


## UNIT 2 – FUNCTIONAL GROUPS AND PROPERTIES

**VTOC:** [Boiling & Melting Points](#)   [Hydrogen Bonding](#)   [Water Solubility](#)

**UCSD:** [1.4: Functional groups and organic nomenclature](#), [2.3: Non-covalent interactions](#)  
[2.4: The relationship between non-covalent interactions physical properties](#)

### Skills:

- 2A. Identify if one or more of the following functional groups are present in a molecule: (alkane), alkene, alkyne, aromatic, alkyl halide, alcohol, ether, amine, aldehyde, ketone, carboxylic acid
- 2B. Determine the type of IMFs present in a molecule (dispersion, dipole-dipole, and hydrogen bonding forces)
- 2C. Determine relative boiling and melting points of compounds based on structure and IMFs
- 2D. Determine the likely solubility of a molecule based on structure (hydrophobic/hydrophilic). Use the hydrophobic effect to explain the structure and properties of soap and cell membranes

Common Functional Groups in CHM 241:					
Hydrocarbons (only C & H)		C–Y (σ bond to electronegative atom)		Carbonyls (contain C=O)	
Alkane	$R-H$	Alkyl halide	$R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{X}}$	Aldehyde	$\begin{array}{c} \text{:O:} \\ \parallel \\ R-C-H \end{array}$
Alkene	$\begin{array}{c} \diagup \quad \diagdown \\ C=C \\ \diagdown \quad \diagup \end{array}$	Alcohol	$R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{O}}-H$	Ketone	$\begin{array}{c} \text{:O:} \\ \parallel \\ R-C-R \end{array}$
Alkyne	$-C\equiv C-$	Ether	$R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{O}}-R$	Carboxylic Acid	$\begin{array}{c} \text{:O:} \\ \parallel \\ R-C-\overset{\cdot\cdot}{\underset{\cdot\cdot}{O}}H \end{array}$
Aromatic		Amine	$\begin{array}{c} R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{N}}H_2 \\ R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{N}}H-R \\ R-\overset{\cdot\cdot}{\underset{\cdot\cdot}{N}}(R)-R \end{array}$		

Intermolecular Forces (IMFs) from weakest to strongest		
Force	Present in	Arises from
Dispersion	All molecules	Attractions between temporary dipoles due to fluctuations in electron density.
Dipole-Dipole	Polar molecules	Attractions between the positive and negative ends of polar molecules.
Hydrogen Bonding	Molecules with H-F, H-O, or H-N bonds	Strong attractions between small highly positive hydrogen nuclei and lone pairs.