography etc.

59. (c) Halogens are detected by Beilstein's test. In this test, a copper wire is dipped in original solution and heated in a bunsen burner flame. Green colour is imparted to the flame, due to the formation of a volatile copper halide. This proves the presence of halogen.

60. (d) *o*-nitro phenol has intra molecular hydrogen bonding, while *p*-nitrophenol has intermolecular hydrogen bonding (comparitively stronger). Due to this reason, the boiling point of *o*-nitrophenol is found quite less than that of *p*-nitrophenol. Hence, *o*-nitrophenol is steam volatile and can be separated from *p*-nitrophenol by steam distillation.

61. (b) The mixture of conc. H_2SO_4 and conc. HNO_3 is called nitrating mixture. It is used in the nitration of aryl compounds.



62. (d) Kjeldahl's and Duma's methods are used for the quantitative estimation of nitrogen in an organic compound. In the Kjeldahl method, the nitrogen element of organic compound is changed to the ammonia.

63. (b) Homolytic fission is favoured by sunlight. In it, each bonded atom takes away its shared electrons and thus free radicals are produced.

64. (a) Equivalent of NH_3 evolved

$$= \frac{100 \times 0.1 \times 2}{1000} - \frac{20 \times 0.5}{1000} = \frac{1}{100}$$

percent of nitrogen in the unknown organic compound

$$= \frac{1}{100} \times \frac{14}{0.3} \times 100 = 46.6\ \%$$

percent of nitrogen in urea $(NH_2)_2CO$

$$= \frac{14 \times 2}{60} \times 100 = 46.6\ \%$$

$\therefore$ The compound must be urea.

65. (b) Mixture of benzoic acid and naphthalene can be separated from hot water in which benzoic acid dissolves but naphthalene does not.

66. (d) Empirical formula weight C_2H_4O

$$= (12 \times 2 + 4 + 16) = 44$$

$$\text{Molecular formula} = \frac{\text{mol. wt}}{\text{eq. formula wt.}} \times \text{ Emp. Formula}$$

$$= \frac{132.1}{44} \times \text{Emperical formula}$$

$$= 3 \times C_2H_4O = C_6H_{12}O_3$$

67. (d) Mol. wt = 2 $\times$ Vap. Density

$$= 2 \times 45 = 90$$

Empirical formula weight

$$= 12 + 2 + 16 = 30$$

$$\therefore\ n = \frac{\text{mol. wt.}}{\text{empirical formula wt.}}$$

$$= \frac{90}{30} = 3$$

$\therefore$ Molecular formula of the compounds

$$= (CH_2O)_3 = C_3H_6O_3$$

69. (d) CH_3COOH and $C_6H_{12}O_6$ both have same percentage of carbon *i.e.* 40%.

72. (c) Distillation particularly fractional distillation because the boiling point of benzene (80^oC) and chloroform (61.5^oC) are close.

Fractional distillation involves repeated distillations and condensations, in a fractionating column. As a result of distillation and condensation at each point of the fractionating column, the vapours rising up become richer in more volatile component and the liquid falling back into the flask becomes richer in less volatile component. Thus, the low boiling liquid distils first while the higher boiling liquid distils afterwards.

73. (a) Chemical method using $NaHCO_3$ solution.

75. (e) $C_2H_5Cl \xrightarrow{-HCl} C_2H_4$

64.5 28

32.25 28

64.5 *gm* C_2H_5Cl gives 28 *gm* of C_2H_4

32.25 *gm* C_2H_5Cl gives $= \frac{28 \times 32.25}{64.5}$

= 14 *gm* of C_2H_4

Obtained product is 50% so mass of obtained alkene

$$= \frac{14}{2} = 7\ gm$$

76. (e) Percentage of sulphur

$$= \frac{32}{233} \times \frac{\text{mass of } BaSO_4}{\text{mass of organic compound}} \times 100$$

$$= \frac{32}{233} \times \frac{1.158}{0.53} \times 100 = 30\%$$

Classification and nomenclature of organic compounds

26. (b) $^{1}CH_3 - {}^{2}\underset{\underset{{}^{6}CH_3}{|}}{\overset{\overset{{}^{5}CH_3}{|}}{C}} - {}^{3}CH_2 - {}^{4}CH_3$

$C-2$ is quaternary carbon because it is attached to 4 other carbon atoms.

36. (d) Tertiary butyl alcohol; $^{1}CH_3 - \underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C^{2}}} - {}^{3}CH_3$

2-Methyl propan-2-ol

41. (a) $120°$ and $109.5°$

$Cl - \underset{\underset{Cl}{|}}{C} = \underset{\underset{Cl}{|}}{C} - Cl$

sp^2-hybridization

Bond angle $= 120^{o}$

$\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}(Cl)(Cl)$

sp^3-hybridization

Bond angle $= 109.5^{o}$

42. (a) $\overset{1}{COOH} - \overset{2}{CH_2} - \overset{3}{CH_2} - \overset{4}{COOH}$

1,4 – butandioic acid

43. (c) $\overset{4}{CH_3} - \underset{\underset{CH_3}{|}}{\overset{3}{CH}} - \overset{2}{CH_2} - \overset{1}{CH_2} - Br$

1–bromo–3–methylbutane

44. (c) $\overset{7}{CH_3} - \overset{6}{CH} = \overset{5}{CH} - \overset{4}{CH_2} - \underset{\underset{NH_2}{|}}{\overset{3}{CH}} - \overset{2}{CH_2} - \overset{1}{COOH}$

3–amino-5-heptenoic acid

45. (d) $CH_2 = CH - CH_2 - Cl$

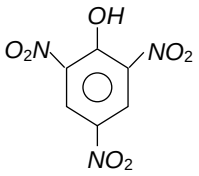
(3–chloro-1-propene)

52. (c) $\underset{4}{CH_3} - \underset{3}{CH} = \underset{2}{CH} - \underset{1}{CHO}$

But-2-en-1-ol

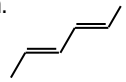
72. (c) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C^{4^o}}} - \overset{2^o}{CH_2} - \underset{\underset{CH_3}{|}}{\overset{3^o}{CH}} - \overset{1^o}{CH_3}$

85. (a)



2, 4, 6-trinitrophenol (picric acid)

97. (e) If atom or group of higher priority are on opposite direction at the double bond of each carbon atom then the configuration is known as E and if they are in same direction then the configuration is known as Z configuration.



(2E, 4E) –2, 4-Hexa di ene

99. (b) $HOOC - CH_2 - \underset{\underset{COOH}{|}}{CH} - CH_2 - CH_2 - COOH$

3 carboxy hexane -1, 6 dioic acid

100. (d) Ethyl should come before methyl.

101. (a) $\underset{4}{CH_3} - \underset{3}{CH_2} - \underset{2}{\overset{\overset{OCH_3}{|}}{CH}} - \underset{1}{CH_2} - OH$

2 methoxy 1-butanol or 2-meth

102. (b) $\overset{3}{CH_3} - \underset{\underset{NH_2}{|}}{\overset{2}{CH}} - \overset{1}{CH_3}$

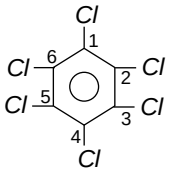
2-amino propane

103. (d) Propyne have the structure $CH_3 - C \equiv CH$.

It consist 2 primary carbon (a carbon to which single carbon is bonded) and one secondary carbon. Its structure show that it contain only primary hydrogen.

104. (c) $Fe_4[Fe(CN)_6]_3$ compound formed in the positive test for nitrogen with the lassaigne solution of an organic compounds.

105. (c)



1,2,3,4,5,6 hexachlorobenzene.

106. (a) $CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_3$

2 chloropropane

107. (c) $\underset{5}{CH_3} - \underset{\underset{OH}{|}}{\overset{4}{CH}} - \underset{3}{CH_2} - \underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{\overset{2}{C}}} - \underset{1}{CH_3}$; $\underset{\underset{CN}{|}}{CH_2} - \underset{\underset{CN}{|}}{CH} - \underset{\underset{CN}{|}}{CH_2}$

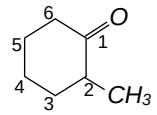
2 methyl 2, 4-pentanediol

1, 2, 3 tricyano propane

108. (a) $\underset{4}{CH_3} - \underset{3}{CH_2} - \underset{2}{C(Br)} = \underset{1}{CH} - Cl$

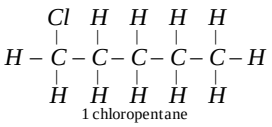
2-bromo 1-chloro butene

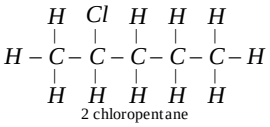
109. (b)

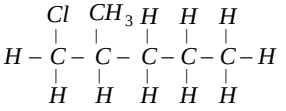


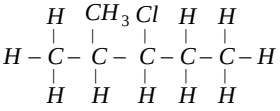
2 methyl cyclohexanone

110. (a) To be optically active the compound or structure should possess chiral or a symmetric centre but in the rest of the structures it is present.


1 chloropentane


2 chloropentane


1 chloro -2 methyl pentane


3 chloro 2 methyl pentane

111. (b) $\overset{5}{C}H_2=\overset{4}{C}H-\overset{3}{C}H(CH_3CH_2)-\underset{\underset{Br}{|}}{\overset{2}{C}}=\overset{1}{C}H_2$

2 bromo-3-ethyl-1, 4 pentadie ne

112. (d) $\underset{3}{CH_3}\,\underset{2}{CH_2}\,\underset{1}{COOH}$

Propanoic acid

116. (b) $CH_3-\overset{3}{\underset{\underset{2}{|}}{CH}}-\overset{\overset{4}{|}}{\underset{\underset{CH_2-CH_3}{|}}{CH}}-\overset{5}{CH_2}-\overset{\overset{7}{CH_2-CH_3}}{\underset{\underset{6}{|}}{CH}}-\overset{1}{CH}-CH_3$

3,4 6-Trimethyloctane

117. (a) $H_3\overset{1}{C}-\overset{2}{\underset{\underset{Cl}{|}}{C}}=\overset{3}{C}H-\overset{4}{\underset{\underset{CH_3}{|}}{CH}}-\overset{5}{C}H_3$

2-chloro-4-methyl-2-pentene

118. (d) $\overset{1}{C}H_3-\overset{2}{C}O-\overset{3}{C}H_3$

Ketones are named by adding the suffix '-one' in place of '–e' of alkane. Thus IUPAC name is propanone.

Critical Thinking Questions

1. (c) $116\,mg$ compounds means $116\times10^{-3}\,gm$

compound since $1mg$ contain $10^{-3}\,gm$

Mol. wt. of compound

$$=\frac{\text{mass of the substance}}{\text{volume of the vapour at S.T.P.}}\times 22400$$

$$=\frac{116\times10^{-3}}{44.8}\times 22400 \quad =57.99\% \text{ or } 58.0\%$$

2. (b)

Element.	No. of moles	Simple ratio
C	12	49.3/12 = 4.1	4.1/2.7 = 1.3 × 2 = 2.6 = 3
H	1	6.84/1= 6.84	6.84/2.7=2.5×2=5
O	16	43.86/16 = 2.7	2.7/2.7=1×2=2

Empirical formula = $C_3H_5O_2$

E.F. wt. = 12 × 3 + 1 × 5 + 16 ×2 = 73

Molecular wt = V.D. × 2 = 73 × 2 = 146

$$n=\frac{M.wt}{E.F.wt}=\frac{146}{73}=2$$

Molecular formula = (E.F)$_n$ $=(C_3H_5O_2)_2=C_6H_{10}O_4$.

3. (c) Mass of silver salt taken = 0.228 *gm*

Mass of silver left = 0.162 *gm*

Basicity of acid = 2

Step 1– To calculate the equivalent mass of the silver salt (E)

$$\frac{\text{Eq. mass of silver salt}}{\text{Eq. mass of silver}}=\frac{\text{Mass of Acid taken}}{\text{Mass of silver left}}$$

$$=\frac{E}{108}=\frac{0.228}{0.162}$$

$$=E=\frac{0.228}{0.162}\times 108=152\,(\text{Eq. mass of silver salt})$$

Step 2 – To calculate the eq. mass of acid.

Eq. mass of acid =

Eq. mass of silver salt – Eq. mass of *Ag* + Basicity

= 152 – 108 + 1 = 152 – 109 = 43 (Eq. mass of acid)

Step 3– To determine the molecular mass of acid.

Mol. mass of the acid = Eq. mass of acid × basicity = 45 × 2 = 90.

4. (d) $\because$ 0.0833 mole carbohydrate has hydrogen = $1g$

$\therefore$ 1 mole carbohydrate has hydrogen

$$=\frac{1}{0.0833}=12g$$

Empirical Formula (CH_2O) has hydrogen $=2g$

Hence $n=\frac{12}{2}=6$

Hence molecular formula of carbohydrate $=(CH_2O)_6$

$=C_6H_{12}O_6$

5. (e) Solution contain $He+CH_4$

Their mol. wt = $4+16=20$

% wt of CH_4 $=\frac{\text{wt of } CH_4}{\text{Total wt}}\times 100=\frac{16}{20}\times 100=80.0\%$

6. (b) % of $H=\frac{2}{18}\times\frac{\text{wt.of } H_2O}{\text{wt.of organic compound}}\times 100$

$$=\frac{2}{18}\times\frac{0.9}{0.5}\times 100=20\,\%$$

Since percentage of hydrogen is 20. Therefore, remaining is carbon *i.e.* 80 %.

7. (b) Some compound like hydrazine (NH_2NH_2) although contain nitrogen, they do not respond lassaigne's test because they do not have any carbon & hence $NaCN$ is not formed.

8. (a) Due to its volatile nature camphor is often used in molecular mass determination.

9. (d) In Kjeldahl's method, the nitrogen is estimated in the form of ammonia, which is obtained by heating compounds with $NaOH$.

$$CH_3CONH_2 + NaOH \xrightarrow{\Delta} CH_3COONa + H_2O + NH_3$$

10. (d) Mol. wt of C_2H_5OH

$= 2\times12 + 5 + 16 + 1 = 64$

$\because$ $48\,g\,C_2H_5OH$ has H atom $= 6\times N_A$

$\therefore$ $0.046\,g\,C_2H_5OH$ has H atoms

$$= \frac{6\times6.02\times10^{23}\times0.046}{46} = 3.6\times10^{21}$$

11. (a) $C = 10.5\ gm = \frac{10.5}{12} mol = 0.87\ mol$

$H = 1\ gm = \frac{1}{1} = 1\ mol$

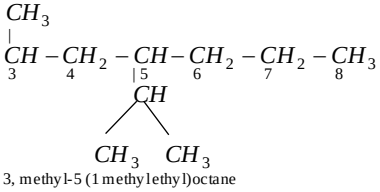
$\therefore (C_{0.87}H_1)_7 = C_{6.09}H_7 \approx C_6H_7$

$PV = nRT$; $PV = \frac{w}{m}RT$

$1\times1 = \frac{2.4}{m}\times0.082\times400$

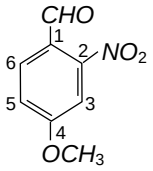
$m = 2.4\times0.082\times400 = 78.42 \approx 79$.

12. (b)



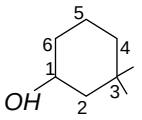
3, methyl-5 (1 methylethyl)octane

13. (a)



4, methoxy-2 nitrobenzaldehyde

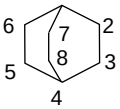
14. (a)



3, 3 dimethyl -1-cyclohexanol

15. (b) 4 ethyl, 3 methyl octane.

16. (a)



Bicyclo (2, 2, 2) octane.

Assertion and Reason

1. (b) Chromatography is used to separate almost any given mixture. Whether coloured or colourless into its constituents and to test the purites of these constituents.

2. (e) Paper chromatography is a liquid-liquid partition chromatography in which the water is adsorbed or chemically bond to cellulose of paper which acts as the stationary phase while the mobile phase is another liquid which is usually a mixture of two or three solvents in which water is one of the components.

4. (b) On shaking with concentrated H_2SO_4 thiophene being more reactive undergoes sulphonation and the thiophene-2-sulphonic acid thus formed dissolves in concentrated H_2SO_4

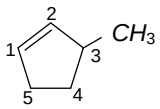
5. (c) As, the functional group is $-COOH$, the numbering is done from RHS to give minimum number to carbon atom bearing the functional group. Rewriting the above structure $CH_3-\underset{|}{\overset{CH_3}{CH}}-CH_2-COOH$. The chain consists of four carbon atoms. Hence it's a derivative of butane. The substituent is the methyl group. So the above compound is 3-methyl butanoic acid.

6. (b) Petroleum can be refined by fractional distillation since it separate crude petroleum into useful fractions such as gasoline, kerosine oil, disel oil, lubricating oil etc.,

7. (e) In lassaigne test potassium can not be used in place of sodium as potassium reacts vigorously and its use causes explosion.

8. (a) In naming cycloalkenes, number the ring to give the double bonded carbons 1 and 2 and choose the direction of numbering so that the substituents get the lowest numbers. The position of the double bond is not indicated because it is known to bond between *C*-1 and *C*-2 .

So,



is

cyclopentene

9. (a) On adding $FeCl_3$ solution to sodium extract during testing for nitrogen a red precipitate is obtained. It is due to the presence of sulphur also.

$$3NaCNS + FeCl_3 \longrightarrow \underset{\text{Red colour}}{Fe(CNS)_3} + 3NaCl$$