

Take notes while watching the following video tutorials to prepare for the "Polarity & IMF of Molecules Activity".

# Shapes & Interactions Part 2: Electronegativity & Molecular Polarity

## Covalent Bonding – a closer look

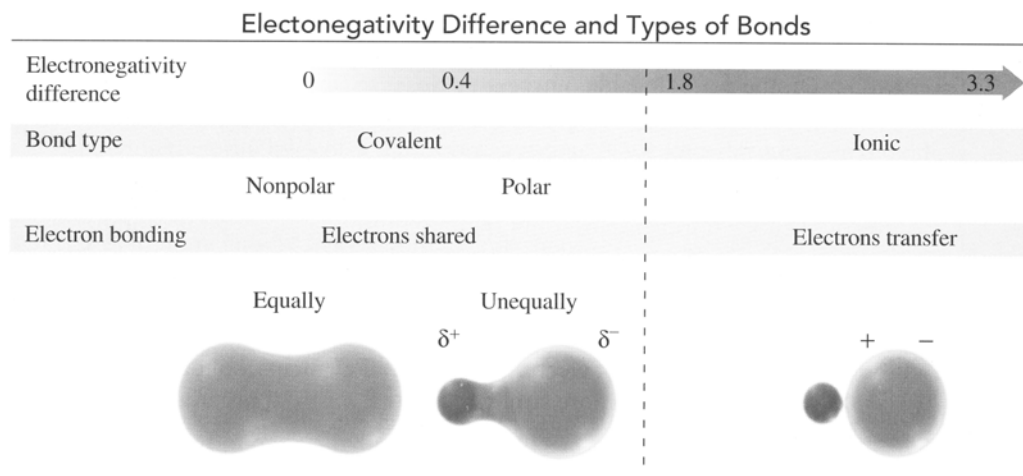
Are e<sup>-</sup>'s shared equally?

Electronegativity

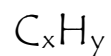
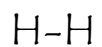
## Trends of Periodic Table

		<div>H 2.1</div>						Group 8A (18)	
Group 1A (1)	Group 2A (2)			Group 3A (13)	Group 4A (14)	Group 5A (15)	Group 6A (16)	Group 7A (17)	
Li 1.0	Be 1.5	B 2.0	C 2.5	N 3.0	O 3.5	F 4.0			
Na 0.9	Mg 1.2	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0			
K 0.8	Ca 1.0	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8			
Rb 0.8	Sr 1.0	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5			
Cs 0.7	Ba 0.9	Tl 1.8	Pb 1.9	Bi 1.9	Po 2.0	At 2.1			

## Electronegativity & Types of Bonds

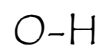
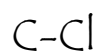


Nonpolar Covalent Bond:

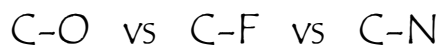


Polar Covalent Bond

Indicate polarity of the following bonds using  $\delta^+/\delta^-$  or dipole moment arrows.



Arrange the following bonds in order of decreasing polarity?



## Molecular Polarity – Depends on 2 factors

1)

2)

Nonpolar Molecule: no distribution of charge or a symmetrical (balanced) distribution of charge

Polar Molecule: an **asymmetrical** (unbalanced) distribution of charge

Examples:

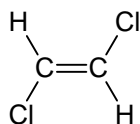
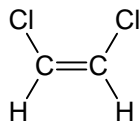
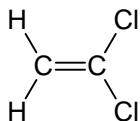
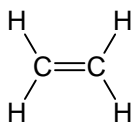
2 atom molecules

3 atom molecules

4 atom molecules

5 atom molecules

Polar or Nonpolar



## Shapes & Interactions Part 3: Intermolecular Forces (IMFs)

Intermolecular Forces =

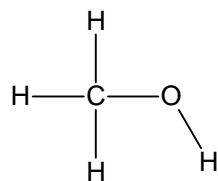
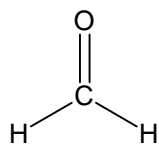
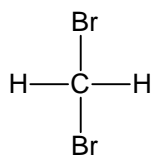
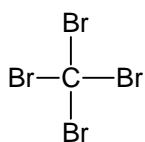
dipole-dipole:

H-bonding:

## London Forces

### Relative Strengths of the IMFs

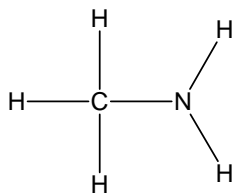
Determine the dominant IMF in each of the following compounds.



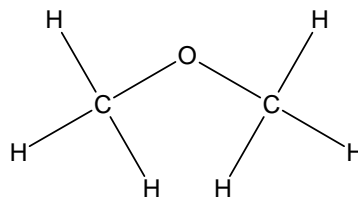


Are the following pure compounds capable of H-bonding?

a)

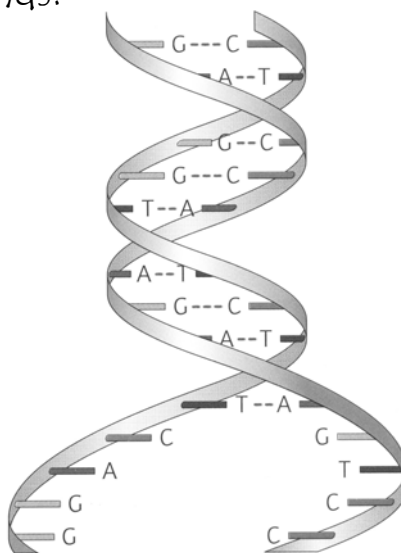


b)

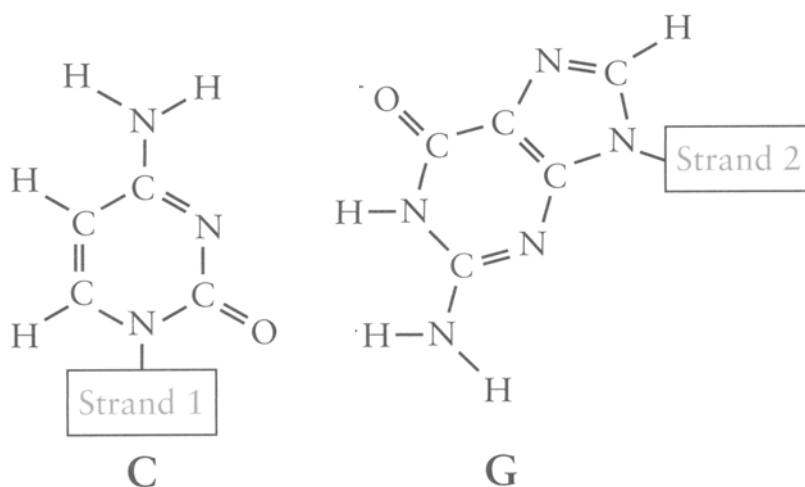


### H-bonding in DNA

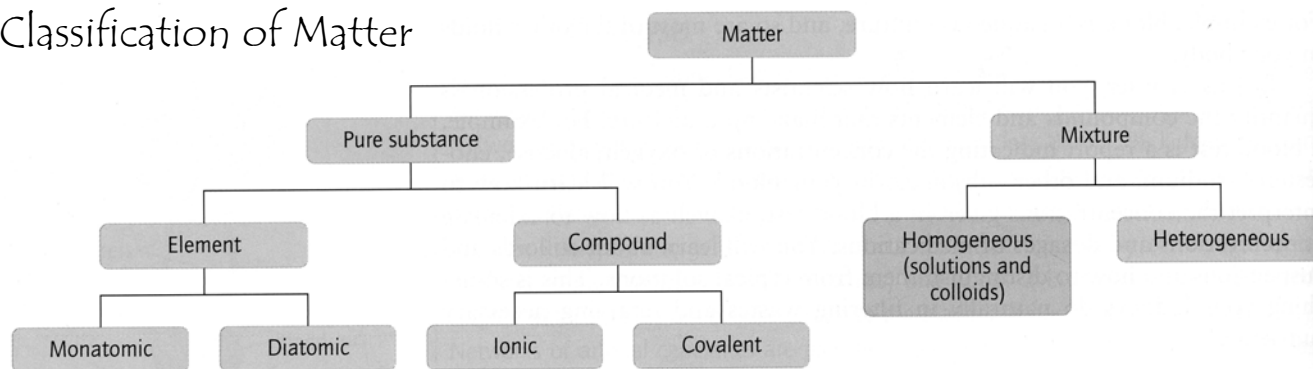
DNA has two strands bound together in the overall shape of a double helix. The two strands are held together by H-bonds formed between atoms on adjacent strands.



Use dashed lines to draw the H-bonds between C and G in the diagram below.



### Classification of Matter



### Mixtures

Heterogeneous Mixture: components are unevenly distributed throughout the mixture

Homogeneous Mixture: components are evenly distributed throughout the mixture

### Solutions

Solute: a substance present in the solution in a lesser amount

Solvent: the substance present in the greatest amount

Classify the following as

- heterogeneous mixture
- homogeneous mixture
- compound
- element.

\_\_\_\_ A colorless gas, only part of which reacts with hot iron.

\_\_\_\_ A cloudy liquid that separates into two layers upon standing.

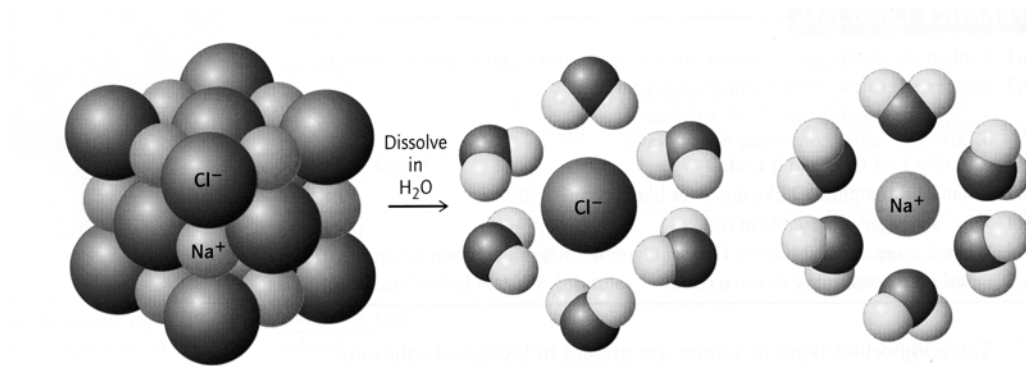
Solution Formation – IMF's between solute & solvent are comparable

## Solubility Rules

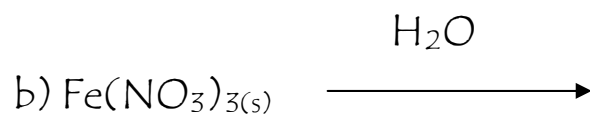
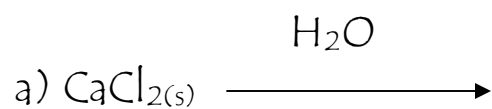
Miscible =

Immiscible =

## Ions as Solutes



Complete the reactions below when the following salts are dissolved in water.



## Molecules as Solutes

### Gases as solutes

Molecules in the gas phase can also dissolve in water.

How does the solubility of gases and solids differ with temperature change?

Which cpd is more soluble in water?



Predict whether the following compounds are soluble in

W = water, O = octane ( $\text{C}_8\text{H}_{18}$ ), or B= both.

- a) ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ )
- b) hexane ( $\text{C}_6\text{H}_{14}$ )
- c) vegetable oil
- d) 1-octanol ( $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ )