Chemical Names

Writing Chemical Names

Binary Ionic Compounds: These compounds will be composed of a metal and a non-metal. There will only be 2 different atoms in each compound.

Rules

1. Name the cation first and then the anion
2. Name the cation (metal) directly from the periodic table.
3. Name the anion (non-metal) but drop the ending and end the name in “ide”.

**These rules are only for Group 1, 2 and 13 metals. There will be another set of rules for the Transition Metals!!!

Examples

Chemical Formula	Name of Ionic Compound
1. H_2S	Hydrogen sulfide
2. NaCl	Sodium chloride
3. $MgBr_2$	Magnesium bromide
4. KCl	Potassium chloride
5. Na_2S	Sodium sulfide

Here are some examples of common roots (endings):

Cl → chlor - ide

F → fluori - ide

Br → brom - ide

O → ox - ide

I → iod - ide

N → nitr -ide

Activity #1

Name the binary ionic compounds

1. MgS – Magnesium sulphide
2. KBr – Potassium bromide
3. Ba_3N_2 – Barium nitride
4. Al_2O_3 – Aluminum oxide
5. NaI – Sodium iodide

6. SrF_2 – Strontium fluoride
7. Li_2S – Lithium sulphide
8. $RaCl_2$ – Radium chloride
9. CaO – Calcium oxide
10. AlP – Aluminum phosphide

11. K_2S – Potassium sulphid
12. BiBr – Bismuth bromide
13. Sr_3P_2 - Strontium phosphide
14. $BaCl_2$ – Barium chloride
15. NaBr – Sodium bromide
16. MgF_2 – Magnesium flouride
17. Na_2O – Sodium oxide
18. SrS – Strontium sulphide
20. AlN – Aluminum nitride

Binary Molecular (Covalent) Compounds

These compounds will be composed of two **non-metals.**

There will only be 2 different atoms in each compound.

Rules

When naming these compounds you will need to know (and memorize) the Greek prefixes:

Number of Atoms	Prefix	Number of Atoms	Prefix
1	Mono	6	Hexa
2	Di	7	Hepta
3	Tri	8	Octa
4	Tetra	9	Nona
5	Penta	10	Deca

- *Note: when the addition of the Greek prefix places two vowels adjacent to one another, the "a" (or the "o") at the end of the Greek prefix is usually dropped; e.g., "nonaoxide" would be written as "nonoxide", and "monooxide" would be written as "monoxide". The "i" at the end of the prefixes "di-" and "tri-" are never dropped.*

The names of these compounds will take this form:

prefix first non-metal prefix second non-metal

Remember: the name must end in “ide”

and if there is only one element named first “mono” is not included

Examples

Chemical Formula	Name of the Molecular Compound
1. N_2O	Dinitrogen monoxide
2. NO_2	Nitrogen dioxide
3. IF_7	Iodine heptafluoride
4. N_2O_5	Dinitrogen pentoxide
5. XeF_2	Xenon difluoride

1) As_4O_{10} - tetrarsenic decoxide
2) BrO_3 – Bromine trioxide
3) BN – Boron mononitride
4) N_2O_3 - Dinitrogen trioxide
5) NI_3 – Nitrogen triiodide
6) NO_2 – Nitrogen dioxide
7) XeF_4 – Xenon tetraflouride
8) PCl_3 – Phosphorous trichloride
9) CO – Carbon monoxide
10) PCl_5 – Phosphorous pentachloride

11) P_2O_5 – Diphosphorous pentoxide

12) S_2Cl_2 – Disulphur dichloride

13) ICl_2 – Iodine dichloride

14) SO_2 – Sulphur dioxide

15) P_4O_{10} – Tetraphosphorous decoxide

16) OF_2 – Oxygen diflouride

17) ClO_2 – Chlorine dioxide

18) SiO_2 – Silicon dioxide

19) BF_3 – Boron triflouride

Nitrogen Triioxide (Nitroglycerin)

http://www.metacafe.com/watch/787410/nitroglycerin_and_nitrogen_triiodide/

A Special case for Ionic Naming - Stock System

- The Stock System is used only if the metal element in the compound may have more than one charge. Example: Iron can form ions that have a charge of 2+ or 3+.
- In this system, the valence of the metal element is indicated by using a Roman numeral in parenthesis following the name for the metal.
- Example: Iron (II) for a valence of 2+ and Iron (III) for a valence of 3+.

Example: Fe_2O_3

1. The non-metal ion, oxygen, has a charge of O^{2-}. As there are three oxide ions in the formula, the total negative charge in the compound is -2 x 3 = -6.

2. The positive ions must have a charge equal to the charge of negative ions to give the compound a net charge of zero. The charge on the ion must be +6 (? x 2 = +6).

3.Since there are two iron ions shown, the valence on the iron is +3. The name of the compound is iron (III) oxide.

Example: PbS_2

- Total negative ions is 2- x 2 = 4-.
- Therefore total positive ions must equal 4+ (? x 1 = 4+). Since there is only one lead ion, the valence on the lead is 4.
- The name of the compound is lead (IV) sulfide.

Writing Chemical Names

- 1. HgF_2 – Mercury (II) flouride
- 2. KCl - Potassium chloride
- 3. PF_5 - Phosphorous pentaflouride
- 4. KF – Potassium flouride
- 5. HCl – hydrogen chloride
- 6. $SbCl_3$ – Antimony (III) chloride
- 7. As_4O_{10}- Tetrarsenic decoxide
- 8. LiI – Lithium iodide
- 9. HBr – Hydrogen bromide
- 10. IF_5 - Iodine pentaflouride

- 11. CCl_4
- 12. Na_2O
- 13. IF_6
- 14. BaF_2
- 15. CO_2
- 16. MgO
- 17. Mg_3P_2
- 18. P_2O_5
- 19. Ca_3N_2
- 20. Li_2S

Extra Practice

1) NiO – Nickel (II) oxide
2) Sn_3N_2- Tin (II) nitride
3) $PbCl_4$- Lead (IV) chloride
4) Pb_3P_2 – Lead (II) phosphide

Writing Formulas for Ionic Compounds using the Criss-Cross Method

- Rule 1: Write the symbol of the **metallic** element **first**. The **nonmetal** is written **second.**
- Rule 2: Place the ionic charge number (valence number) of one element at the base (as a subscript) of the other element.
- Rule 3: If a subscript has a value of one, leave it out.

Examples

1) Beryllium and chlorine

2) Magnesium and sulfur

Ionic Compound Forming Questions

- Answer key in Word Document

Polyatomic Ions

- If you ever see an ending that does not end in –ide, you know you have a polyatomic ion (ex: **-ate, -ite**)
- Polyatomic ions are ions (something that has a charge) that contain **more than one atom**
- You always look on your common ion chart to find the charges of these

Naming Examples:

i) $NaNO_3$

ii) K_2CO_3

iii) $Mg(HS)_2$

iv) $AgNO_2$

v) $Pb(C_2H_3O_2)_4$

Compound Forming Examples

i) calcium carbonate

ii) ammonium chloride

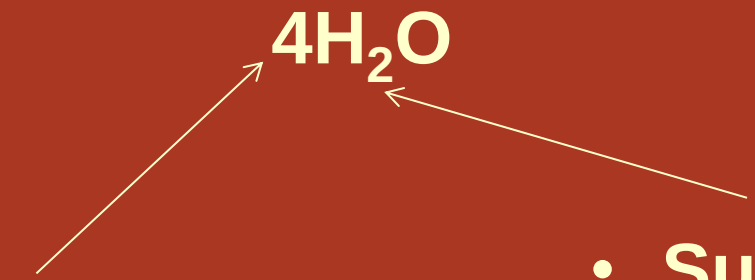
iii) iron(III) nitrate

iv) silver phosphate

Do Polyatomic Worksheet

- Answer key in word file

Balancing Chemical Equations



Coefficient – the number in front of a compound that tells me how many molecules or formula units of that compound there are.

- **Subscript** – the little number beside an atom that tells us how many of that atom is in the compound.

Balancing Equations Questions Answers

1) $4Na + O_2 \rightarrow 2Na_2O$

2) $2K + Cl_2 \rightarrow 2KCl$

3) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

4) $P_4 + 5O_2 \rightarrow P_4O_{10}$

5) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

6) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

7) $2C_3H_6 + 9O_2 \rightarrow 6CO_2 + 6H_2O$

8) $CaCO_3 \rightarrow CaO + CO_2$

9) $F_2 + 2LiCl \rightarrow 2LiF + Cl_2$

10) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Conservation of Mass

The reason that equations always balance is because of the Law of Conservation of Mass. It simply states that we ca not create or destroy matter. Whatever we start with we have to finish with that much. If we begin with 10 oxygen atoms we must end with 10 oxygen atoms.

Classifying Chemical Reactions

1) Single replacement

- One element replaces an ion in a compound to make a new free element and a new compound.

$A + BC \rightarrow AC + B$ or

$A + BC \rightarrow BA + C$

A metal must switch places with another metal and a non-metal must switch places with another non-metal.

2) Double replacement

- Two compounds trade elements to make two new compounds.

$AB + CD \rightarrow AD + BC$

- Remember a positive ion combines with a negative ion and we write the metal first.

3) Synthesis

- Two elements (or polyatomic ions) combine to form a new compound.

$A + B \rightarrow AB$

4) Decomposition

- A compound breaks up into its elements.
- The opposite of synthesis
- Remember HOFBrINCl

AB → A + B

5) Combustion

- A hydrocarbon combines with oxygen to form carbon dioxide and water.