

Chains Encyclopedia Article

Chains

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One of the more important properties of **carbon**, from the point of view of organic **chemistry**, is its ability to "catenate" or form long chains with itself. Carbon is by no means unique in this regard as most of the non-metallic elements are capable of forming chains. However, carbon is unique in being able to form stable chains. That is, the structurally analogous silanes--mixtures of **silicon** and **hydrogen**--are spontaneously flammable in air.

Examples of simple chains are the hydrocarbons. In essence, these are built from the successive addition of -CH_2 units. **Methane** is therefore one -CH_2 inserted into a H-H bond. Ethane is two -CH_2 units. Propane is three and so on. Extension of these chains to the millionth -CH_2 unit provides polymers and **plastics**. In essence, this is the basic structure of **polyethylene**.

Simple chains are not the only possibility. A variety of polymeric substances, built from repeating units, are also possible. But more important and interesting are the chains of life. These are the protein molecules, made from chains of **amino acids** strung together by amide bonds, and DNA/RNA, which are chains of **nucleic acids** strung together by **phosphate** linkages between the deoxyribose (for **DNA**) and ribose (for **RNA**) saccharides, respectively. Peptides, such as many human messengers and hormones, contain between about four to 100 amino acids. **Proteins** are longer chains, containing between 100-1,000 amino acids. DNA, on the other hand, is a chain of millions of base pairs. But in either case, it is the ability of carbon to form chains with itself that make these molecules possible.