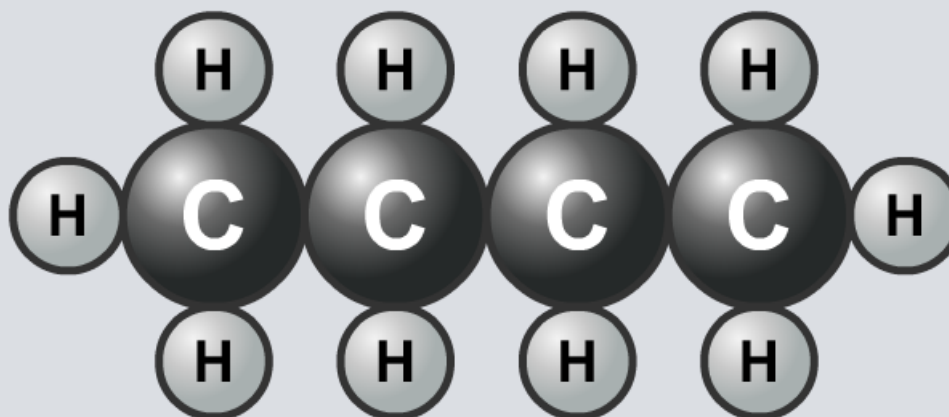
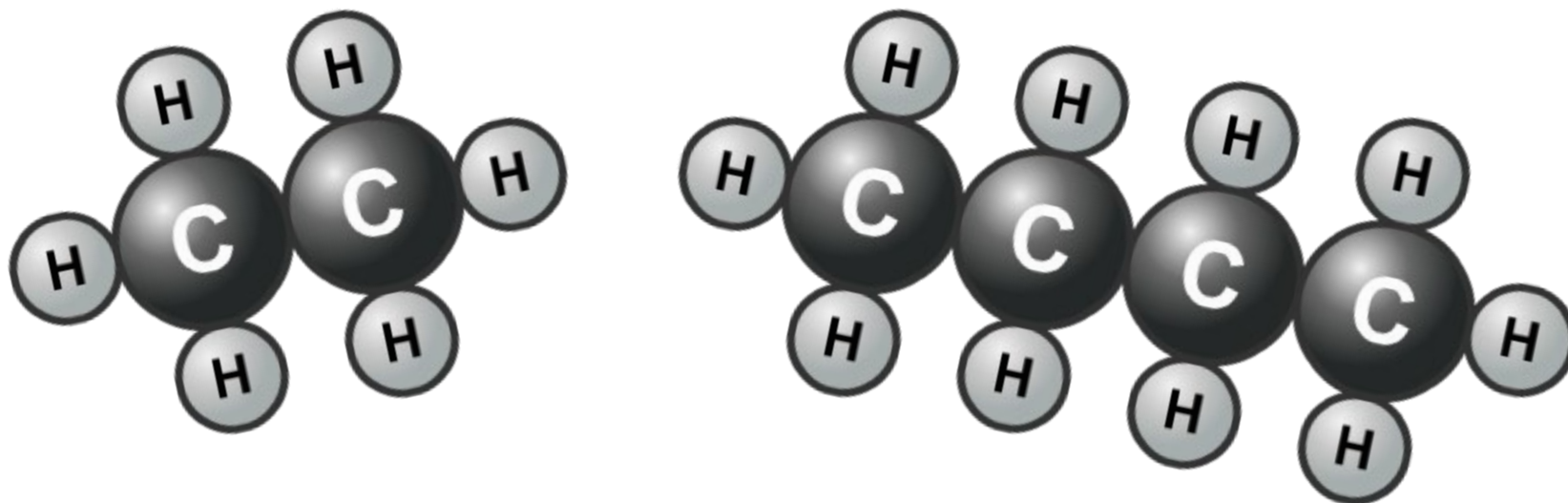


# Hydrocarbons



# Hydrocarbons in crude oil

Many compounds in crude oil only contain the elements carbon and hydrogen. They are called **hydrocarbons**.



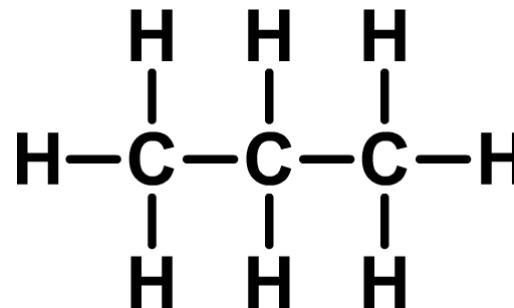
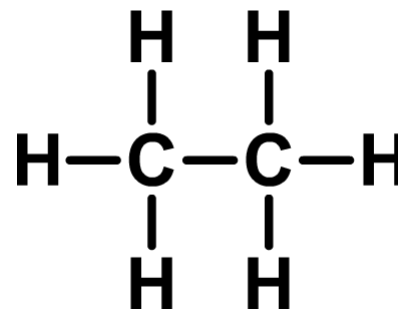
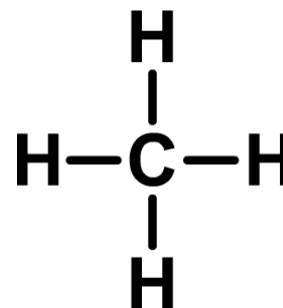
Most hydrocarbons in crude oil are compounds called **alkanes**. Alkanes contain a single chain of carbon atoms with hydrogen atoms bonded along the side.



# What are alkanes?

Alkanes are a family of hydrocarbon compounds with the general formula  $C_nH_{2n+2}$ .

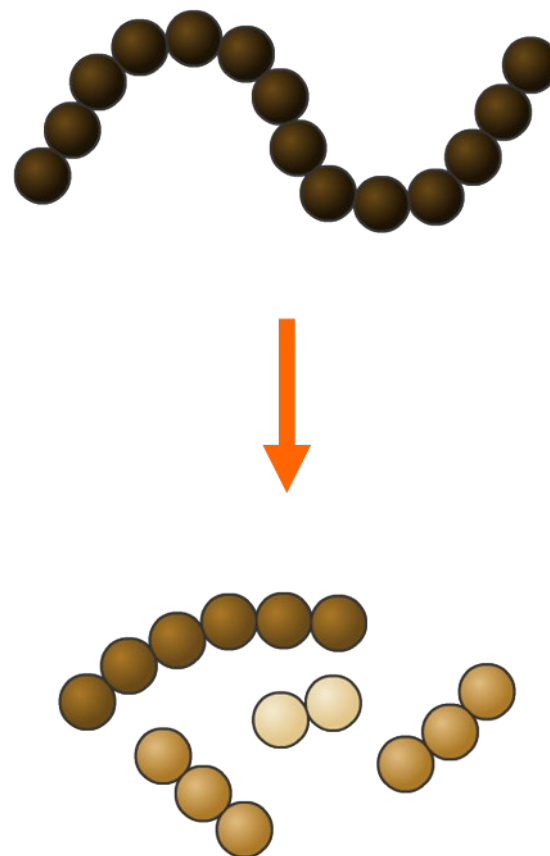
- The simplest alkane is **methane**. It has the formula  $CH_4$ .
- The second simplest alkane is **ethane**. It has the formula  $C_2H_6$ .
- The third simplest alkane is **propane**. It has the formula  $C_3H_8$ .



Large hydrocarbon molecules can be broken down into smaller molecules using a catalyst. This is called **catalytic cracking**, and is an example of a **thermal decomposition** reaction.

The hydrocarbon molecules are heated until they turn into vapor, and then mixed with a catalyst. The molecules break apart, forming smaller alkanes and **alkenes**.

Alkenes are reactive molecules that are used to make plastics and other chemicals.

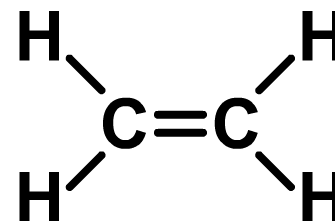


# What are alkenes?

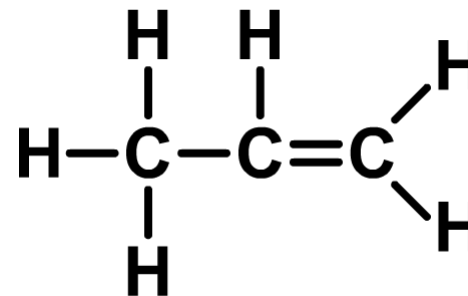
Alkenes are a family of hydrocarbon compounds with the general formula  $C_nH_{2n}$ .

Alkenes are very similar to alkanes, but they have one important difference: they contain at least one double covalent bond between carbon atoms.

- The simplest alkene is **ethene**. It has the formula  $C_2H_4$ .



- The second simplest alkene is **propene**. It has the formula  $C_3H_6$ .

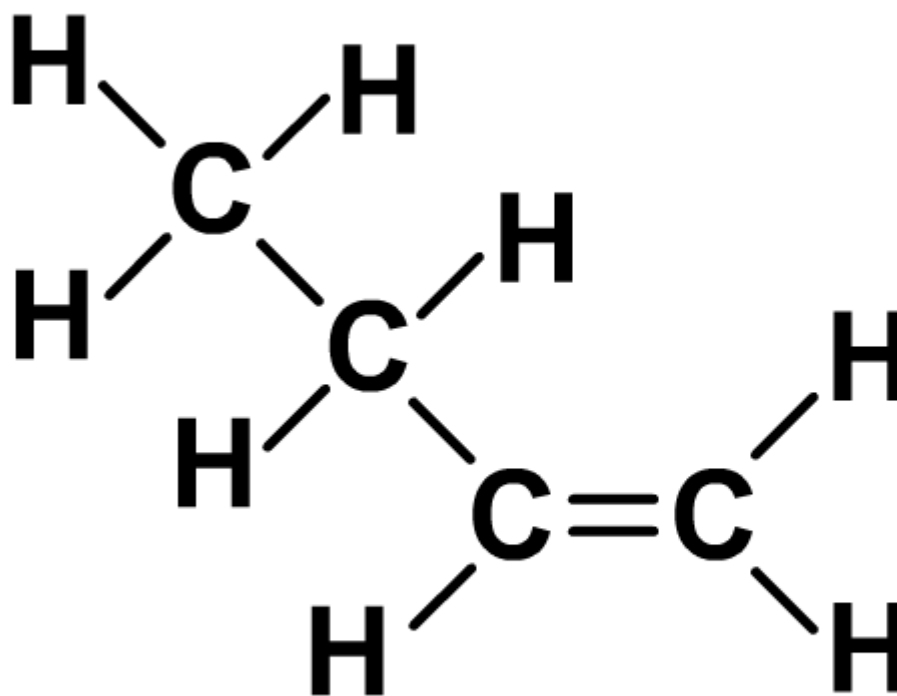


## How many structures have the formula $C_4H_8$ ?

Hydrocarbons can have different structures, but the same molecular formula.

These different structures are called isomers.

Click "**start**" to see isomers of  $C_4H_8$ .



start





# Saturated vs. unsaturated

Alkanes are examples of **saturated** compounds.

A **saturated** compound only contains **single** covalent bonds between carbon atoms.

Alkenes are examples of **unsaturated** compounds.

An **unsaturated** compound contains at least one **double** covalent bond between carbon atoms.

A test to distinguish between saturated and unsaturated compounds is to add red **bromine water**. In the presence of unsaturated compounds, the red color disappears.

