Answers and Solutions

Chemical analysis of organic compounds

3. (d) Elements No. of Moles Simple ratio

$C = 90\%$ $90/12 = 7.5$ $7.5/7.5 = 1 \times 3 = 3$

$H = 10\%$ $10/1 = 10$ $10/7.5 = 1.33 \times 3 = 4$

$\therefore$ 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 = $(\text{Empericalformula})_n$

$= (CH_2O)_2 = C_2H_4O_2$.

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

$\therefore 18gm$ 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 = $\frac{35.5}{143.5} \times \frac{\text{Massof } AgCl}{\text{Massof substance}} \times 100$

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

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

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

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 $= CH_5N$ or CH_3NH_2.

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 Simple ratio $\frac{2800}{60} = 46.66\%$

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. × 2 = 23 × 2 = 46

Molecular weight of $C_2H_6O = 46$

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

53. (c) Molecular mass

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

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

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

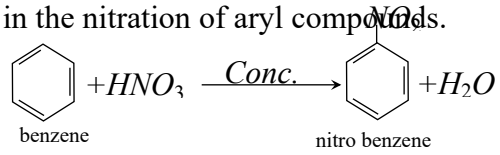
58. (b) Chromatography is the latest technique for the purification of organic compounds. Chromatography are of various type viz. Column chromatography, gas chromatography, paper chromatography etc. Simple ratio

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

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

Molecular formula $= \frac{\text{mol. wt}}{\text{eq. formula wt.}} \times$ 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) $^{1}CH_3 - {}^{2}\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - {}^{3}CH_2 - {}^{4}CH_3$

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

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

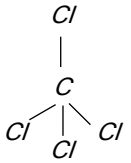
2-Methyl propan-2-ol

41. (a) 120° and 109.5°

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

sp^2-hybridization

Bond angle= 120^o



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–butandioicacid

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-heptenoicacid

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

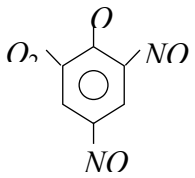
(3–chloro-1-propene)

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) $\overset{3}{CH_3}-\underset{\underset{NH_2}{|}}{\overset{2}{CH}}-\overset{1}{CH_3}$

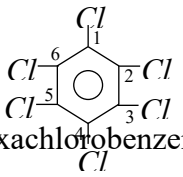
2-amino propane

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) $CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{CH}}-CH_3$

2 chloropropane

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

2 methyl 2,4-pentanedid

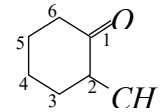
$CH_2-\underset{\underset{CN}{|}}{CH}-\underset{\underset{CN}{|}}{CH_2}$

1, 2, 3 tricyano propane

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

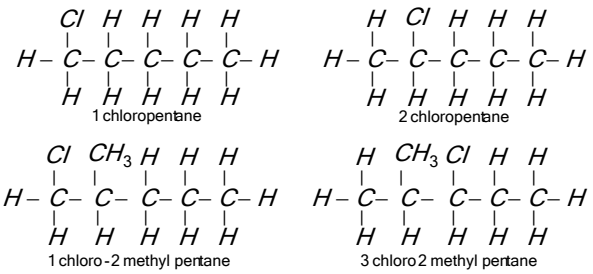
2-bromo 1-chloro butene

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.



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

2 bromo-3-ethyl-1, 4 pentadiene

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

Propanoic acid

116. (b) $CH_3-\overset{3}{CH}(\overset{7}{CH_2}-\overset{8}{CH_3})-\overset{4}{CH}-\overset{5}{CH_2}-\overset{6}{CH}(\overset{2}{CH_2}-\overset{1}{CH_3})-CH_3$

3,4 6-Trimethyloctane

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

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

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

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

2. (b)

Element.	No.	No. of moles	
C	12	49.3/12 = 4.1	$4.1/2.7 = 1.3\times2 = 2.6 = 3$
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)

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

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

$$=E=\frac{0.228}{0.162}\times108=152(\text{Eq. mass of silver salt})$$

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 $=2g$

Simple ratio 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 = $4+16=20$

$$\%\ \text{wt of}\ CH_4=\frac{\text{wt of } CH_4}{\text{Total wt}}\times100$$

$$=\frac{16}{20}\times100=80.0\%$$

6. (b) $\%\ \text{of}\ H=\frac{2}{18}\times\frac{\text{wt.of } H_2O}{\text{wt. of organic compound}}\times100$

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

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

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

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

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

$$= \frac{6 \times 6.02 \times 10^{23} \times 0.046}{46} = 3.6 \times 10^{21}$$

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

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

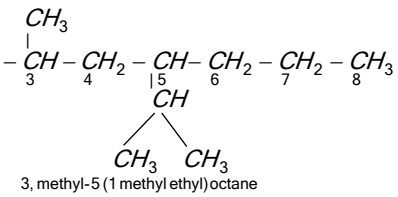
$$\therefore (C_{0.87}H_1)_7 = C_{6.09}H_7 \approx C_6H_7$$

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

$$1 \times 1 = \frac{2.4}{m} \times 0.082 \times 400$$

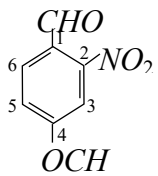
$$m = 2.4 \times 0.082 \times 400 = 78.42 \approx 79.$$

12. (b)



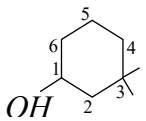
3, methyl-5 (1 methyl ethyl) octane

13. (a)



4, methoxy-2 nitrobenzaldehyde

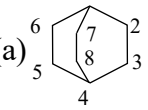
14. (a)



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

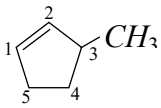
5. (c) As, the functional group is $-COOH$, the numbering is done from RHS to give minimum number to carbon atom bearing the functional group. Rewriting the above structure $CH_3 - \underset{|}{\overset{CH_3}{CH}} - CH_2 - COOH$. The chain consists of four carbon atoms. Hence it's a derivative of butane.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



cyclopentene

is

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.

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