**Alkanes**

**A\_\_\_\_\_\_\_\_\_\_\_** are **s\_\_\_\_\_\_\_\_\_\_\_ h\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. They consist of the elements **c\_\_\_\_\_\_\_\_\_\_** and **h\_\_\_\_\_\_\_\_\_\_\_**, and all the bonds between the Carbon atoms are **s\_\_\_\_\_\_\_\_\_\_** bonds. They have the general formula **\_\_\_\_\_\_\_\_\_\_\_\_\_**. Since all Alkanes are similar in structure and properties, they are called a **h\_\_\_\_\_\_\_\_\_\_\_\_\_\_ s\_\_\_\_\_\_\_\_\_\_\_\_\_**.

The structure of an alkane, as with all hydrocarbons, can be represented with a

* + **A 3D diagram**, with all the atoms and bonds shown, modelled in 3 dimensions.
	+ **Displayed Formula**, with all the atoms and bonds shown.
	+ **Skeletal Formula**, with only the bonds between the Carbon atoms shown.
	+ **Shortened Structural Formula**, a linear form where all the atoms are shown but no bonds.



**Branched Alkanes and Cycloalkanes**

Alkanes can be **l\_\_\_\_\_\_\_\_ s\_\_\_\_\_\_\_\_\_\_\_\_ c\_\_\_\_\_\_\_\_\_\_\_\_\_** of carbon atoms bonded with each other and hydrogen, but they can also come in different shapes. **B\_\_\_\_\_\_\_\_\_\_\_\_\_\_** can occur, as can the formation of **c\_\_\_\_\_\_\_\_\_\_\_\_\_\_** structures. This is called **i\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**B\_\_\_\_\_\_\_\_\_\_\_\_ a\_\_\_\_\_\_\_\_\_\_** occur when a straight chain alkane forms replaces one of its hydrogen atoms with an **a\_\_\_\_\_\_\_\_\_** group (an alkane which has similarly lost a hydrogen on the end carbon), forming a **b\_\_\_\_\_\_\_\_\_\_\_\_\_**. Branching can happen in many different ways and means that a variety of possible structures can exist for one **m\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ f\_\_\_\_\_\_\_\_\_\_\_\_**. Branched Alkanes may have the prefix 'iso'.

**C**\_\_\_\_\_\_\_\_ **a\_\_\_\_\_\_\_\_\_\_\_** have the general formula **\_\_\_\_\_\_\_\_\_\_\_\_\_** and consist of **C**\_\_\_\_\_\_\_\_\_\_ atoms bonded in a **c\_\_\_\_\_\_\_\_\_\_\_** structure. They are name with the prefix '**c\_\_\_\_\_\_\_\_**', *for example cyclohexane*.

 

**Reactions of Alkanes**

Since a\_\_\_\_\_\_\_\_ are s\_\_\_\_\_\_\_\_\_\_ h\_\_\_\_\_\_\_\_\_\_, they do not readily react. However, they can be made to react under certain conditions, so give useful products or energy output. Alkanes will react with o\_\_\_\_\_\_\_\_\_ if they are given sufficient a\_\_\_\_\_\_\_\_\_\_\_ e\_\_\_\_\_\_\_. This will result in a highly e\_\_\_\_\_\_\_\_ reaction, producing c\_\_\_\_\_\_ d\_\_\_\_\_ and w\_\_\_\_\_, which makes alkanes very useful as fuels.

When Alkanes C4-C6 are heated to 150°C with a platinum of aluminium o\_\_\_\_\_\_\_\_ c\_\_\_\_\_\_\_\_, isomerism occurs. The reaction produces branched a\_\_\_\_\_\_\_\_\_, and so is useful in improving octane number. Reforming is the process of increasing the amount of c\_\_\_\_\_\_\_\_\_\_\_\_ and Hydrocarbons containing b\_\_\_\_\_\_\_\_ rings, to improve octane number. This is done with alkanes in the naphtha fraction (C6-C10) at 500°C with a p\_\_\_\_\_\_\_\_\_\_ or a\_\_\_\_\_\_\_\_\_ oxide catalyst. Hydrogen is recycled through the mixture to reduce 'coking'.

C\_\_\_\_\_\_\_\_ is the process of breaking longer chained a\_\_\_\_\_\_\_\_\_\_ down into smaller alkanes and alkenes, sometimes for p\_\_\_\_\_\_\_\_\_ manufacture, and sometimes to improve octane number. Steak cracking involves heating alkanes from the naphtha and kerosene fractions (C6-C16) to 900°C without a catalyst and using steam as a diluent to reduce 'coking'. This is used in the manufacture of Polymers. C\_\_\_\_\_\_\_\_\_ cracking takes feedstock from longer chained alkanes in the gas oil fraction (C14-C20) and heating to 500°C with a Z\_\_\_\_\_\_\_\_. This can produce branched and cyclic h\_\_\_\_\_\_\_\_\_\_\_ and is used to improve octane number.