

# Covalent Compounds

Note that compounds is aka a molecule...

## A. Definitions

- A **covalent compound** is formed when two atoms **share e-** (a covalent bond)
  - Occurs between two non-metals
- **Diatomic**: a compound with two atoms
- **Triatomic**: a compound with three atoms
- **Bonding pairs**: e- are shared between two atoms
- **Single bond**: one pair of e- are shared
- **Double bond**: two shared pairs of e-
- **Triple bond**: three shared pairs of e-
- **Lone pairs**: e- on an atom that are not involved in the bond but have an effect of the shape

## B. Structural Formulas

- Diagram where sticks represent bonds between atoms
- Double bonds are shown as = and triple bonds are shown as ≡

## C. Properties of Covalent Compounds

- Can be solid, liquid or gas at room temperature
- Most do not conduct electricity (non-electrolytes)

## D. Electronegativity Scale

- Sharing is not always equal in a bonding pair
- The atom with the higher EN will attract the e- more strongly
- **Dipole**: slight difference in charge across a covalent bond causes the bond to become polar, one atom will be slightly more negative than the other
  - Represent charges with a  $\delta^-$  or  $\delta^+$  sign
- **Polar Bonds**: when a dipole exists, bigger EN difference determines the strength of the bond
- **Polar compounds**: must have an overall dipole that is an EN difference therefore a 3D shape
- Water is the most polar compound
  - A compound with a difference in EN greater than 1.7 is ionic (metal and non-metal)
- **Non polar**: no difference in EN (atoms are identical in EN) sharing is equal  
eg.  $H_2$  H-H       $CCl_4$
- **Ionic character**: a number that is given by the difference in EN text p. 25