

Unit 5 – Chemical Structures
 Learning Target Write and Name Ionic Compounds
Ionic Compounds

Trend 2 Ionization Energy

Valence Electrons:
 Outermost Energy Shell (n)

Na: 11+ / 11- with shells 2, 8, 1
 Cl: 17+ / 17- with shells 7, 8, 2

Simple Ions.

Cation: Positive Ion Metal loses an electron.

Na atom → Na⁺ ion (Loses an electron)

Just Remember... “Plussy Cat”

Simple Ions.

Anion: Negative Ion Nonmetal gains an electron.

Cl atom → Cl⁻ ion (Gains an electron)

Just Remember... “Ant-ion”

Trend 2 Ionization Energy

Valence Electrons:
 Outermost Energy Shell (n)

Na: 11+ / 11- with shells 2, 8, 1
 Cl: 17+ / 17- with shells 7, 8, 2

Trend 2 Ionization Energy

Valence Electrons:
 Outermost Energy Shell (n)

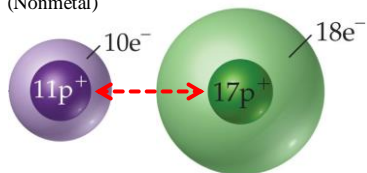
Na: 11+ / 10- with shells 2, 8
 Cl: 17+ / 18- with shells 8, 8, 2

OCTET Filled
 But now we have a CHARGED ATOM

Opposites Attract

Cation + **Anion** = **Ionic Compound**

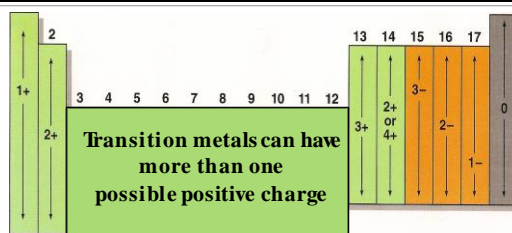
(Metal) (Nonmetal)



Na⁺ ion

Cl⁻ ion

Ion (+/-) Trend



Ionic Compounds

Ionic Compounds are

NEUTRAL

(zero charge)

POSITIVE charge = **NEGATIVE** charge

Rules for Ionic Compounds

Cation is written first.

Anion is written last.

Use element name

Element root + "...ide"

Na⁺¹ Sodium

F⁻¹

Fluoride

Ca⁺² Calcium

Cl⁻¹

Chloride

Al⁺³ Aluminum

Br⁻¹

Bromide

Fe⁺² Iron (II)

O⁻²

Oxide

Fe⁺³ Iron (III)

S⁻²

Sulfide

Cu⁺² Copper (II)

N⁻³

Nitride

Cu⁺⁴ Copper (IV)

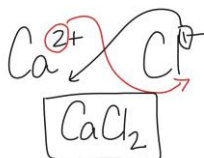
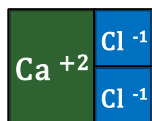
P⁻³

Phosphide

Criss-Cross Rule

Ionic Compounds are **NEUTRAL**
POSITIVE charge = **NEGATIVE** charge

Calcium Ca⁺²
 Chlorine Cl⁻¹



Calcium chloride

Binary Compounds.

Potassium and Chlorine REACT!!!

Potassium (K⁺¹) reacts with Chlorine (Cl⁻¹)
 creating **POTASSIUM CHLORIDE (KCl)**

Calcium and Bromine REACT!!!

Calcium (Ca⁺²) reacts with Bromine (Br⁻¹)
 creating **CALCIUM BROMIDE (CaBr₂)**

Compound Practice

Sodium Chloride

Potassium Iodide

Calcium Fluoride

Iron (II) Oxide

NaCl

MgS

BaCl₂

Fe₂O₃

Goldenrod Ion Page

Element Cations

Element	Charge
Alkali metals (1A), Silver	+1
Alkaline Earths (2A), Zinc, Cadmium	+2
Aluminum, Gallium, Indium (3A)	+3
All other Metals	
<i>Roman Numerals give the charge</i>	
(I) +1	(VI) +6
(II) +2	(VII) +7
(III) +3	(VIII) +8
(IV) +4	(IX) +9
(V) +5	(X) +10

Element Anions

Element	Charge
Fluorine, Chlorine, Bromine, Iodine (7A)	-1
Oxygen, Sulfur, Selenium (6A)	-2
Nitrogen, Phosphorous (5A)	-3

Compound Practice Answers

Sodium Chloride

Magnesium sulfide

Barium chloride

Iron (III) oxide

Potassium Iodide

Calcium Fluoride

Iron (II) Oxide

NaCl

MgS

BaCl₂

Fe₂O₃

KI

CaF₂

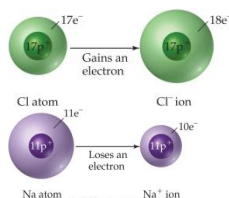
FeO

Unit 4 – Chemical Structure

Polyatomic Ionic Compounds

Polyatomic Ions.

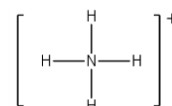
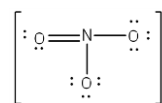
Ionic Compound: Cation (+) charges attract Anion (-) charges.



Gain or Lose
Electrons to
fill **OCTET RULE**

Polyatomic Ions.

Polyatomic Ion



When **two (or more) nonmetals** SHARE electrons to fill the **OCTET RULE** but end up with a positive or negative charge.

These polyatomic ions will attract other (+) and (-) ions.

Polyatomic Matrix

General Chemistry Unit 5 (Ionic Compounds) Polyatomic Ions

	Nitrate	Hydroxide	Sulfate	Carbonate	Phosphate
Sodium					
Calcium					
Aluminum					
Copper (II)					
Iron (III)					

Polyatomic Ionic Compounds

Sodium (Na^{+1})	Nitrate (NO_3^{-1})
Calcium (Ca^{+2})	Hydroxide (OH^{-1})
Aluminum (Al^{+3})	Sulfate (SO_4^{-2})
Copper (II) (Cu^{+2})	Carbonate (CO_3^{-2})
Iron (III) (Fe^{+3})	Phosphate (PO_4^{-3})

Polyatomic Compound Practice

Potassium hydroxide	KOH
Sodium nitrate	NaNO_3
Lithium sulfate	Li_2SO_4
$\text{Mg}_3(\text{PO}_4)_2$	Magnesium phosphate
KSCN	Potassium thiocyanate
NH_4Cl	Ammonium chloride

Wednesday December 11

PREPARE
for your Ionic Compound
QUIZ

Ionic Compounds Quiz 2013

- Cation vs. Anion
 - What is the difference between cations and anions?
 - Cation: (+) Anion: (-)
 - Cation: Metal Anion: Nonmetal

Ionic Compounds Quiz 2013

- Cation vs. Anion
 - Explain what causes the differences between the ions.
 - Cation: Lose e^- Anion: Gain e^-
 - Cation: $\leq 3 ve^-$ Anion: $\geq 5 ve^-$

Ionic Compounds Quiz 2013

2. Write the correct name.

BaI_2	Barium iodide
$\text{Pb}(\text{OH})_2$	Lead (II) hydroxide
Na_2SO_4	Sodium sulfate
FeCl_3	Iron (III) chloride
$\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$	Ammonium acetate

Ionic Compounds Quiz 2013

3. Write the correct formula.

Cu_3PO_4	Copper (I) phosphate
MgS	Magnesium sulfide
Cr_2O_3	Chromium (III) oxide
KMnO_4	Potassium permanganate
AgNO_3	Silver nitrate