Science-X

I.C.S.E.

12 Organic Chemistry

Topics

12.1 INTRODUCTION

Chemistry is the branch of science that deals with the properties, composition, and structure of elements and compounds, how they can change, and the energy that is released or absorbed when they change. It has three main branches as follows,

i) Organic Chemistry
ii) Inorganic Chemistry
iii) Physical Chemistry

Organic means pertaining to life. The compounds obtained from living things are known as Organic Compunds like urea, carbohydrates, proteins, acetic acid etc.

And the chemistry dealing with the study of Organic compounds is known as Organic Chemistry

Modern definition: The chemistry of hydrocarbons and their derivatives is termed as Organic Chemistry

Vital Force Theory: According to this theory organic compounds cannot be formed in lab, they can only be produced by living things.

This theory was failed by Freidrich Wohler (1828) when he prepared Urea in lab by the following chemical reaction,

$$NH_4CNO \rightarrow NH_2CONH_2$$

Ammonium cyanate Urea

Acetic acid was prepared by Kolbe (1845)
Methane gas was prepared by Berthelot (1856)

Therefore the Vital Force Theory was discarded

12.2 ORGANIC COMPOUNDS

Organic compounds are the compounds of Carbon and Organic Chemistry is the study of Organic compounds excluding oxides of Carbon, Metallic carbonates and related compounds like Metal cyanides and Metal carbides.

SOURCES OF ORGANIC COMPOUNDS

1. Plants: e.g. sugar, starch and cellulose and many drugs like Quinine etc.
2. Wood: e.g. Methyl alcohol, Acetone by destructive distillation of wood
3. Animals: e.g. Urea, Proteins, Fats etc.
4. Coal: e.g. Benzene, Naphthalene, Dyes, Drugs, Perfumes etc.
5. Petroleum: e.g. Gasoline, Petrol, Diesel, Vaseline, Naphtha etc.
6. Fermentation: Ethyl alcohol, Vinegar (Acetic acid) etc.
7. Synthetic Methods: most of the Organic compounds are now synthesized in lab.

12.2.1 COMPARISON BETWEEN ORGANIC AND INORGANIC COMPOUNDS

Characteristics	Organic Compounds	Inorganic Compounds
1. Presence of Carbon	C is essentially present	C is not essential, CO_2 , $CaCO_3$ are Inorganic
2. Solubility in water	No	Yes
3. Solubility in Organic solvents	Yes	No
4. M.P. and B.P.	Low	High
5. Combustibility	Yes	Don’t burn easily
6. Bonding	Covalent bonding	Ionic bonding
7. Conductivity	Bad conductors	Ionic comps are conductive in solution or molten form
8. Isomerism	Yes	No
9. Colour and Smell	Yes	No
10. Reactions	Slow	Fast

12.2.2 APPLICATIONS OF ORGANIC CHEMISTRY

- Shampoo, Gasoline, Perfume, Lotion, Drugs, Food and food additives, Plastics, Paper, Insect repellent
- Synthetic fabrics (nylon, polyester, rayon), Paint, Mothballs (naphthalene), Enzymes, Nail polis, remover
- Wood, Coal, Natural gas
- Solvents
- Fertilizers
- Vitamins
- Dyes
- Soap
- Candles
- Asphalt

12.2.2 APPLICATIONS OF ORGANIC CHEMISTRY

- **Polymers**: Common polymers you encounter every day are organic molecules. Examples include nylon, acrylic, PVC, polycarbonate, cellulose, and polyethylene.
- Petrochemicals are gasoline, plastics, detergents, dyes, food additives, natural gas, and medicines.
- **Soaps & Detergents**: Soap is made by the saponification reaction, which reacts to hydroxide with an organic molecule (e.g., an animal fat) to produce glycerol and crude soap. While soap is an emulsifier, detergents tackle oily, greasy (organic) soiling mainly because they are surfactants, which lower the surface tension of the water and increase the solubility of organic compounds.
- **Perfume** fragrance comes from a flower or a lab, the molecules you smell and enjoy are an example of organic chemistry.
- **Cosmetics industry** is a lucrative sector of organic chemistry.
- **Medicines**: medicines are direct result of organic chemistry
- **Clothes**: polyester, teryline etc

to be continued...