Polyatomic Ions

A group of atoms with an overall charge.

NH_4^+	ammonium	OH^-	hydroxide
ClO_3^-	chlorate	ClO_2^-	chlorite
NO_3^-	nitrate	NO_2^-	nitrite
CO_3^{2-}	carbonate	CN^-	cyanide
SO_4^{2-}	sulfate	SO_3^{2-}	sulfite
PO_4^{3-}	phosphate	PO_3^{3-}	phosphite
HCO_3^-	hydrogen carbonate (bicarbonate)		

Naming Ternary Compounds

- Contain at least 3 elements
- Name the nonmetals as a polyatomic ion
- Examples:

$NaNO_3$	Sodium nitrate
K_2SO_4	Potassium sulfate
$Al(HCO_3)_3$	Aluminum bicarbonate or Aluminum hydrogen carbonate

Learning Check

Name the following:

A. Na_2CO_3

$MgSO_3$

$MgSO_4$

B. $Ca(HCO_3)_2$

$CaCO_3$

$Ca_3(PO_4)_2$

Solution

A. Na_2CO_3 3) sodium carbonate

$MgSO_3$ 1) magnesium sulfite

$MgSO_4$ 2) magnesium sulfate

B. $Ca(HCO_3)_2$ 3) calcium bicarbonate

$CaCO_3$ 1) calcium carbonate

$Ca_3(PO_4)_2$ 2) calcium phosphate

Learning Check

A. aluminum nitrate

B. copper(II) nitrate

C. Iron (III) hydroxide

D. Tin(IV) hydroxide

Solution

A. aluminum nitrate

$Al(NO_3)_3$

B. copper(II) nitrate

$Cu(NO_3)_2$

C. Iron (III) hydroxide

$Fe(OH)_3$

D. Tin(IV) hydroxide

$Sn(OH)_4$

Naming Binary Covalent Compounds

Two nonmetals

- **Name each element**
- **End the last element in -ide**
- **Add prefixes to show more than 1 atom**

Prefixes

mono	1	hexa	6
di	2	hepta	7
tri	3	octa	8
tetra	4	nona	9
penta	5	deca	10

Learning Check

Fill in the blanks to complete the following names of covalent compounds.

CO	carbon _____oxide
CO_2	carbon _____
PCl_3	phosphorus _____chloride
CCl_4	carbon _____chloride
N_2O	_____nitrogen _____oxide

Solution

CO	carbon monoxide
CO_2	carbon dioxide
PCl_3	phosphorus trichloride
CCl_4	carbon tetrachloride
N_2O	dinitrogen monoxide

Learning Check

A. P_2O_5

B. Cl_2O_7

C. Cl_2 (be careful!)

Solution

A. P_2O_5 3) diphosphorus pentoxide

B. Cl_2O_7 1) dichlorine heptoxide

C. Cl_2 1) chlorine

Compound Names and Formulas

NAMING IONIC COMPOUNDS

- Ionic compounds are formed by the strong attractions between cations and anions. Both ions are important to the compound's structure, so it makes sense that both ions are included in the name.

- **Name the cation first (metal) then the anion (nonmetal)**
- **Drop the end of the anion and add the suffix *–ide***
  - **NaCl = sodium chlor<u>ide</u>**

MORE NAMING PRACTICE

cation	anion	Balance formula	Compound name
Cs^{+1},cesium	F^{-1},fluorine	CsF	Cesium Fluoride
Ba^{+2}, barium	Cl^{-1},chlorine	$BaCl_2$	Barium chloride
Al^{+3}, aluminum	S^{-2}, sulfur	Al_2S_3	Aluminum sulfide

NAMING COVALENT COMPOUNDS

- **Use prefixes to name compounds of two elements**

For two element covalent compounds, numerical prefixes tell how many atoms of each element are in the molecule. If there is only one atom of the first element, it does not get a prefix.

Which ever element is farthest to the right in the periodic table is named second and ends in *–ide*

BF_3= boron trifluoride

Dihydrogen monoxide = ????

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

Dihydrogen Monoxide!!!!!!!

Why????

DHMO KILLS

Dangers:
- Death by inhalation
- Corrodes metals
- Bloating & nausea
- Electrical short-circuit
- Tissue damage & burns
- Soil erosion
- Brake failure
- Disaster & destruction

Uses:
- Animal research
- Abortion clinics
- Nuclear plants
- Chemical warfare
- Performance enhancers
- Torture
- Cult rituals
- Fire suppression

Places:
- Cancerous tumors
- Cleaning solvents
- Prisons & hospitals
- Acid rain
- Pharmaceuticals
- Lakes & streams
- Industrial waste
- Baby food & beer

Ban Dihydrogen Monoxide

©DHMO.org

BAN

DIHYDROGEN MONOXIDE

The Invisible Killer

NO DHMO

©DHMO.org

MORE NAMING PRACTICE

- COVALENT:
  - NO
  - NO_2
  - N_2O
- IONIC:
  - NaF
  - ZnCl
  - $CaCl_2$

Try these covalent molecules…

- CO Carbon monoxide
- CO_2 Carbon dioxide
- N_5H_8 Pentanitrogen octahydride
- $TeBr_2$ Tellurium dibromide
- Si_3S_7 Trisilicon heptasulfide

THE NAME GAME

What's in a name???

How many people can you "bond" with!?

- You must turn in to me a piece of paper with…

1. Your element and it's oxidation number
2. A total of 6-7 BINARY IONIC COMPOUND formulas
3. AND the name of the compounds

Your Ion	What you're bonding with	Chemical Formula	Name
Fe^{+2}	O^{-2}	FeO	Iron Oxide

Write the correct ionic formulas and names for the following:

1. Na + Cl
2. Mg + F
3. Fe^{+3} + S
4. NH_4^+ + P
5. Ca + NO_2^-

Name the following compounds:

1. N_5H_8
2. $TeBr_2$
3. Si_3S_7
4. MgS
5. $MoCl_2$

Write the correct ionic formulas and names for the following:

1. Na + Cl _____ _____
2. Mg + F _____ _____
3. Fe^{+3} + S _____ _____
4. NH_4^+ + P _____ _____
5. Ca + NO_2^- _____ _____

Name the following compounds:

1. N_5H_8 _____
2. $TeBr_2$ _____
3. Si_3S_7 _____
4. MgS _____
5. $MoCl_2$ _____

PHYSICAL CHANGES

Occur when the size or shape of the substance is changed

Occasionally, the color can change, too

Regardless, **the original substance(s) do not change**

Evidences of Physical Changes:

- Bending, stretching, heat, and cooling can all cause a physical change
- All phase changes are physical changes

CHEMICAL CHANGES

Occurs when there is a change in the arrangement of atoms so that a different substance with different properties is produced

Very often, there is some kind of evidence (*for example, the formation of a gas*)

EVIDENCE OF A CHEMICAL CHANGE

1. Formation of a gas
2. Reaction with acids

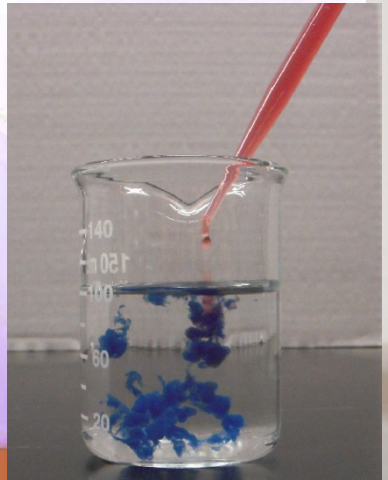
(like this picture of copper reacting with nitric acid)

3. (Sometimes) a color change can indicate a chemical change. A good example of this is metal tarnishing

Is a neutralization reaction a chemical change?

EVIDENCE OF CHEMICAL REACTIONS

1. Bubbles/fizzing/formation of a gas
2. Precipitate formed
3. Energy change
4. Color change
5. Odor…



FRIDAY 10/16 - BELLRINGER

1. **What is the main difference between a chemical and physical change?**

2. **If a reaction forms a gas, you know it is a _____ change.**

3. **If something changes color, you *know* it's a chemical change. True False**

4. **Name four evidences of a chemical reaction.**