**4.2 Names and Formulas of Chemical Compounds** Date:

***WARM UP!****Counting Atoms Practice*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Formula* | *# of Atoms* |  | *Formula* | *# of Atoms* |
| *NaCl* |  |  | *Mg(OH)2* |  |
| *HNO3* |  |  | *(NH4)2O* |  |
| *H2SO4* |  |  | *NH4NO3* |  |

**Complex and Simple Ions**

* **Simple Ions**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

H+ S-2 Cu+1 Cu+2

* **Complex Ions**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Called ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

SO4-2 NO3-1 NH4+1

Remember…

* ALL ELEMENTS WANT TO HAVE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The combining capacity (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) tells you how many electrons have to be lost/gained to get a full outer shell

**Ionic Compounds**

* Always involve a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Electrons are always \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because losing and gaining electrons (charges result)

**Covalent Compounds**

* Always involves 2 or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Electrons are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Occurs in all diatomic molecules
* **DO NOT form ions!**

**Naming Ionic Compounds**

Only 2 elements:

* Metal always first; name never changes
* Non-metal second; ending becomes “ide” (see page 186 and data booklet)

EX:

NaCl = MgF2 = Al2O3 =

**Making Ionic Compounds**

1. Get symbol and charge
   * Charges are the same skip to step 2
   * If charges are different “**swap and drop”**
2. Combine

Eg. Sodium chloride Magnesium oxide Aluminum fluoride Magnesium nitride

**Naming Multivalent Ionic Compounds**

* **Multivalent** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ion charge)
* Same naming as Ionic Compounds
* **BUT** use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to show which combining capacity is used
* Mostly found in the ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** section

I II III IV V VI VII VIII

+1 +2 + 3 +4 +5 +6 +7 +8

**Making Multivalent Ionic Compounds (Roman Numeral given)**

1. Get appropriate ion (from Roman Numeral)
   * Charges are the same skip to step 2
   * If charges are different “**swap and drop”**
2. Combine

Eg. Manganese (IV) sulfide Cobalt (III) oxide Cobalt (II) oxide

**Naming Multivalent Ionic Compounds** (no Roman Numeral given)

1. Write the options
2. Determine which pairing will give the correct formula
3. Write the name same as you did with Binary Ionic Compounds
4. Add the appropriate Roman Numeral **between** the metal and non-metal

Eg. Au3N FeO Fe2O3

**Naming Polyatomic Ionic Compounds**

* Found in Data Booklet and page 192
* Usually seen in more complicated compounds

1. Look up both names
2. Check for Roman Numerals
3. Combine

Endings NEVER change!

Eg. NH4CH3COO (NH4)2SO4  FeSO3

**Making Polyatomic Ionic Compounds**

1. Get symbol and charge
   * If same skip to step 2
   * If different “swap and drop”
2. Combine – use brackets if need be for polyatomic ions ONLY

Eg. Manganese (III) chlorate Ammonium sulfate

**Naming Covalent Compounds**

1. Name first element

**IF first atom is 1 DO NOT add “mono”**

1. Name second element with “ide” ending
2. Add any needed prefixes

**Prefixes**

**Prefix # Atoms**

Mono 1

**Change any “oo” to “o”**

**I.E. monooxide = monoxide**

Di 2

Tri 3

Tetra 4

Penta 5

Hexa 6 Eg. CO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hepta 7 N2O3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Octa 8 CS2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Nona 9 CCl4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Deca 10 P4O10 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Making Covalent Compounds**

1. Write each symbol
2. Add any subscripts using prefixes

Eg. Nitrogen tribromide dichlorine monoxide

**Naming Covalent Compounds With Hydrogen**

* Memorize:
  + CH4 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + NH3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + H2O = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Naming Covalent Compounds With Hydrogen**

* + HF = hydrogen fluoride
  + HCl = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + HBr = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + HI = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* But when dissolved in water they become acids:
  + HF(aq) = hydrofluoric acid
  + HCl(aq) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + HBr(aq) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + HI(aq) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Summary**

IONIC

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

“ide” endings

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = Roman numerals

Polyatomics = brackets

COVALENT

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons
  + Two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

“ide” endings

prefixes