

# Solutions

Molarity (M)

Molality (m)

Normality (N)

Mole fraction (x)

# Polarity of compounds

Covalent Bond

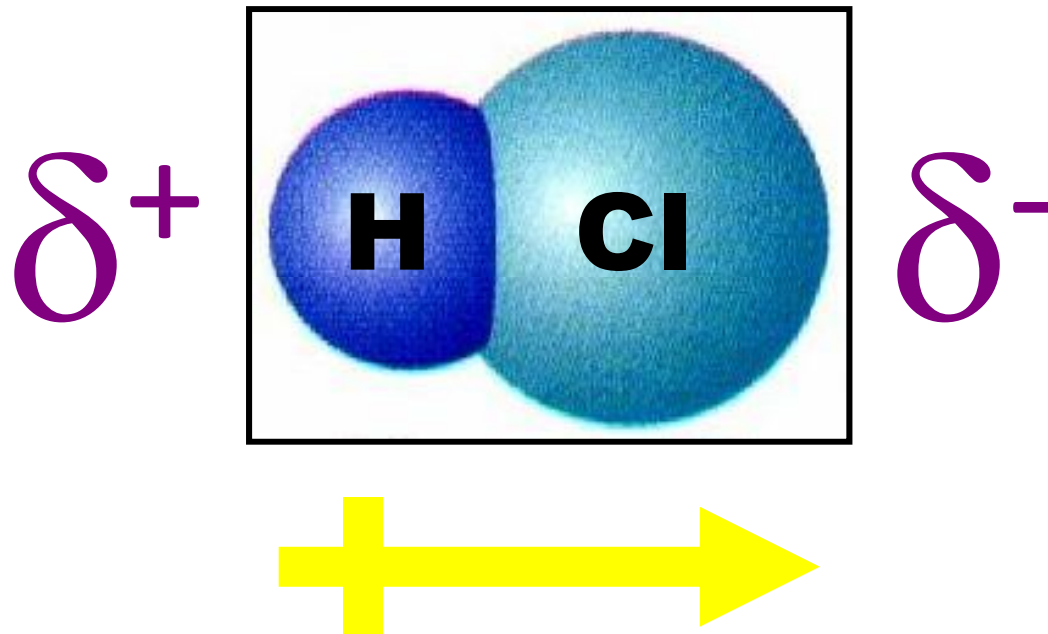
Electronegativity

Polar bond

Symmetry and polarity

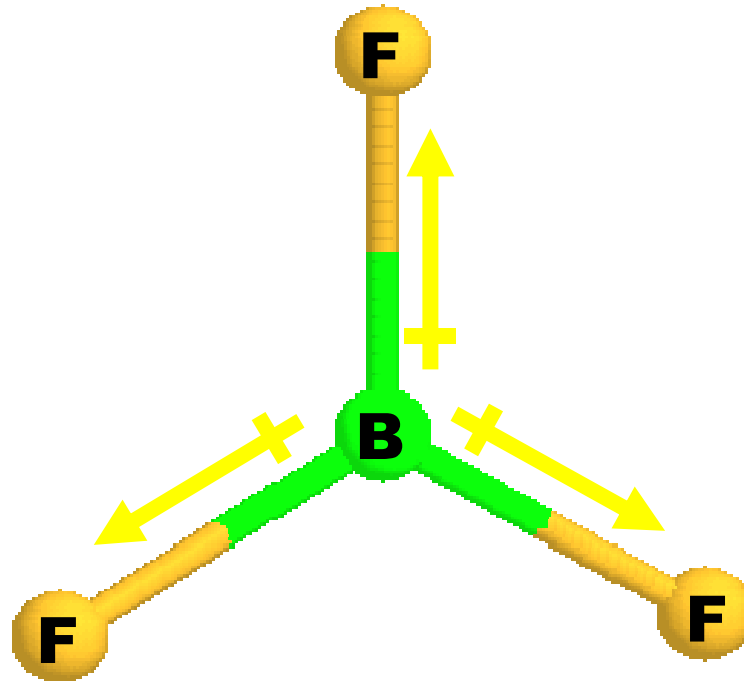
# Dipole Moment

- Direction of the polar bond in a molecule.
- Arrow points toward the more e<sup>-</sup>neg atom.



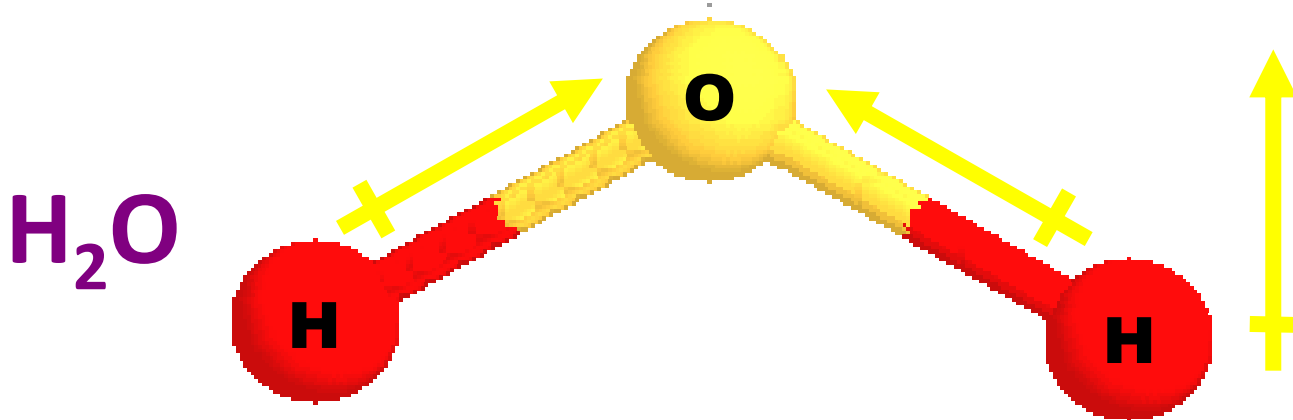
# Nonpolar Molecules

- Dipole moments are symmetrical and cancel out.



# Polar Molecules

- Dipole moments are asymmetrical and don't cancel .
- Molecule has a net dipole moment.



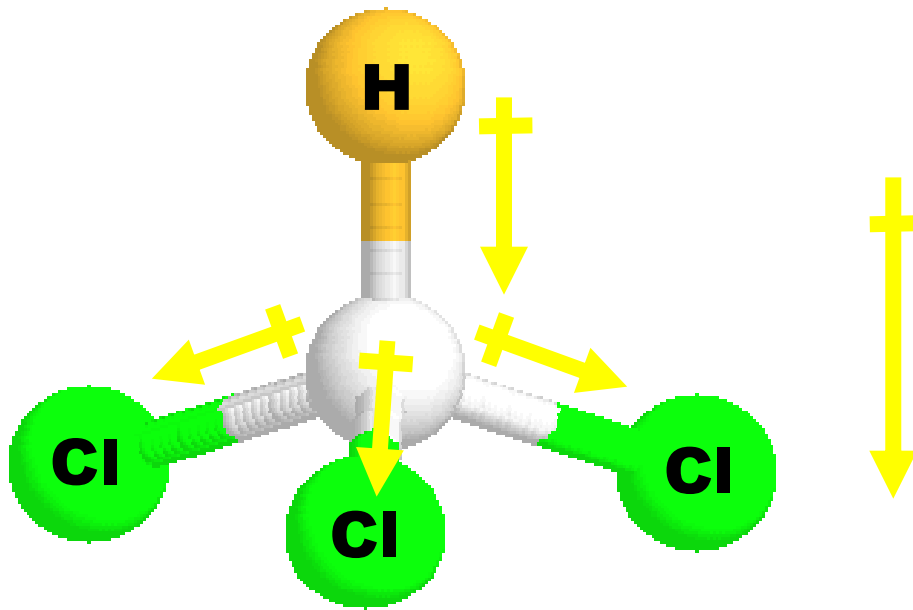
## Polar Bonds vs. Polar Molecules

- The effect of polar bonds on the polarity of the entire molecule depends on the molecule shape
  - carbon dioxide has two polar bonds, and is linear = nonpolar molecule!



# Determining Molecular Polarity

- **Therefore, polar molecules have...**
  - asymmetrical shape (lone pairs) or
  - asymmetrical atoms

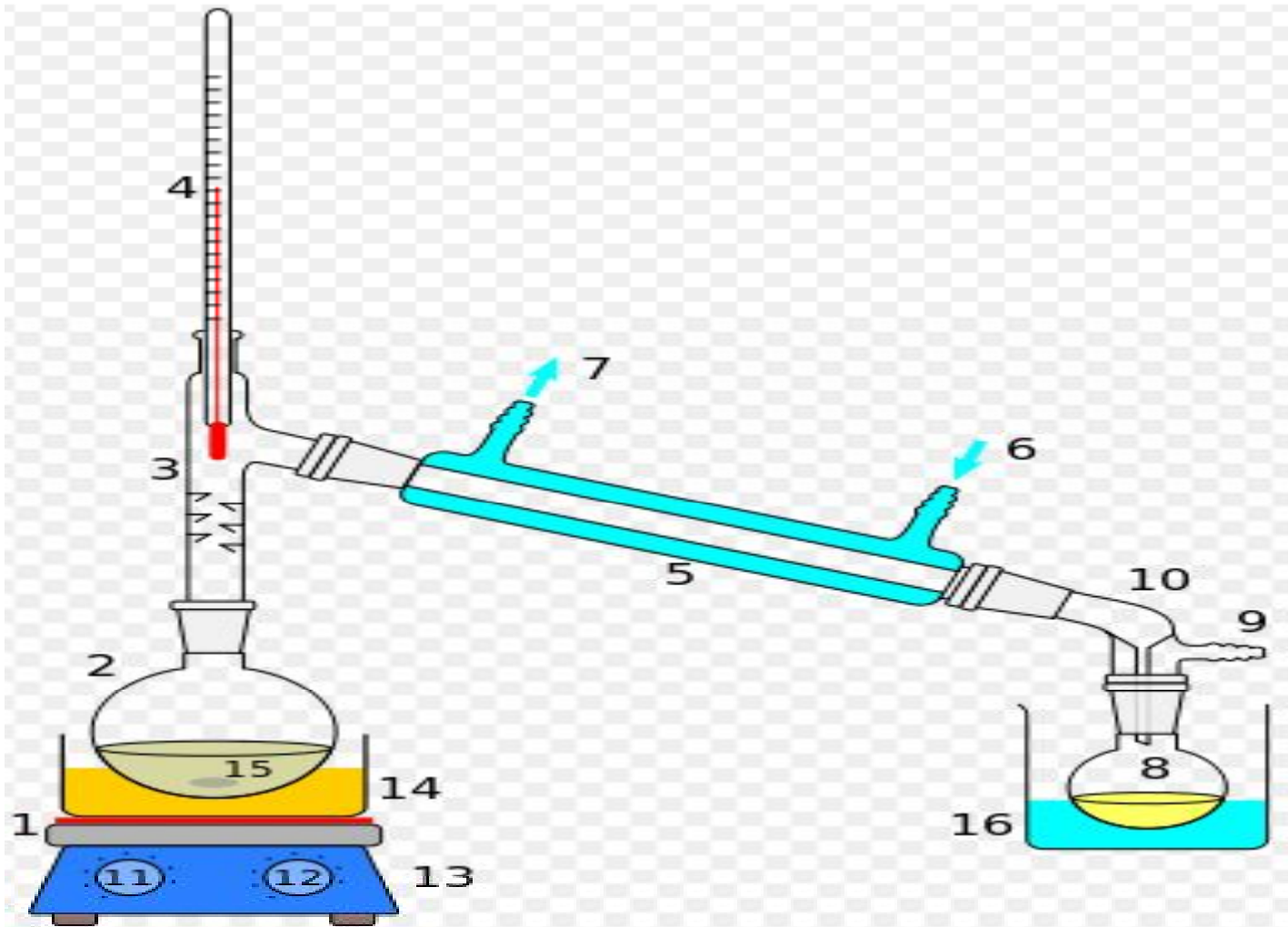


# Raoult's Law

- The common mathematical statement for this behavior is known as Raoult's Law:
- $P_{\text{soln}} = X_{\text{solvent}} P_{\text{solvent}}$
- $P_{\text{soln}}$  is the observed vapor pressure of the solution
- $X_{\text{solvent}}$  is the mole fraction
- $P_{\text{solvent}}$  is the vapor pressure of the pure solvent.



# Distillation



# Soxhlet

