Name: _____

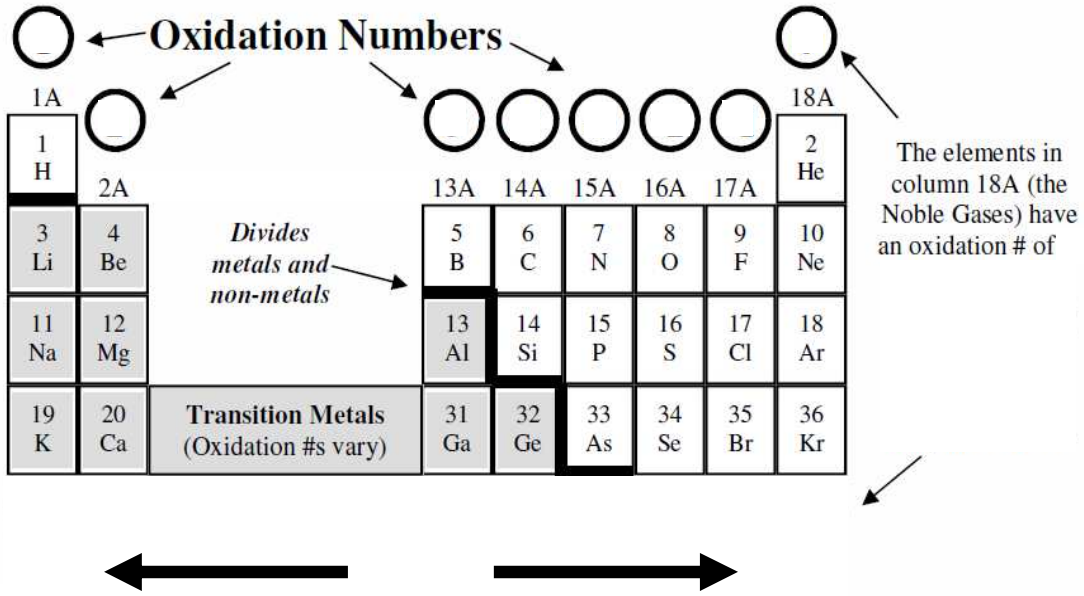
Period: _____

# Ionic Compounds



## Oxidation Numbers

Atoms gain or lose electrons when near certain other elements to fulfill the octet rule: "If I 8 I full".




The elements in column 18A (the Noble Gases) have an oxidation # of

## Notation

$Na^{1+}_{2}$

Mg

$O_2$

$H_2O$

$SO_4$

O

## Opposite Ions Attract

**Chemical Bonds** **Ionic Bonds**

Just as with protons and electrons: oppositely charged atoms attract. (metals) attract (nonmetals), forming ionic compounds.

**Positive ions attract Negative ions**

$Mg^{2+}$ attracts $F^{1-}$

$\rightarrow MgF_2$ Magnesium Fluoride

## Electron Arrows

Electron arrows are an easy way to visualize electrons being given or accepted by atoms.

**The Symbols**

Losing 1 electron

Gaining 1 electron

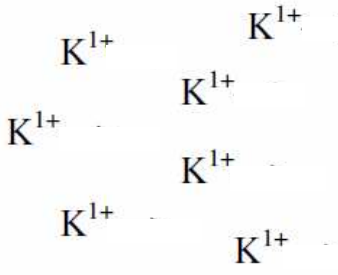
An ionic bond

The number of electron arrows comes from the oxidation numbers. Positives give electrons; negatives receive.

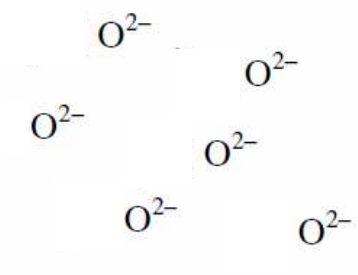
$Mg^{2+}$ $F^{1-}$

## Ionic Compounds

How do elements combine to form compounds? Elements rarely occur naturally as individual atoms. Instead, each sample of an element contains a huge number of atoms! When placed together most elements will begin to lose electrons (becoming a positive ion) or gain electrons (becoming a negative ion). The positive ions are attracted to negative ions and combine into ionic compounds.




*Each potassium loses 1 electron.*




*Each oxygen gains 2 electrons.*



---

| | |
|---|---|
| 1. Oxidation #s | A. Attracted by a positive ion. |
| 2. Zero | B. Tells you how many electrons will be gained or lost by an element. |
| 3. Negative ion | C. Net charge of a balanced ionic compound. |
| 4. Positive ion | D. When the number of electrons given equals the number taken. |
| 5. Balanced | E. Attracted by a negative ion. |

**6.** *Use the following symbols to answer the following.*

A. An electron being lost:

B. An ionic bond:

C. An electron being gained:

D. Used for a metal:

E. Used for a nonmetal:

**7.** *Give abbreviations with oxidation numbers and arrows*

| | | | |
|---|---|---|---|
| Calcium | $Ca^{2+}$ → | Nitrogen | |
| Oxygen | | Fluorine | |
| Sodium | | Aluminum | |

**8.** Give number of electrons gained or lost

| | | | |
|---|---|---|---|
| $Ca^{2+}$ | *2 lost* | $Ca_3^{2+}$ | *6 lost* |
| $F^{1-}$ | _____ | $F_3^{1-}$ | _____ |
| $Al^{3+}$ | _____ | $Al_2^{3+}$ | _____ |
| $O^{2-}$ | _____ | $O_3^{2-}$ | _____ |
| $Na^{1+}$ | _____ | $Na_3^{1+}$ | _____ |
| $N^{3-}$ | _____ | $N_2^{3-}$ | _____ |

***For the following six examples, combine the two given atoms using electron arrows, then give the balanced ionic compound formula.***

| | | | |
|---|---|---|---|
| Combine Sodium and Oxygen | Give the balanced ionic formula for *Sodium Oxide*. | Combine Beryllium and Fluorine | Give the balanced ionic formula for *Beryllium Fluoride*. |
| Combine Magnesium and Sulfur | Give the balanced ionic formula for *Magnesium Sulfide* | Combine Lithium and Phosphorus | Give the balanced ionic formula for Lithium Phosphide |
| Combine Calcium and Nitrogen | Give the balanced ionic formula for Calcium Nitride | Combine Aluminum and Oxygen | Give the balanced ionic formula for Beryllium Fluoride. |