

Topic: **Alkane Hydrocarbons**

Objective: What are Alkanes, and how do they function in chemistry?

Alkane Family:

1. The **simplest** form of **hydrocarbon** is the **alkane** series, also called the paraffin family. Alkanes are made up of a single chain of carbon-carbon (C-C) bonds with two (a middle carbon) or three (an end carbon) hydrogen (H) atoms attached to each carbon atom.

FORMULA	Name	Boiling Point	Structural Formula
CH ₄	methane	-161 °C	<pre> H H - C - H H </pre>
C ₂ H ₆	ethane	-89	<pre> H H H - C - C - H H H </pre>
C ₃ H ₈	propane	-44	<pre> H H H H - C - C - C - H H H H </pre>
C ₄ H ₁₀	butane	-0.5	<pre> H H H H H - C - C - C - C - H H H H H </pre>
C ₅ H ₁₂	pentane	36	<pre> H H H H H H - C - C - C - C - C - H H H H H H </pre>
C ₆ H ₁₄	hexane	68	Add 1 carbon and 2 hydrogens to the middle of pentane
C ₇ H ₁₆	heptane	98	Add 1 carbon and 2 hydrogens to the middle of hexane
C ₈ H ₁₈	octane	125	Add 1 carbon and 2 hydrogens to the middle of heptane
C ₉ H ₂₀	nonane	151	Add 1 carbon and 2 hydrogens to the middle of octane
C ₁₀ H ₂₂	decane	174	Add 1 carbon and 2 hydrogens to the middle of nonane

2. Look at the boiling point listed for each alkane group. As the molecule gets **larger**, the boiling point **increases**. This is due to the increasing number of London Dispersion forces, and with it more London Dispersion strength.
3. Methane (CH₄) is the only hydrocarbon that is **only** an alkane, since it only has one carbon atom.
4. The general **formula** for an **alkane** is C_nH_{2n+2}. If you know the number of carbon atoms (prefix), then you double the prefix and add two to get the number of hydrogen atoms for that alkane.
5. What is the molecular formula for octadecane? Well, this one is not on your chart, but octadec- is the prefix for 18, so this is an 18 carbon alkane. Using the general formula C_nH_{2n+2}, we can write the molecular formula for octadecane:



Unsaturated Hydrocarbons:

- i. An unsaturated hydrocarbon is a hydrocarbon that contains at least one double (C=C) or triple (C≡C) carbon to carbon bond.
- ii. Unsaturated hydrocarbons are anything EXCEPT alkanes.