Practical Organic Chemistry

Question1

The element whose percentage composition in an organic compound can be determined by Carius method is

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Options:

A.

nitrogen

B.

sulphur

C.

carbon

D.

oxygen

Answer: B

Solution:

The Carius method is used to determine the composition of sulphur and halogen in an organic compound.

Question2

' x ' mg of an organic compound was analysed by Kjeldahl method. The ammonia evolved was absorbed in 50 mL of $0.5 \mathrm{M} H_2SO_4$. The unused acid required 60 mL of 0.5 M NaOH solution for complete neutralisation. If the percentage of nitrogen in the compound is 56 ,

the value of x is

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Options:

A.

500

B.

250

C.

750

D.

375

Answer: A

Solution:

The reaction is,

$2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

Moles of H_2SO_4 neutralised $= \frac{0.030}{2} =$

0.015 moles

$$\begin{aligned}\text{Initial moles of } H_2SO_4 &= 0.050 \text{ L} \times 0.5 \text{ mL} \\ &= 0.025 \text{ mol}\end{aligned}$$

Moles of H_2SO_4 reacted

$= 0.025 - 0.015 = 0.010$ mole

Moles of NH_3 produced

$= 2 \times 0.010 = 0.020$ mole

Mass of $N = 0.020 \times 14 = 0.28$ g

$\%$ of $N = \frac{0.28}{\text{Mass of compound}} \times 100$

$\Rightarrow$ Mass of compound

$= \frac{0.28 \times 100}{56} = 0.50$ g or 500mg

Question3

Which method is used to purify liquids having very high boiling points and liquids which decompose at or below their boiling point?

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Options:

A.

Distillation

B.

Fractional distillation

C.

Distillation under reduced pressure

D.

Steam distillation

Answer: C

Solution:

Distillation under reduced pressure method is used to purify liquid with high boiling points and liquids that decompose at or below their boiling point.

This technique lower the boiling point of liquid by reducing the pressure.

Question4

A mixture of substances A, B, C, D is subjected to column chromatography. The degree of adsorption is the order of $D > B > C > A$. The column is eluted with suitable solvent. Identify the correct statement with respect to separation of mixture

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Options:

A. D comes out first from the column

B. A comes out first from the column

C. C comes out after B from the column

D. B comes out after D from the column

Answer: B

Solution:

In column chromatography, compounds with lower adsorption (or weaker interactions with the stationary phase) elute earlier than those that are more strongly adsorbed.

Given the degree of adsorption:

$D > B > C > A$

Compound D is most strongly adsorbed and will therefore come out last.

Compound A, being the least adsorbed, will come out first.

Now, let's review the options:

Option A: "D comes out first from the column." – This is incorrect because D has the highest retention.

Option B: "A comes out first from the column." – This is correct as A is the least adsorbed.

Option C: "C comes out after B from the column." – This is incorrect since the elution order will be A first, then C, followed by B, and lastly D.

Option D: "B comes out after D from the column." – This is incorrect because D, being the most adsorbed, should elute last.

Thus, the correct answer is:

Option B: A comes out first from the column.

Question5

In Lassaigne's test for halogens, it isnecessary to remove X and Y from thesodium fusion extract, if nitrogen andsulphur are present. This is done by boilingthe extract with Z. Identify X, Y and Z.

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Options:

A. $X = \mathrm{NaNO_3}, \quad Y = \mathrm{Na_2SO_4}, \quad Z = \text{conc. } \mathrm{HNO_3}$

B. $X = \mathrm{NaNH_2}, \quad Y = \mathrm{NaSH}, \quad Z = \text{conc. } \mathrm{HCl}$

C. $X = \mathrm{Na_2NO_2}, Y = \mathrm{NaSO_3H}, \quad Z = \text{conc. } \mathrm{H_2SO_4}$

D. $X = \mathrm{NaCN}, \quad Y = \mathrm{Na_2\,S}, \quad Z = \text{conc. } \mathrm{HNO_3}$

Answer: D

Solution:

In the test of halogens from sodium extract, a small amount of conc. $\mathrm{HNO_3}$ is added. This is done to remove NaCN and $\mathrm{Na_2\,S}$, so that they do not interfere with the test for halogen. Therefore, dilute nitric acid is added before testing halogens to expel all the gases if evolved.

$$\mathrm{Na + C + N} \xrightarrow{\Delta} \mathrm{NaCN}(X) \quad \text{(if N is present)}$$

$$\mathrm{2Na + S} \xrightarrow{\Delta} \mathrm{Na_2\,S}(Y) \quad \text{(if S is present)}$$

$$\text{Sodium extract} + \underset{(Z)}{\text{conc. } \mathrm{HNO_3}} \longrightarrow \underset{[Cl,|Br|,I]}{\text{Halogen identity}}$$
