

A Brief Note on Alkanes and its Applications

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DESCRIPTION

Alkanes are organic compounds that are composed entirely of single-bonded carbon and hydrogen atoms and have no other functional groups. The general formula of alkanes is $C_n H_{2n+2}$, which is subdivided into the subsequent three categories: straight-chain alkanes, branched-chain alkanes and cycloalkanes. Alkanes are also saturated hydrocarbons. These are the simplest and least reactive hydrocarbons, containing only carbon and hydrogen. They are very important commercially because they are the main components of gasoline and lubricants and are widely used in organic chemistry; although the role of pure alkanes (such as hexane) is mainly entrusted to solvents. The quality of alkanes makes them different from other compounds that also contain carbon and hydrogen, which have no unsaturation. That is, it does not contain double or triple bonds that are highly reactive in organic chemistry. The energy in carbon-carbon and carbon-hydrogen bonds is extremely high and their rapid oxidation will generate tons of warmth, usually within the sort of fire.

APPLICATIONS OF ALKANES

The application of alkanes depends on the number of carbon atoms. The first four alkanes are used primarily for heating and cooking, and are also used for power generation in some countries. Methane and ethane are the main components of natural gas; they are generally stored in gaseous form under pressure. However, they are easier to transport as liquids: this requires compression and cooling of the gas. Propane and butane are gases at atmospheric pressure that can liquefy at relatively low pressure and are commonly called Liquefied Petroleum Gas (LPG). Propane is used as a fuel for propane

burners and highway vehicles, and butane is used for space heaters and disposable cigarette lighters. Both are used as propellants for aerosols. From pentane to octane, alkanes are highly volatile liquids. They are used as fuel for internal combustion engines because they easily vaporize on entering the combustion chamber without forming liquid droplets, which can impair the uniformity of combustion. Branched chain alkanes are preferred because they are less prone to premature ignition than linear homologues, which can cause detonation. This tendency to catch fire prematurely is measured by the octane number of the fuel, where 2,2,4-trimethylpentane (iso-octane) has an arbitrary value of 100 and heptane has a value of 0. In addition to being used as fuel, intermediate alkanes are also good solvents for nonpolar substances.

Diesel fuel is characterized by its cetane number, which is the old name of hexadecane. However, the higher melting points of these alkanes can cause problems in the polar and low-temperature regions, where the fuel becomes too thick to flow properly. Alkanes above hexadecane are the most important components of fuel oil and lubricating oil. In this last function, they also act as preservatives because their hydrophobicity means that water cannot reach the surface of the metal. Many solid alkanes can be used as paraffin waxes, for example in candles. However, this should not be confused with real waxes, which are made up mostly of esters. However, higher alkanes are of little value and generally decompose to lower alkanes by cracking. Some synthetic polymers, such as polyethylene and polypropylene, are paraffins with chains containing hundreds to thousands of carbon atoms. These materials are used in countless applications, and billions of kilograms of these materials are manufactured and used every year.

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