**Podcast 5.5: Naming Covalent Compounds**

**What is a covalent bond?**

* Atoms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ one or more electrons with each other to form the bond.
* Each atom is left with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ outer shell.
* A covalent bond forms between two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example C1: Hydrogen + Hydrogen Example C2: 2 Hydrogen + Oxygen

Example C3: Chlorine + Chlorine Example C4: Oxygen + Oxygen

Example C5: Carbon + 2 Oxygen Example C6: Carbon + 4 Hydrogen

*Challenge: What are some other ionic or covalent bonds that can be formed by the elements you see? Write the chemical formula for the compound and its name on a separate piece of paper and attach to this page.*

|  |  |
| --- | --- |
| 1 | mono |
| 2 | di |
| 3 | tri |
| 4 | tetra |
| 5 | penta |
| 6 | hexa |
| 7 | hepta |
| 8 | octo |
| 9 | nono |
| 10 | deca |

-ide ending, each element has “prefix”

* prefix refers to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_ – NOT CHARGE

N2O4 =

* Exception: drop mono- for \_\_\_\_\_\_\_\_element

CO2 =

* The first vowel is often dropped to avoid the combination of “\_\_\_\_\_\_\_” or “\_\_\_\_\_\_\_”.

CO =

P4O10 =

SO2 =

Example: Name the following covalent compounds.

1. CCl4
2. P2O3
3. IF7

Writing Formulas from Names

1. Identify the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ involved
2. Use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_to write the formula

Examples:

1. Nitrogen dioxide
2. Dinitrogen trioxide
3. Tetraphosphorous decoxide
4. Xenon tetrafluoride

WARNING!!! \*\*Decide whether the compound is ionic or covalent BEFORE trying to name it or write it’s formula!

Example: Fe2O3 is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or iron (III) oxide, NOT di-iron trioxide

**MEMORIZE THIS ONE:**

NH3 is called \_\_\_\_\_\_\_\_\_\_\_. Nitrogen trihydride is OK, but it already has a name

**Podcast 5.6: Molecular Structures**

Molecular Compounds

* Molecule
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_ group of atoms joined together by covalent bonds
* Covalent Bond
  + Sharing of electrons between two or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Molecular Formulas

* Represents how many atoms of each element are in the compound
  + Cannot be determined by the \_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_\_\_ Method
  + Can be determined by creating a structural (Lewis dot) formula
* Octet Rule
  + Atoms still tend to attain the electron configuration for a \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ by sharing electrons

Structural Formula

* Shows the arrangement of covalently bonded atoms using \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as bonds (shared electrons) and \_\_\_\_\_\_\_\_\_\_\_\_\_ as unshared electrons
* Example – Hydrogen

(Lewis Dot Structure)

* Creates an electron configuration of \_\_\_\_\_\_\_\_\_\_\_\_\_ (noble gas) for both hydrogens by sharing the electrons

(Structural Formula)

Shared electrons represented by a dash

Drawing Structural Formulas – Steps

1) Count the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the compound

ex. CH4 (methane)

2) Arrange the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is NEVER in the middle
* Elements with only one atom are typically in the middle and usually written \_\_\_\_\_\_\_\_\_\_\_\_\_ in the formula

3) Fill in electrons, starting around the \_\_\_\_\_\_\_\_\_\_\_ atom(s) until all your valence electrons are used.

4) Draw \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (dashes) for any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_electron pairs and leave all unshared electrons where they are.

Drawing Structural Formulas – Now Try These

* + H2O
  + F2
  + NH3

Bond Order

* Single Bond
  + Two atoms held together by sharing \_\_\_\_\_\_ electrons (1 pair)
* Double Bond
  + Two atoms held together by sharing \_\_\_\_\_\_ electrons (2 pairs)
* Triple Bond
  + Two atoms held together by sharing \_\_\_\_\_\_ electrons (3 pairs)
* Double and triple bonds NEVER form with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!!
* Examples
* Double and triple bonds are needed sometimes to satisfy the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rule for all the atoms in the compound.

Exceptions to Octet Rule (Page 228)

* + For small atoms, like Boron
    - BF3
  + For some atoms in the 3p-block that have access to d-orbitals and can be \_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_
    - PCl5 or SF6

Molecular Shape

* Compounds are \_\_\_\_\_\_\_\_\_\_\_\_\_\_-DIMENSIONAL
* \_\_\_\_\_\_\_\_\_\_\_\_
  + Valence-Shell Electron-Pair Repulsion Theory
  + The negative charge on electrons \_\_\_\_\_\_\_\_\_ each other creating molecular shapes where the electrons are as far away from each other as possible.

Common Shapes

* Tetrahedral (Angle – 109.5⁰)
* Trigonal Pyramidal
* Bent
* Linear
* Trigonal Planar
* There are others – page 233