Q1. Which of the following techniques is most suitable for separating a mixture of camphor and salt?

A. Filtration
B. Crystallization
C. Sublimation
D. Distillation

Answer: C. Sublimation
Explanation: Camphor sublimes on heating (solid → gas directly), while salt does not. Thus, sublimation is ideal.

Q2. Which technique would best purify a solid organic compound contaminated with small amounts of soluble impurities?

A. Sublimation
B. Crystallization
C. Simple distillation
D. Filtration

Answer: B. Crystallization
Explanation: Crystallization allows the pure compound to form crystals, leaving impurities in solution.

Q3. Which of the following mixtures can be separated using simple distillation?

A. Benzene and Toluene
B. Acetone and Water
C. Ethanol and Water
D. Chloroform and Aniline

Answer: D. Chloroform and Aniline
Explanation: Chloroform and aniline have widely different boiling points and do not form azeotropes, so simple distillation is effective.

Q4. Which purification method uses differences in adsorption to separate components?

A. Crystallization
B. Distillation
C. Chromatography
D. Sublimation

Answer: C. Chromatography
Explanation: Chromatography separates substances based on differential adsorption on a stationary phase.

Q5. Which of the following compounds can be purified by sublimation?

A. Naphthalene
B. Sodium chloride
C. Glucose
D. Potassium nitrate

Answer: A. Naphthalene
Explanation: Naphthalene sublimates on heating and can be purified using sublimation.

Q6. A student wants to separate two immiscible liquids. Which method should they use?

A. Crystallization
B. Distillation
C. Separating funnel
D. Chromatography

Answer: C. Separating funnel
Explanation: Immiscible liquids can be separated using a separating funnel based on density difference.

Q7. Which of the following methods is not suitable for purification of liquids with close boiling points?

A. Fractional distillation
B. Simple distillation
C. Steam distillation
D. Azeotropic distillation

Answer: B. Simple distillation
Explanation: Simple distillation is not effective for liquids with close boiling points; fractional is preferred.

Q8. Paper chromatography is based on the principle of:

A. Solubility

B. Partition between stationary and mobile phases
C. Melting point difference
D. Density difference

Answer: B. Partition between stationary and mobile phases
Explanation: Chromatography uses differential partitioning to separate components.

Q9. In paper chromatography, the solvent acts as the:

A. Mobile phase
B. Stationary phase
C. Adsorbent
D. Precipitating agent

Answer: A. Mobile phase
Explanation: The solvent carries the components across the paper (stationary phase).

Q10. The process of separating constituents of a dye using chromatography is primarily based on:

A. Color of the constituents
B. Boiling points
C. Differential adsorption
D. Density of components

Answer: C. Differential adsorption
Explanation: Different components adsorb to the stationary phase differently, leading to separation.

Q11. A compound X is separated from a mixture by forming crystals on slow cooling. The process used is:

A. Sublimation
B. Filtration
C. Crystallization
D. Distillation

Answer: C. Crystallization
Explanation: Crystals form on cooling a saturated solution — a classic crystallization method.

Q12. During purification of an organic compound, which method can be used to remove volatile impurities?

A. Sublimation
B. Crystallization
C. Distillation
D. Chromatography

Answer: C. Distillation
Explanation: Volatile components can be removed by heating and condensing the pure liquid.

Q13. For separating glycerol from a mixture of acetone and water, which method is best?

A. Steam distillation
B. Simple distillation
C. Fractional distillation
D. Vacuum distillation

Answer: D. Vacuum distillation
Explanation: Glycerol has a high boiling point and decomposes on heating. Vacuum distillation reduces its boiling point.

Q14. Which method is best suited for separating a mixture of aniline and water?

A. Steam distillation
B. Fractional distillation
C. Simple distillation
D. Sublimation

Answer: A. Steam distillation
Explanation: Aniline is steam volatile and immiscible with water — ideal for steam distillation.

Q15. In crystallization, rapid cooling of the hot solution may lead to:

A. Larger crystals
B. Pure crystals
C. Amorphous solid or impure crystals
D. Colored crystals

Answer: C. Amorphous solid or impure crystals
Explanation: Rapid cooling traps impurities, leading to impure and smaller/amorphous crystals.

Q16. Which reagent is used to detect nitrogen in Lassaigne's test?

A. Lead acetate
B. Sodium hydroxide
C. Ferrous sulphate
D. Silver nitrate

Answer: C. Ferrous sulphate
Explanation: Sodium extract containing NaCN reacts with freshly prepared $FeSO_4$ to form Prussian blue indicating nitrogen.

Q17. In Lassaigne's test for sulphur, the formation of a black precipitate confirms the presence of:

A. Nitrogen
B. Sulphur
C. Halogen
D. Phosphorus

Answer: B. Sulphur
Explanation: Sulphur reacts with sodium to form $Na_2S$, which gives a black precipitate with lead acetate (PbS).

Q18. In Lassaigne's test, why is sodium metal used?

A. To increase temperature
B. To increase solubility
C. To convert covalent elements into ionic form
D. To remove water

Answer: C. To convert covalent elements into ionic form
Explanation: Sodium fuses with the organic compound to convert N, S, X into ionic forms (NaCN, $Na_2S$, NaX) for easy detection.

Q19. In the sodium extract, presence of halogens is confirmed by adding:

A. Ammonium hydroxide
B. Silver nitrate
C. Lead acetate
D. Potassium iodide

Answer: B. Silver nitrate
Explanation: NaX formed reacts with $AgNO_3$ to form AgCl/AgBr/AgI (white/yellow ppt), confirming halogen.

Q20. Which of the following gives white precipitate soluble in ammonium hydroxide during halogen detection?

A. AgI
B. AgCl
C. AgBr
D. $AgNO_3$

Answer: B. AgCl
Explanation: AgCl is white and soluble in $NH_4OH$. AgBr and AgI are less or insoluble.

Q21. Phosphorus in organic compounds is detected by:

A. Fusion with sodium and reaction with $AgNO_3$
B. Conversion to $Na_3PO_4$ and reaction with ammonium molybdate
C. Conversion to $PO_4^{3-}$ and reaction with lead acetate
D. Heating with copper turnings

Answer: B. Conversion to $Na_3PO_4$ and reaction with ammonium molybdate
Explanation: Yellow ppt of ammonium phosphomolybdate indicates phosphorus.

Q22. Which of the following is used to detect halogens in Lassaigne's test?

A. Lead acetate
B. Barium chloride
C. Silver nitrate
D. Ferrous sulphate

Answer: C. Silver nitrate
Explanation: $AgNO_3$ gives characteristic AgX ppt with NaX from sodium fusion — confirms halogens.

Q23. Sodium extract is boiled with nitric acid before testing for halogens to:

A. Decompose NaCN and $Na_2S$
B. Precipitate halogens
C. Form insoluble salts
D. Convert halogens to acids

Answer: A. Decompose NaCN and $Na_2S$
Explanation: Boiling with $HNO_3$ removes interfering ions like $CN^-$ and $S^{2-}$ before testing with $AgNO_3$.

Q24. Which element in an organic compound gives Prussian blue colour in Lassaigne's test?

A. Sulphur
B. Phosphorus
C. Nitrogen
D. Chlorine

Answer: C. Nitrogen
Explanation: NaCN from sodium fusion reacts with $FeSO_4$ to form $[Fe_4[Fe(CN)_6]_3]$ — Prussian blue.

Q25. Which compound gives positive test for both nitrogen and sulphur (blood red colour)?

A. Thiourea
B. Benzamide
C. Acetamide
D. Ethylamine

Answer: A. Thiourea
Explanation: Presence of both N and S gives blood red colour due to formation of $(SCN)^-$ ion and $Fe^{3+}$.

Q26. Elemental analysis shows 40% C, 6.7% H, and 53.3% O. The empirical formula is:

A. $CH_2O$
B. $C_2H_4O_2$
C. $C_3H_6O_3$
D. CHO

Answer: A. $CH_2O$
Explanation:
C: 40 ÷ 12 = 3.33
H: 6.7 ÷ 1 = 6.7
O: 53.3 ÷ 16 = 3.33
Dividing by lowest = C:1, H:2, O:1 → $CH_2O$

Q27. A compound has empirical formula CH and molar mass 78 g/mol. Its molecular formula is:

A. CH
B. $C_2H_2$
C. $C_6H_6$
D. $C_4H_4$

Answer: C. $C_6H_6$
Explanation:
Empirical mass = 13 g/mol
78 ÷ 13 = 6 → CH × 6 = $C_6H_6$

Q28. Which of the following methods is used to determine nitrogen percentage in an organic compound?

A. Dumas method
B. Kjeldahl's method
C. Lassaigne's test
D. Chromatography

Answer: B. Kjeldahl's method
Explanation: Kjeldahl's method is widely used for nitrogen estimation by converting it to $NH_3$.

Q29. In Kjeldahl's method, nitrogen is estimated by converting it to:

A. $NO_2$
B. $NO_3^-$
C. $NH_3$
D. $CN^-$

Answer: C. $NH_3$
Explanation: Organic nitrogen is converted to ammonium sulphate, then released as $NH_3$ on heating with alkali.

Q30. The equivalent of 0.1 g organic compound gives 25 mL of 0.1 N $H_2SO_4$. The % nitrogen is:

A. 35%
B. 28%
C. 7%
D. 56%

Answer: A. 35%
Explanation:
N = (1.4 × V × N) / W = (1.4 × 25 × 0.1) / 0.1 = 35%
Oops! That gives 35% — revise:
(1.4 × 25 × 0.1) / 0.1 = 35%

Q31. In Kjeldahl's method, 0.25 g of an organic compound required 25 mL of 0.1 N HCl for complete neutralisation of evolved $NH_3$. The percentage of nitrogen in the compound is:

A. 10.2%
B. 11.2%
C. 14%
D. 13.4%

Answer: B. 11.2%
Explanation:
%N = (1.4 × V × N) / W
= (1.4 × 25 × 0.1) / 0.25 = 14 / 0.25 = 11.2%

Q32. In Kjeldahl's method, 0.3 g of substance liberated enough $NH_3$ to require 20 mL of 0.1 N $H_2SO_4$ for neutralisation. The % nitrogen is:

A. 9.3%
B. 13.2%
C. 7.2%
D. 10.1%

Answer: C. 7.2%
Explanation:
%N = (1.4 × V × N) / W

= (1.4 × 20 × 0.1) / 0.3 = 2.8 / 0.3 = 9.33%

Correction: So Answer: A. 9.3%

Q33. In Kjeldahl's method, the volume of acid consumed is doubled accidentally. What effect does it have on calculated nitrogen?

A. No change
B. Nitrogen appears doubled
C. Nitrogen appears halved
D. Nitrogen appears zero

Answer: B. Nitrogen appears doubled
Explanation: %N ∝ volume of acid. If acid used is more, %N will be overestimated.

Q34. In Dumas method, 0.3 g of organic compound gave 60 mL of nitrogen gas at STP. % nitrogen in the compound is:

A. 28%
B. 21.5%
C. 18.66%
D. 25%

Answer: B. 21.5%
Explanation:
1 mole $N_2$ = 22.4 L = 28 g
60 mL = 0.06 L
Mass = (28 × 0.06) / 22.4 = 0.075 g
%N = (0.075 / 0.3) × 100 = 25%
Correct answer: D. 25%

Q35. In Lassaigne's test, a compound gives Prussian blue colour. What does it indicate?

A. Halogen
B. Sulphur
C. Nitrogen
D. Phosphorus

Answer: C. Nitrogen
Explanation: NaCN formed reacts with $Fe^{2+}$ and $Fe^{3+}$ to give Prussian blue complex.

Q36. In detection of halogens, the sodium extract is boiled with $HNO_3$. Why?

A. To convert halides to acids
B. To remove interfering $CN^-$ and $S^{2-}$ ions
C. To oxidise halogens
D. To reduce halogens

Answer: B. To remove interfering $CN^-$ and $S^{2-}$ ions
Explanation: $CN^-$ and $S^{2-}$ also give precipitates with $AgNO_3$, leading to false results.

Q37. Lassaigne's extract gives a black precipitate with lead acetate. It indicates:

A. Chlorine
B. Bromine
C. Nitrogen
D. Sulphur

Answer: D. Sulphur
Explanation: $Na_2S + Pb(CH_3COO)_2 \rightarrow PbS$ (black ppt) + sodium acetate.

Q38. A student tests a compound for halogens using Lassaigne's test. The white precipitate dissolves in $NH_4OH$. The halogen is:

A. Bromine
B. Iodine
C. Chlorine
D. Fluorine

Answer: C. Chlorine
Explanation: AgCl (white ppt) is soluble in $NH_4OH$, while AgBr (pale yellow) and AgI (yellow) are not.

Q39. The yellow precipitate formed in halogen test is due to:

A. AgBr

B. AgCl
C. AgI
D. $Ag_2S$

Answer: C. AgI
Explanation: AgI is yellow and insoluble in $NH_4OH$ — confirms iodine.

Q40. Which statement is false about Lassaigne's test?

A. Sodium converts covalent to ionic forms
B. Boiling with $HNO_3$ removes $CN^-$ and $S^{2-}$
C. $AgNO_3$ is used for nitrogen detection
D. Lead acetate detects sulphur

Answer: C. $AgNO_3$ is used for nitrogen detection
Explanation: Nitrogen is detected using $FeSO_4$, not $AgNO_3$.

Q41. A student used excess sodium in Lassaigne's test and obtained false results. Why?

A. Sodium did not melt
B. Sodium reacted with water
C. Excess sodium caused decomposition of ionic compounds
D. Halide precipitate dissolved

Answer: C. Excess sodium may cause decomposition or side reactions interfering with test results.

Q42. In quantitative estimation of halogen, the method used is:

A. Kjeldahl's
B. Carius
C. Dumas
D. Victor Meyer

Answer: B. Carius
Explanation: Carius method involves oxidising halogens to halide ions and precipitating as AgX.

Q43. In Carius method, 0.2 g of compound gave 0.287 g AgCl. % of chlorine is:

A. 35.5%
B. 28.7%
C. 17.5%
D. 25.4%

Answer:
AgCl = 143.5 g/mol, Cl = 35.5
%Cl = (35.5 / 143.5) × 0.287 × 100 / 0.2 =
≈ (0.248 × 100) / 0.2 = 124.15% → wrong, check again.
Mass of Cl = (35.5 / 143.5) × 0.287 = 0.071 g
%Cl = (0.071 / 0.2) × 100 = 35.5%

Answer: A. 35.5%

Q44. In Carius method, halogen is converted into:

A. AgX
B. HX
C. NaX
D. $X_2$

Answer: A. AgX
Explanation: Halogens form halide ions, which are precipitated as AgCl/AgBr/AgI using $AgNO_3$.

Q45. Which of the following tests can detect both N and S together?

A. Lead acetate test
B. $AgNO_3$ test
C. Lassaigne's test
D. Beilstein test

Answer: C. Lassaigne's test
Explanation: Presence of both N and S gives blood red colour with $Fe^{3+}$ — confirms both elements.