

Chemistry Study Materials for Class 11 (NCERT Based Notes of Chapter- 12) Ganesh Kumar Date: -12/01/2021

SOME BASIC PRINCIPLES AND TECHNIQUES

Types of Organic reactions

Organic reactions can be classified into the following categories:

- i. Substitution reactions
- ii. Addition reactions
- iii. Elimination reactions
- iv. Rearrangement reactions

PURIFICATION OF ORGANIC COMPOUNDS

An organic compound may contain impurities and is essential to purify it. Various methods used for the purification of organic compounds are based on the nature of the compound and the impurity present in it.

The common techniques used for purification are as follows:

- i. Sublimation
- ii. Crystallisation
- iii. Distillation
- iv. Differential extraction and
- v. Chromatography

1. Sublimation

It is the process of conversion of a solid substance directly to vapour by heating. It is used to separate sublimable compounds from non-sublimable impurities.

In this method, the substance is placed in a sublimation apparatus and heated under vacuum. Under this reduced pressure, the solid sublimes and condenses as a purified compound on a cooled surface. The impurities left behind on the apparatus.

This method is used for the purification of naphthalene, iodine, camphor etc.

2. Crystallisation

This is one of the most commonly used techniques for the purification of solid organic compounds *It is based on the difference in the solubilities of the compound and the impurities in a suitable solvent.* The impure compound is dissolved in a solvent in which it is sparingly soluble at room temperature but appreciably soluble at higher temperature. The solution is concentrated to get a nearly saturated solution. On cooling the solution, pure compound crystallizes out and is removed by filtration. *If the compound is highly soluble in one solvent and very little soluble in another solvent, crystallisation can be satisfactorily carried out in a mixture of these solvents.*

3. Distillation

This method is used to separate (i) volatile liquids from non-volatile impurities and (ii) the liquids having sufficient difference in their boiling points. The principle of this method is that liquids having different boiling points vaporise at different temperatures. The vapours are cooled and the liquids so formed are collected separately.

In this method, the liquid mixture is taken in a round bottom flask and heated carefully. On boiling, the vapours of lower boiling liquid are formed first. The vapours are condensed by using a condenser and the liquid is collected in a receiver. The vapours of higher boiling liquid form later and it can be collected separately.

Chloroform (b.p 334 K) and aniline (b.p. 457 K) are separated by this technique.

There are different types of distillation methods. They are:

a) **Fractional distillation:**

Fractional distillation is used to separate two or more liquids that are miscible. It is a special type of distillation designed to separate a mixture of two or more liquids that have different boiling points. The process involves heating the mixture and partial condensation of the vapours along a fractionating column. The column is set up such that components with lower boiling points pass through the column and are collected earlier than components with higher boiling points. Repeated vaporization and condensation result in the separation of the components of the mixture. The efficiency of fractional distillation depends on the use of the fractionating column.

The fractionating column is packed with glass beads. It provides a large surface area for vaporization and condensation of the liquid mixture.

Ethanol and water, crude oil, toluene and cyclohexane etc are separated by this method.

b) *Distillation under reduced pressure:*

This method is used to purify liquids having very high boiling points and those, which decompose at or below their boiling points. Such liquids are made to boil at a temperature lower than their normal boiling points by reducing the pressure on their surface. The pressure is reduced with the help of a water pump or vacuum pump. Glycerol can be separated from spent-lye in soap industry by using this technique.

c) *Steam Distillation:*

This technique is applied to separate substances which are steam volatile and are immiscible with water. In steam distillation, steam from a steam generator is passed through a heated flask containing the liquid to be distilled. The mixture of steam and the volatile organic compound is condensed and collected. The compound is later separated from water using a separating funnel. Aniline – water mixture is separated by this method.

4. Differential Extraction

When an organic compound is present in an aqueous medium, it is separated by shaking it with an organic solvent in which it is more soluble than in water. The organic solvent and the aqueous solution should be immiscible with each other. So they form two distinct layers which can be separated by separating funnel. The organic solvent is later removed by distillation or by evaporation to get back the compound.
