

Classification and Formula

A. Aliphatic hydrocarbons: no rings

a) Saturated: Have no double or triple bonds

1. Alkanes (acyclic): Formula C_nH_{2n+2}

b) Unsaturated: Do have double or triple bonds

2. Alkenes (have double bond): Formula C_nH_{2n}

3. Alkynes (have triple bond): Formula C_nH_{2n-2}

B. Cycloalkanes: Have ring, but no double bonds. Formula C_nH_{2n}

Σ Saturated, because no double or triple bonds

C. Aromatics: have planar, flat 6-membered ring (benzene) with 3 double bonds

Σ "Unsaturated", due to double bonds.

Summary: 5 special classes:

Name	Keys	Saturated?	Aliphatic/ Aromatic	Formula
Alkanes	Single bonds	Yes	Aliphatic	C_nH_{2n+2}
Alkenes	Double bond	No	Aliphatic	C_nH_{2n}
Alkynes	Triple bond	No	Aliphatic	C_nH_{2n-2}
Cycloalkanes	Ring	Yes	Cycloaliphatic	C_nH_{2n}
Aromatics	Flat 6-ring, with 3 double bonds	No	Aromatic	

Σ "Saturated" versus "unsaturated": are there any double or triple bonds?

Σ "Aliphatic" vs "Aromatic": is there a planar 6-membered ring (benzene)?

Names for Saturated Hydrocarbons

# C's	Name	Structure	Formula	Substituent	Substituent Name
1	Methane	CH_4	CH_4	$-CH_3$	Methyl
2	Ethane	CH_3CH_3	C_2H_6	$-CH_2CH_3$	Ethyl
3	Propane	$CH_3CH_2CH_3$	C_3H_8	$-CH_2CH_2CH_3$	Propyl
4	Butane	$CH_3CH_2CH_2CH_3$	C_4H_{10}	$-CH_2CH_2CH_2CH_3$	Butyl
5	Pentane	$CH_3CH_2CH_2CH_2CH_3$	C_5H_{12}	$-CH_2CH_2CH_2CH_2CH_3$	Pentyl
6	Hexane	$CH_3(CH_2)_4CH_3$	C_6H_{14}	$-CH_2(CH_2)_4CH_3$	Hexyl
7	Heptane	$CH_3(CH_2)_5CH_3$	C_7H_{16}	$-CH_2(CH_2)_5CH_3$	Heptyl
8	Octane	$CH_3(CH_2)_6CH_3$	C_8H_{18}	$-CH_2(CH_2)_6CH_3$	Octyl
9	Nonane	$CH_3(CH_2)_7CH_3$	C_9H_{20}	$-CH_2(CH_2)_7CH_3$	Nonyl
10	Decane	$CH_3(CH_2)_8CH_3$	$C_{10}H_{22}$	$-CH_2(CH_2)_8CH_3$	Decyl

Organic Nomenclature

1. Longest continuous chain of carbons gives the base name (alkane)

Σ Helpful: circle the longest chain right away!

Σ Helpful: put boxes around the attached "substituent" groups

2. number the base chain from the end with the nearest substituent

3. Name and give position of each alkyl substituent (ex, 3-methyl...)

4. If two or more different alkyl groups are present, list them in alphabetical order

Σ If there are two copies of the same substituent, use "di" (ex, 2,5-dimethyloctane)