

CARBON CHEMISTRY

1 Read Carbon Chemistry and find words matching the following definitions.

- smallest substance into which a substance can be divided without changing its chemical nature - O -----
- body-building substance made up of amino acids - ----- E ---
- scientific study of life - ----- Y
- scientific study of the chemistry of living organisms - O -----
- substance that makes a person unable to feel pain - A -----
- compound made up of large molecules which are in turn made up from combinations of smaller molecules - ----- Y ---
- compound of hydrogen and carbon - ----- C -----
- structural fragment found in all members of a class of compounds - U ----- G -----

The diversity of carbon chemistry is responsible for the diversity of life itself. The ability to form a virtually unlimited range of compounds has led to an almost unlimited range of living organisms constructed out of molecules containing carbon. You yourself are a unique individual because you contain unique proteins: only carbon could form the basis of a range of compounds diverse enough to provide a different one for every individual.

Because the major source of compounds containing carbon and hydrogen is living or once-living material (animals, plants, coal, oil), it was originally thought that only living organisms could produce these compounds. This has since been shown to be untrue, but the name 'organic' has continued to be applied to that branch of chemistry concerned with the study of compounds containing C-H bonds. This includes the vast majority of carbon compounds, but traditionally compounds such as CO, CO₂ and carbonates have been considered to belong to the field of inorganic chemistry.

The position of carbon as the basis of the molecules of life means that the study of organic chemistry is of central importance in understanding the chemistry, and therefore the biology, of living systems (the chemical study of living systems is called biochemistry). The knowledge of organic chemistry enables chemists to develop and manufacture drugs, agricultural chemicals, anaesthetics and other chemicals whose interactions with life processes are important to man. Many other organic chemicals, less directly related to biological compounds, are of prime importance to modern society, for example the many polymers (polythene, nylon) whose properties of flexibility and elasticity are a direct consequence of carbon's unique ability to form chains.

The ability of carbon to form strong bonds to itself and to hydrogen leads to the formation of stable compounds, called hydrocarbons, containing only carbon and hydrogen. All molecules containing the same functional group can be considered as members of a family, with similar properties. Of course, as the hydrocarbon chain gets bigger it increasingly dominates the properties of the compound, so that members of the family show a steady gradation of physical and chemical properties as the size of the hydrocarbon portion increases.

A family of compounds containing the same functional group is called a homologous series.

(From: Hill-Holman, *Chemistry in Context*, Nelson)

- 2** Use these words to complete the summary of Carbon Chemistry: carbon, carbonates, covalent, electrons, four, homologous, inorganic, organic, oxides.

Over two million compounds are known which contain the element (1) and about eighty thousand new compounds are made each year. It is therefore convenient to study such compounds separately, and this branch of chemistry is known as (2) chemistry. Today the distinction between organic and (3) chemistry is an arbitrary one. Organic chemistry is regarded as the chemistry of the compounds of carbon other than its (4), the metallic (5) and related compounds. The bonds which carbon forms are (6): that is, each bond is formed by the sharing of two (7)....., one of which is provided by the carbon atom and one by the other atom. The large number of organic compounds fall into a comparatively small number of series, known as (8) series.

- 3** Match nouns a-f, as they are used in the passage Carbon chemistry, with their synonyms 1-6. Tip: copy the pairs in your indexed book.

- | | | |
|----------------|--------------------------|----------------|
| a. diversity | <input type="checkbox"/> | 1. amount |
| b. field | <input type="checkbox"/> | 2. discipline |
| c. drug | <input type="checkbox"/> | 3. medicine |
| d. interaction | <input type="checkbox"/> | 4. progression |
| e. gradation | <input type="checkbox"/> | 5. relation |
| f. size | <input type="checkbox"/> | 6. variety |

- 4** Match adjectives a-f, as they are used in the passage Carbon chemistry, with their synonyms 1-6. Tip: copy the pairs in your indexed book.

- | | | |
|--------------|--------------------------|----------------|
| a. unlimited | <input type="checkbox"/> | 1. exceptional |
| b. major | <input type="checkbox"/> | 2. fundamental |
| c. untrue | <input type="checkbox"/> | 3. incorrect |
| d. central | <input type="checkbox"/> | 4. infinite |
| e. unique | <input type="checkbox"/> | 5. prime |
| f. steady | <input type="checkbox"/> | 6. stable |

- 5** Match verbs or adverbs a-f, as they are used in the passage Carbon chemistry, with their synonyms 1-6. Tip: copy the pairs in your indexed book.

- | | | |
|-----------------|--------------------------|-------------------|
| a. provide | <input type="checkbox"/> | 1. allow |
| b. belong | <input type="checkbox"/> | 2. be appropriate |
| c. enable | <input type="checkbox"/> | 3. more and more |
| d. manufacture | <input type="checkbox"/> | 4. practically |
| e. increasingly | <input type="checkbox"/> | 5. produce |
| f. virtually | <input type="checkbox"/> | 6. supply |