

## Properties of Alkanes and Cycloalkanes

### Physical Properties

The physical properties of alkanes and cycloalkanes are largely dependent on the size of the molecule (number of carbon atoms).

As the number of carbon atoms in the formula increases;

1. the state of matter at SATP moves from gas to liquid
2. melting point and boiling point increase
3. density increases (but never above 0.8 g/mL so they are always less dense than water).

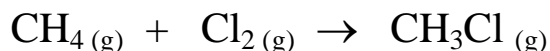
Differences in the above properties occur because larger molecules have a larger number of electrons resulting in stronger London forces between the molecules.

Hydrocarbons are not miscible in water since they are highly non-polar but they are soluble in organic solvents.

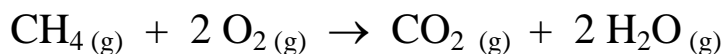
### Chemical Properties

The chemical properties of alkanes and cycloalkanes are largely dependent on the fact that alkanes and cycloalkanes do not contain any multiple bonds. Most reactions of these molecules are slow at SATP.

Alkanes and cycloalkanes only react with very reactive halogens in substitution reactions



Alkanes and cycloalkanes react with oxygen in combustion reactions. These reactions are rapid after a high temperature start and are self-sustaining.



When combustion reactions are incomplete, carbon and carbon monoxide are also formed.

