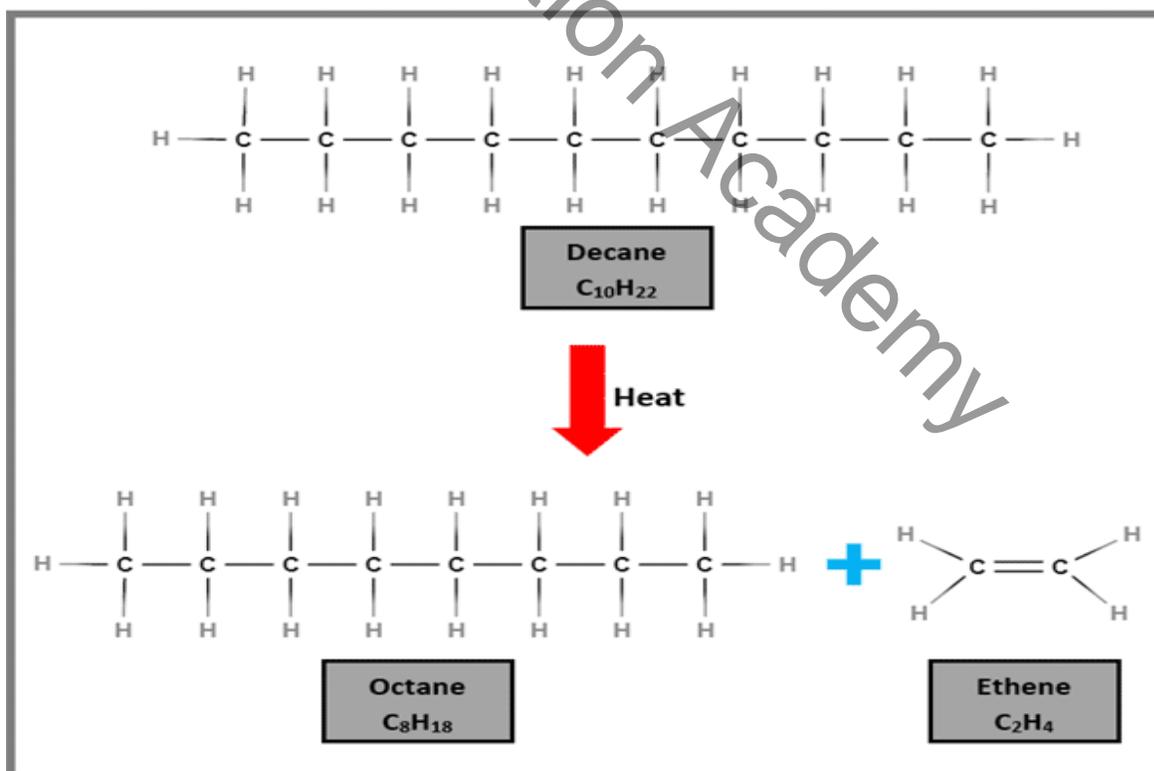


Cracking of Crude oil

- ▶ Crude oil is a complex mixture of hydrocarbons. Two types of hydrocarbons are alkanes and alkenes.
 - **Alkanes** are saturated hydrocarbons, which means that there are no double bonds in the structure. There are only single covalent bonds between the carbon atoms. The general formula for alkanes is C_nH_{2n+2}
 - **Alkenes** are unsaturated hydrocarbons, which means they have at least one double bond between two carbon atoms. The general formula for alkenes is C_nH_{2n}
- ▶ Shorter hydrocarbons tend to be more useful than longer ones; therefore, longer-chain hydrocarbons undergo a process called cracking to produce shorter chains.

“**Cracking** is the process of breaking down long-chain saturated hydrocarbon molecules into smaller, more useful molecules. One example of this is the cracking of decane into octane and ethene.”



Methods of Cracking

► There are two main methods of cracking. Cracking can be performed in several ways, but two of the main methods include using a catalyst or using steam.

a. catalytic cracking

b. steam cracking.

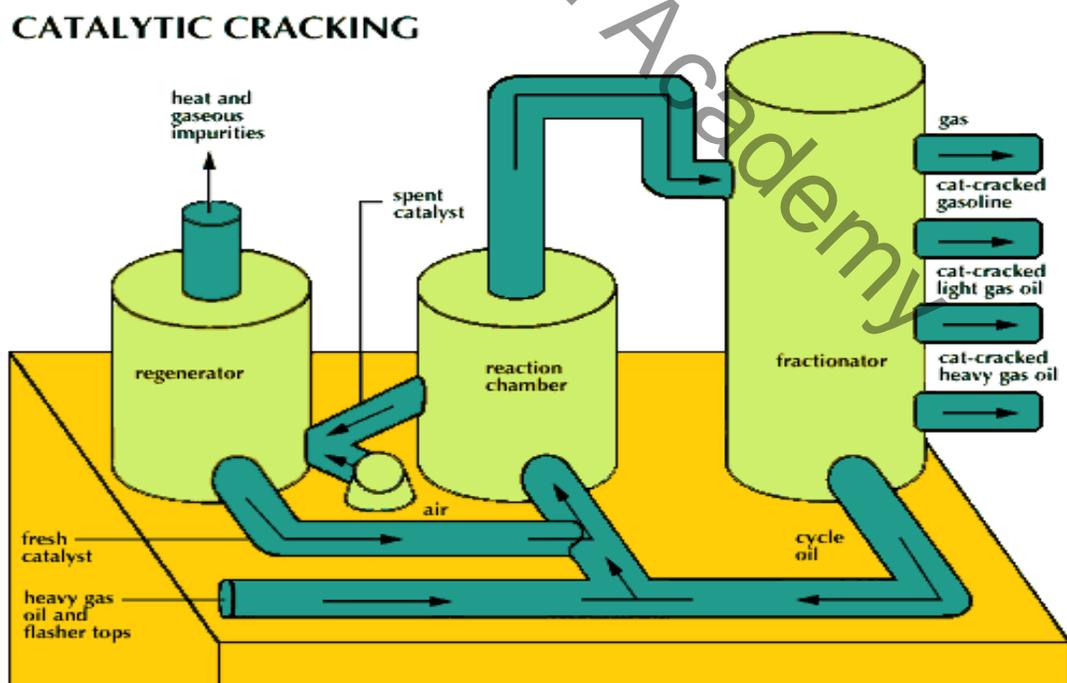
► Both cracking methods involve heat. During cracking, the hydrocarbons are heated up in order for them to break down. This is known as **thermal decomposition**. High temperatures are required for both cracking methods.

a. **Catalytic cracking:**

I. involves an aluminium oxide catalyst.

II. The long chain hydrocarbon is turned into a **gas**, which then passes over a hot, powdered **aluminium oxide catalyst** at a temperature of about 550°C.

III. The long chain hydrocarbon splits into shorter chain hydrocarbons (C5 to C8) as it passes over the surface of the catalyst. The hydrocarbons formed are mostly short chained alkanes. These are more useful as fuels.



b. **Steam cracking:**

I. It simply involves heat and steam.

II. In steam cracking, the long chain hydrocarbon is turned into a gas, then **mixed with steam**. At very high temperatures, over 850 °C, and under pressure, the long chain hydrocarbon will split into shorter chain hydrocarbons and lots of small alkenes.

III. The alkenes are separated from the alkanes by fractional distillation. The alkenes are used to make polymers.

