

# Organic Chemistry

Large number of compounds due to:

- 4 valence pairs
- single / double / triple bonds
- cyclic (ring) structures

## Properties of hydrocarbons

- *Saturated* - all C-C bonds are single
- Insoluble in water
- Almost non-polar (similar electronegativities)
- Only dispersion forces (valence e-)
- Dispersion forces increase with length
- Branched molecules have lower density

## Linear (aliphatic)

Alkanes:  $C_n H_{2n+2}$

Alkenes:  $C_n H_{2n}$

Alkynes:  $C_n H_{2n-2}$

## Naming hydrocarbons

- Branches end with *-yl*
- Indicate number of branches with di-, tri- etc.
- Longest unbranched carbon chain includes function group

## Functional groups

Alcohols	-OH	$R-OH$
Esters	-OCO-	$R-C \begin{matrix} \nearrow O-R \\ \searrow O \end{matrix}$
Aldehydes	-CHO	$R-C \begin{matrix} \nearrow O \\ \searrow H \end{matrix}$
Ketones	-CO-	$R \begin{matrix} \nearrow \\ \searrow \end{matrix} C=O$
Carboxylic acids	-COOH	$R-C \begin{matrix} \nearrow O-H \\ \searrow O \end{matrix}$
Ethers	-O-	$\begin{matrix} R \\ O \\ R \end{matrix}$
Amines	-NH <sub>2</sub>	$R-N \begin{matrix} \nearrow H \\ \searrow H \end{matrix}$
Amides	-CONH <sub>2</sub>	$R-C \begin{matrix} \nearrow O \\ \searrow N \begin{matrix} \nearrow H \\ \searrow H \end{matrix} \end{matrix}$

## Isomers

- **Structural isomers** - same molecular formula, different arrangement

- **Stereoisomers** - same structural configuration, different orientation
  - **Optical isomers** - chiral centre, 4 groups bonded to C, non-superimposable mirror image
  - **Geometric isomers** - C=C double bond, 2 groups bonded to carbon atoms
    - \* **Cis** - same horizontal plane
    - \* **Trans** - diagonal

