SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

PURIFICATION OF ORGANIC COMPOUNDS (UT-05 QB)

1. The purification of naphthalene can be done by

(a) filtration (b) sublimation

(c) crystallization (d) evaporation

2. Phenol can be purified by the method of

(a) distillation (b) steam distillation

(c) crystallization (d) fractional distillation

3. Chromatography is based on the phenomenon of

(a) adsorption (b) absorption

(c) solubility (d) chemisorption

4. Sugar is decolorized by

(a) coal (b) carbon black (c) charcoal (d) coke

5. Liebig method is used for the estimation of

(a) carbon only (b) hydrogen only (c) carbon and hydrogen (d) nitrogen

6. Per cent of carbon in an organic compound is given as

a) $\frac{M_C}{M_{CO_2}} \cdot \frac{m_{CO_2}}{m_{compound}} \times 100$ b) $\frac{M_C}{M_{CO_2}} \frac{m_{compound}}{m_{CO_2}} \times 100$

c) $\frac{M_{CO_2}}{M_C} \frac{m_{CO_2}}{m_{compound}} \times 100$ d) $\frac{M_{CO_2}}{M_C} \frac{m_{compound}}{m_{CO_2}} \times 100$

7. Dumas method is used for the estimation of

a) Carbon b) Hydrogen c) Sulphur d) Nitrogen

8. The expression to complete percent of nitrogen in an organic compound by dumas the method is

a) $\frac{\left(V_{N_2}\right)_{STP} M_{N_2}}{\left(22414 cm^3 mol^{-1}\right) m_{compound}} \times 100$ b) $\frac{\left(V_{N_2}\right)_{STP} m_{compound}}{\left(22414 cm^3 mol^{-1}\right) M_{N_2}} \times 100$

c) $\frac{\left(22414 cm^3 mol^{-1}\right) M_{N_2}}{\left(V_{N_2}\right)_{STP} m_{compound}} \times 100$ d) $\frac{22414 cm^3 mol^{-1}}{\left(V_{N_2}\right)_{STP}} \frac{m_{compound}}{M_{N_2}} \times 100$

9. Kjeldah's method is used to estimate the element

a) Carbon b) Hydrogen c) Sulphur d) Nitrogen

10. The expression to complete percent of nitrogen in an organic compound by the Kjeldahl's method is

a) $\left(\frac{M_N}{m_{compound}}\right)\left(V_{acid} N_{acid} - V_{alkali} N_{alkali}\right) \times 100$ b) $\left(\frac{m_{compound}}{M_N}\right)\left(V_{acid} N_{acid} - V_{alkali} N_{alkali}\right) \times 100$

c) $\left(\frac{M_N}{m_{compound}}\right)\left(V_{acid} - V_{alkali}\right) \times 100$ d) $\left(\frac{m_{compound}}{M_N}\right)\left(V_{acid} - V_{alkali}\right) \times 100$

11. The expression to compute the per cent of halogen X in an organic compound by the Carius method is

(a) $\left(\frac{m_{AgX}}{M_{AgX}}\right) \frac{M_{Ag}}{m_{compound}} \times 100$ (b) $\frac{M_X}{M_{AgX}} \frac{m_{AgX}}{m_{compound}} \times 100$

(c) $\frac{M_{AgX}}{M_X}\frac{m_{compound}}{m_{AgX}}\times 100$ (d) $\frac{M_X}{M_{AgX}}\frac{m_{compound}}{m_{AgX}}\times 100$

12. Molar mass of Volatile compounds can be determined by

a) volumetric method b) Victor Meyer's method

c) depression in freezing point d) elevation in boiling point

13. Molar mass and vapour density are related to each other through the expression

a) $M_{substance} = \left(2gmol^{-1}\right)$(Vapour density) b) $M_{substance} = \left(\frac{1}{2gmol^{-1}}\right)$(Vapour density)

c) $M_{substance} = \left(\frac{1gmol^{-1}}{2}\right)$(Vapour density) d) $M_{substance}$ = Vapour density

14. 0.1890 g of an organic compound gives 0.287 g of silver chloride determined by Carius method. The per cent of Cl in the compound is

a) 18.7 b) 37.5 c) 56.2 d) 75.0

15. An organic compound contains 90% C and 10 % H by mass. Its empirical formula is

a) C_2H_6 b) C_2H_4 c) C_3H_8 d) C_3H_4

16. 0.246 cm^3 of the organic compound gave 22.4 cm^3 of nitrogen gas at STP as determined by Dumas method. The per cent of nitrogen in the compound is

a) 11.38 b) 17.07 c) 22.76 d) 34.14

17. An organic compound contains 58.53 % 4.06 % H and 11.38 % N by mass. The empirical formula of compound is

a) $C_6H_5N_2O$ b) $C_6H_5NO_2$ c) $C_5H_6N_2O$ d) $C_5H_7NO_2$

18. An organic compound (0.156 g) on Kjeldahl's method for nitrogen estimation requires 16.25 cm^3 of 0.1 M NaOH for the remaining unneutralized acid in 60.25 cm^3 of 0.1 N H_2SO_4 taken to start with. The per cent of nitrogen in the compound is

a) 39.26 b) 78.52 c) 49.26 d) 59.26

19. A compound (0.244 g) containing sulphur yielded 0.9336 g of $BaSO_4$. The per cent of sulphur in the compound is

a) 25.46 b) 52.46 c) 64.25 d) 46.52

20. Which of the following statements is true regarding the fractional distillation of a mixture of two liquids?

(a) The distillate collected is the liquid of lower boiling point

(b) The distillate collected is the liquid of higher boiling point

(c) The liquid left behind the flask is that of lower boiling point

(d) The compositions of distillate and the liquid left behind the flask do not depend upon the length of fractionating column

21. Which of the following compounds is not expected to exhibit Lassaigne's test of nitrogen?

a) CH_3CN b) CH_3NH_2 c) CH_3NO_2 d) NH_2OH

22. Sodium extract is heated with concentrated HNO_3 before testing for halogens because.

(a) Ag_2S and AgCN are soluble in acidic medium

(b) Silver halides are totally insoluble in nitric acid

(c) S^{2-} and CN^-, if present, are decomposed by conc. HNO_3 and hence do not interfere in the test.

(d) Ag reacts faster with halides in acidic medium

23. 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…

24 A gas mixture contains 50 % helium and 50% methane by volume. What is the percent by weight of methane in the mixture…

25. 0.5 g of hydrocarbon gave 0.9 g water on combustion. The percentage of carbon in hydrocarbon is ……

26. Insulin contains 3.4 % sulphur. The minimum molecular weight of insulin is….

27. In Carius method 0.099 g organic compound gave 0.287 g AgCl. The percentage of chlorine in the compound will be…..

28. The percentage of N_2 in urea is about …..

29. 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….

KEY

1) **b**	2) **b**	3) **a**	4) **c**	5) **c**	6) **a**	7) **d**	8) **a**	9) **d**	10) **a**
11) **b**	12) **b**	13) **a**	14) **b**	15) **d**	16) **a**	17) **b**	18) **a**	19) **b**	20) **a**
21) **d**	22) **c**	23) **58.09%**	24) **80.0%**	25) **80%**	26) **940**	27) **71.71%**	28) $C_6H_{10}O_4$	29) **80**	

SOLUTIONS

14. $\text{Percent of chlorine} = \left(\frac{M_{Cl}}{M_{AgCl}}\right)\left(m_{AgCl}\right)\left(\frac{100}{m_{compound}}\right) = \left(\frac{35.5}{143.5}\right)(0.287)\left(\frac{100}{0.189}\right) = 37.57$

15. $C : H :: \frac{90}{12} : \frac{10}{1} :: 7.5 : 10 : 3.4$; Empirical formula C_3H_4

16. $\text{Percent of nitrogen} = = \left(\frac{V_{N_2}}{22400 cm^3 mol^{-1}}\right)\left(M_{N_2}\right)\left(\frac{100}{m_{compound}}\right) = \left(\frac{22.4}{22400}\right)(28)\left(\frac{100}{0.246}\right) = 11.38$

17. $C : H : N : O : \frac{58.53}{12} : \frac{4.08}{1} : \frac{11.38}{14} : \frac{26.01}{16} :: 4.88 : 4.08 : 0.81 : 1.63$

$:: 6 : 5 : 1 : 2$. Empirical formula $= C_6H_5NO_2$

18. Initial amount of $H^+ = VM = \left(0.06025 dm^3\right)\left(0.1 mol dm^{-3}\right) = 0.006025 mol$

Remaining amount of $H^+ = \left(0.01625 dm^3\right)\left(0.1 mol dm^{-3}\right) = 0.001625 mol$

Amount H^+ reacted = $(0.006025 - 0.001625) mol = 0.0044 mol$

Mass of NH_3 produced $= \left(\text{Amount of } H^+\right)\left(M_{NH_3}\right) = (0.0044 mol)\left(17 g mol^{-1}\right) = 0.0748 g$

$$\text{per cent of nitrogen} = \left(\frac{M_N}{M_{NH_3}}\right)\left(m_{NH_3}\right)\left(\frac{100}{m_{compound}}\right) = \left(\frac{14}{17}\right)(0.0748)\left(\frac{100}{0.156}\right) = 39.5$$

19. $\text{Per cent of sulphur} = \left(\frac{M_S}{M_{BaSO_4}}\right)\left(m_{BaSO_4}\right)\left(\frac{100}{m_{compound}}\right) = \left(\frac{32}{233}\right)(0.9336)\left(\frac{100}{0.244}\right) = 52.5$

22. Both S^{-2} and CN^- are decomposed by conc. HNO_3 and hence no precipitation of these ions occur with $AgNO_3$

23. 116 mg of a compound means 116×10^{-2} gm compound since 1mg contain 10^{-2} gm

Mol.wt of compound = $\frac{mass\ of\ the\ substance}{volume\ of\ the\ vapour\ at\ S.T.P} \times 224000$

$$= \frac{116 \times 10^{-2}}{44.8} \times 22400 = 57.99 \; or \; 58.09\,\%$$

24. Solution contain He+ CH_4
Their mol. wt=4+16=20

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

25. $\% \; of \; H = \frac{2}{18} \times \frac{Wt.of \; H_2O}{wt.of \; organic \; compound} \times 100 = \frac{2}{18} \times \frac{0.9}{0.5} \times 100 = 20\%$

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

26. Minimum mass of sulphur = wt. of its one atom =32
∴ 3.4 gms of Sulphur present in 100 gms

∴ 32 gms of Sulphur present in $= \frac{100 \times 32}{3.4} = 940$

27. $\% \; of \; chlorine = \frac{35.5}{143.5} \times \frac{Mass \; of \; AgCl}{Mass \; of \; subs\tan ce} \times 100$

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

28. (46.66)
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 = $\left(C_3H_5O_2\right)_2 = C_6H_{10}O_4$

29. Molecular mass

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

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