Alkanes

(Teacher Resource)

Alkanes are carbon molecules with single bonds between carbon atoms and all other bonds filled with hydrogen. These molecules are saturated with hydrogen. (See Table 1 for classifications of alkanes.) The number of carbon atoms per molecule determines the state of matter for the compound and its usefulness.

Table 1: Alkanes (C_nH_{2n+2})

Number of Carbon Atoms	Name	Formula	Structural Formula
1	Methane	CH_4	
2	Ethane	C_2H_6	
3	Propane	C_3H_8	
4	Butane	C_4H_{10}	
5	Pentane	C_5H_{12}	
6	Hexane	C_6H_{14}	
7	Heptane	C_7H_{16}	
8	Octane	C_8H_{18}	
9	Nonane	C_9H_{20}	
10	Decane	$C_{10}H_{22}$	

Alkanes

(Teacher Resource continued)

(See Table 2.) Alkanes with 1-4 carbon atoms per molecule are gases which are used for heating, cooking, lighters, and torches. Alkanes with 5-7 carbon atoms per molecule are liquids with low boiling points that are used as solvents. Alkanes with 6-18 carbon atoms per molecule are liquids and are components of gasoline. Alkanes with 12-24 carbon atoms per molecule are liquids and are components of jet fuel and portable stove fuel. Alkanes with 18-50 carbon atoms per molecule are high-boiling point liquids used for lubricants, diesel fuel, or heating oil. Alkanes with 50 or more carbon atoms per molecule are solid or semi-solid and are found in waxes and petroleum jelly. Alkanes are named for the longest continuous chain of carbon atoms in the compound.

Table 2: Uses of Alkanes

Number of Carbon Atoms	State	Uses
1-4	Gas	heating and cooking fuel
5-7	Low-Boiling Liquids	solvents, gasoline
6-18	Liquids	gasoline
12-24	Liquids	jet fuel, portable stove fuel
18-50	High-Boiling Liquids	diesel fuel, lubricants, heating oil
50+	Solids	petroleum jelly, paraffin