Now try in English: Organic chemistry; Friedrich Wohler's biography

Organic chemistry

Organic chemistry is the scientific study of the structure, properties, composition, reactions, and synthesis of organic compounds that by definition contain carbon. It is a specific discipline within the subject of chemistry. Organic compounds are molecules composed of carbon and hydrogen, and may contain any number of other elements. Many organic compounds contain nitrogen, oxygen, halogens, and more rarely phosphorus or sulphur.

History

Organic chemistry as a science is generally agreed to have started in 1828 with Friedrich Woehler's synthesis of the organic, biologically significant compound urea by accidentally evaporating an aqueous solution of ammonium cyanate NH_4OCN now called the Wöhler synthesis. The name organic chemistry comes from the idea that carbon chains were only produced biologically. This was false, but organic chemistry remains predominantly a study of the molecules of living organisms, also called biochemistry.

Characteristics of organic substances

Organic compounds are generally covalently bonded. This allows for unique structures such as long carbon chains and rings. The reason carbon is excellent at forming unique structures and that there are so many carbon compounds is that carbon atoms form very stable covalent bonds with one another (catenation). In contrast to inorganic materials, organic compounds typically melt, boil, sublimate, or decompose below 300°C. Neutral organic compounds tend to be less soluble in water compared to many inorganic salts, with the exception of certain compounds such as ionic organic compounds and low molecular weight alcohols and carboxylic acids where hydrogen bonding occurs. Organic compounds tend to be much more soluble in organic solvents such as ether or alcohol, but the solubility in each solute depends upon the functional groups present and on the overall structure. Like inorganic salts, organic compounds form crystals. Another unique property of carbon in organic compounds is the ease of formation of carbon carbon double bonds and triple bonds. When these bonds are arranged in a special way it gives rise to conjugated systems and aromaticity.

Categories of organic substances

Because so very many compounds exist, a clear, unambiguous naming system is necessary. Organic nomenclature is the system established for naming and grouping organic compounds. Organic subtances are classified by their molecular structural arrangement, and by what other atoms are present: hydrogen is impicitly assumed. Other atoms such as O, N, or Cl almost always bond in certain relative ways, forming functional groups. In chemistry, structure is quite synonymous with function, and so the structural categories double as cat-

egories of property or activity. The main organizational categories are aliphatic compounds such as alkanes, aromatic compounds such as benzene.
Examples of functional group based categories are Alcohols, Aldehydes, Ketones, Amines, Carboxylic acids, Ethers and Esters.

Polymers

Polymers consist of long chains of repeating segments of small molecular units. The segments could be chemically identical, which would make such a molecule a homopolymer - or, the segments could vary in chemical structure, which would make that molecule a heteropolymer. Polymers can be organic or inorganic. Commonly-encountered polymers are usually organic such as polyethylene, polypropylene, Nylon or Plexiglass. But inorganic polymers for instance silicone) are also familiar within everyday items.

(Adapted from Wikipedia)

Friedrich Wöhler's biography

Friedrich Wöhler (1800 - 1882)

He was born in Eschersheim near Frankfurt am Main. In 1823 Wöhler finished his study of medicine in Heidelberg at the laboratory of Leopold Gmelin, who arranged for him to work under Jöns Jakob Berzelius in Stockholm. He taught chemistry from 1825 to 1831 at the Polytechnic School in Berlin; then till 1836 he was stationed at the Higher Polytechnic School at Cassel, and then he became Ordinary Professor of Chemistry in the University of Göttingen, where he remained till his death.
Wöhler is regarded as a pioneer in organic chemistry as a result of his (accidental) synthesizing urea in the Wöhler synthesis in 1828. Until 1828, it was believed that organic substances could only be formed under the influence of the vital force in the bodies of animals and plants. Wöhler proved by the artificial preparation of urea from inorganic materials that this view was false. Urea synthesis was integral for biochemistry because it showed that a compound known to be produced only by biological organisms could be produced in a laboratory, under controlled conditions, from inanimate matter. This in vitro synthesis of organic matter disproved the common theory (vitalism) about the vis vitalis, a transcendent «life force» needed for producing organic compounds. By showing that ammonium cyanate can become urea by an internal arrangement of its atoms, without gaining or losing in weight, Wöhler furnished one of the first and best examples of isomerism, demolishing the old view that equality of composition could not coexist in two bodies, A and B, with differences in their respective physical and chemical properties. In the year of his urea synthesis, Wöhler became professor at the age of 28. Two years later, in 1830, Wöhler published, jointly with Justus von Liebig, the results of a research on cyanic acid and cyanuric acid and on urea. Berzelius, in his report to the Royal Swedish Academy of Sciences, called it the most important of all researches in physics, chemistry, and mineralogy published in that year. The results were quite unexpected, and furnished additional evidence in favour of isomerism.
Wöhler was also a co-discoverer of beryllium and silicon, as well as the synthesis of calcium carbide, among others. In 1834, Wöhler and Liebig published an investigation of the oil of bitter almonds. They proved by their experiments that a group of carbon, hydrogen, and oxygen atoms can behave like an element, take the place of an element, and can

be exchanged for elements in chemical compounds. Since the discovery of potassium by Humphry Davy, it had been assumed that alumina, the basis of clay, contained a metal in combination with oxygen. Davy, Oerstedt, and Berzelius attempted the extraction of this metal, but failed. Wöhler then worked on the same subject, and discovered the metal aluminium. To him also is due the isolation of the elements yttrium, beryllium, and titanium, the observation that silicium can be obtained in crystals, and that some meteoric stones contain organic matter. He analyzed a number of meteorites, and for many years wrote the digest on the literature of meteorites in the Jahresbericht der Chemie.
Wöhler and Sainte Claire Deville discovered the crystalline form of boron, and Wöhler and Buff the hydrogen compounds of silicium and a lower oxide of the same element.
Wöhler's discoveries had great influence on the theory of chemistry. The journals of every year from 1820 to 1881 contain contributions from him. It was remarked that «for two or three of his researches he deserves the highest honor a scientific man can obtain, but the sum of his work is absolutely overwhelming.
The aspect of chemistry would be very different from that it is now, if he had ever lived».
While sojourning at Cassel, Wöhler made, among other chemical discoveries, one for obtaining the metal nickel in a state of purity, and with two friends he founded a factory there for the preparation of the metal.

(Adapted from Wikipedia)

Activities

Match the words in table A with the English equivalent in table B. Use a dictionary if needed.

Table A

A	Idrocarburo
B	Isomeria
C	Gruppo funzionale
D	Cloroformio
E	Aldeide
F	Chetone
G	Acido carbossilico
H	Etere
I	Estere
J	Benzene
K	Fenolo
L	Anilina
M	Radicale
N	Alcol
O	Ammina
P	Aromatico
Q	Polimero
R	Alcano
S	Alchene
T	Alchino

Table B

1	Aromatic
2	Ketone
3	Polymer
4	Carboxylic acid
5	Alcohol
6	Chloroform
7	Alkene
8	Ester
9	Aniline
10	Isomerism
11	Alkyne
12	Benzene
13	Phenole
14	Hydrocarbon
15	Alkane
16	Ether
17	Radical
18	Functional group
19	Amina
20	Aldehyde

Keys

Match the words in table A with the English equivalent in table B. Use a dictionary if needed.

Table A	Table B
A	14
B	10
C	18
D	6
E	20
F	2
G	4
H	16
I	8
J	12
K	13
L	9
M	17
N	5
O	19
P	1
Q	3
R	15
S	7
T	11