Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 12)

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Hyper conjugation: is the interaction of the electrons in a sigma bond with an adjacent empty or partially filled non-bonding p-orbital, antibonding σ or π orbital, or filled π orbital, to give an extended molecular orbital that increases the stability of the system. Only electrons in bonds that are β to the positively charged carbon can stabilize a carbocation by hyper conjugation

METHODS OF PURIFICATION OF ORGANIC COMPOUNDS :

Sublimation: This method is used to separate the sublimable compounds from non sublimable compounds.

Crystallisation: is a process of solidification of a pure substance from its dissolved state. Distillation: This method is used to separate volatile liquids from non volatile liquids and liquids having sufficient difference in their boiling points.

Fractional distillation: If the boiling points of two liquids is not much , they are separated by this method.

Distillation under reduced pressure : This method is used to purify liquids having high boiling points and decomposes at or below their boiling points.

Steam distillation : This method is used to separate substances which are steam volatile and are immiscible with water.

Differential Extraction: When an organic compound is present in an aqueous medium it is separated by shaking it with organic solvent in which it is more soluble than in water. The aqueous solution is mixed with organic solvent in a separating funnel and shaken for sometimes and then allowed to stand for some time .when organic solvent and water form two separate layers the lower layer is run out by opening the tap of funnel and organic layer is separated, the process is repeated several times and pure organic compound is separated.

Chromatography: the technique of separating the constituents of a mixture by the differential movement of individual components through the

stationary phase under the influence of mobile phase.

(i) Adsorption Chromatography: It is based on the fact that different compounds are adsorbed on an adsorbent to different degrees. Silica jel or alumina is used as adsorbents. Types of adsorption chromatography:

Column chromatography: As the eluant (Solvent or mixture of solvents) passes down the column, it dissolves the different components.

b) Thin layer chromatography: Separation of the components of the mixture is achieved over a thin layer of adsorbent.

(ii) Partition Chromatography: It is based on the continuous differential portioning of components of a mixture between stationary and mobile phase.

QUALITATIVE ANALYSIS OF ORGANIC COMPOUNDS

Detection of Carbon and Hydrogen: heating the compound with CoO in a hard glass tube when C present in the compound is oxidized to CO2 which can be tested with lime Water and H is converted to water which can be tested with anhydrous CuSO4 which turns blue.

$$C + CuO \longrightarrow Cu + CO_2$$

$$H_2 + CuO \longrightarrow Cu + H2O$$

$$CO_2 + Ca(OH) \longrightarrow 2\,CaCO_3 + H_2O$$

$$5H_2O + CuSO_4 \longrightarrow CuSO_4.5H_2O$$

DETECTION OF OTHER ELEMENTS

Sodium Fusion Extract: A small piece of dry Na metal is heated with a organic compound in a fusion tube for 2 -3 minutes and the red hot tube is plunged in to distilled water contained in a china dish. The contained of the china dish is boiled, cooled and filtered.

Test for Nitrogen: The sodium fusion extract is boiled with FeSO4 and then acidified with Conc. H_2SO_4 the formation of Prussian blue colour confirms the presence of nitrogen.

$$6CN^- + Fe^{2+} \longrightarrow [Fe(CN)6]^{4-}$$

$$3[Fe(CN)6]^{4-} + 4Fe^{3+}\ xH2O \longrightarrow Fe4[Fe(CN)6]^{3}.xH2O$$

Test for Sulphur: the sodium fusion extract is acidified with CH3COOH and lead acetate is added to it. A black precipitate of PbS indicates the presence of sulphur.

$S^{2-} + Pb^{2+} \rightarrow PbS$ (black)

Test for halogens: The sodium fusion extract is acidified with HNO3 and then treated with AgNO3. A white PPT, soluble in NH4OH shows the presence of Cl, a yellowish ppt. sparingly soluble in NaOH the presence of Br, a yellowish ppt. insoluble in NH4OH shows the presence of I.

$$X^- + Ag^+ \longrightarrow AgX$$

QUANTITIVE ANALYSIS (Carbon and Hydrogen) Let the mass of organic compound be m g. Mass of water and carbon dioxide produced be m1 and m2 g respectively;

% of carbon = 12 x m2 x 100 /44 x m

% of hydrogen = 2 x m1 x 100 18 x m

Nitrogen

DUMAS METHOD:

Volume of Nitrogen at STP = P1V1 x 273 760 x T1

%N = 28 x vol of N2 at STP x 100/ 22400 x mass of the substance taken

KJELDAHL'S METHOD: %N= 1.4 x Molarity of the acid x Basicity of the acid x Vol of the acid used/ Mass of the substance taken

Halogens Carius method: A known mass of an organic compound is heated with fuming nitric acid in the presence of silver nitrate contained in a hard glass test tube known as Carius tube in a furnace. Carbon and hydrogen present in the compound are oxidized to carbon dioxide and water. The halogen present forms the corresponding silver halide. It is filtered, dried, and weighed.

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