

## Announcements – Lecture IV– Thursday, Sep 13<sup>th</sup>

iClicker for credit starts today.

Grading : Participate in 75% of the class discussion questions ... ie submit an appropriate answer.

Allowed 2 absences for the semester.

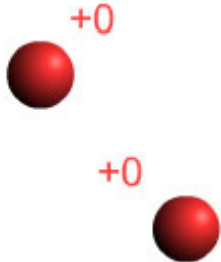
### 3.5 What Is an Ionic Bond and What Holds It Together – *Coulomb's Law*

Coulomb's Law

Stationary Ion  
▲  
▼  
0

Mobile Ion  
▲  
▼  
0

Go to class web site to interact with this module.



Force of Attraction = 0.0 N  
Distance = 2.50 Å

The diagram shows two red spheres representing positive ions. Each sphere is labeled with a red '+0'. They are positioned diagonally, with one higher and to the left of the other. The background is white with a thin black border.

FA : Force of Attraction

a) Magnitude of the charges.

b) Distance between them.

### 3.5 What Is an Ionic Bond and What Holds It Together

Which of the following three salts have the greatest force of attraction?  
(Assume that the distance is constant)



a) AlP

b) NaI

c) CaO

AlP

Al: Grp 3A, +3

P: Grp 5A, -3

NaI

Na: Grp 1A, +1

I: Grp 7A, -1

CaO

Ca: Grp 2A, +2

O: Grp 6A, -2

### 3.5 What Is an Ionic Bond and What Holds It Together

Which of the following salts would you expect to be soluble in water?  
(Assume that the distance is constant)

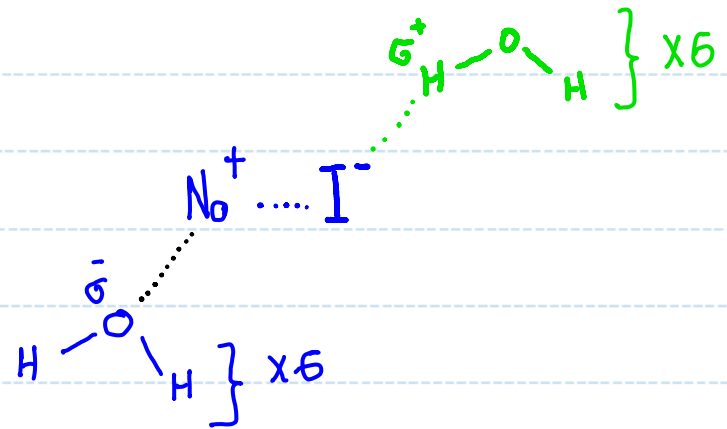
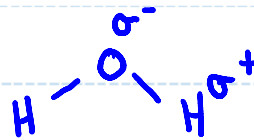


a) AlP

b) NaI

c) CaO

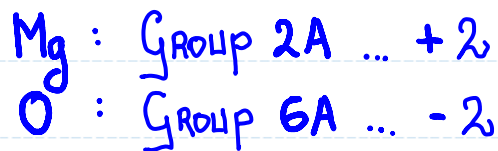
↳ The salt with the smallest FA



### 3.6 How Do We Predict Formulas and Name Ionic Compounds.

#### A Binary Compounds

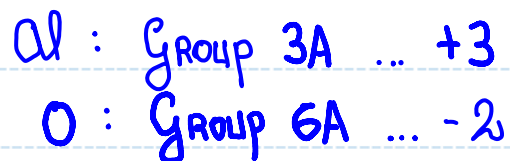
What is the formula and name of the ionic compound produced by Magnesium and Oxygen?



Cation named first  
Magnesium oxide



Formula and name for the ionic compound produced by Oxygen and Aluminum?



Aluminum oxide

### 3.6 How Do We Predict Formulas and Name Ionic Compounds.

#### B Transition Metals

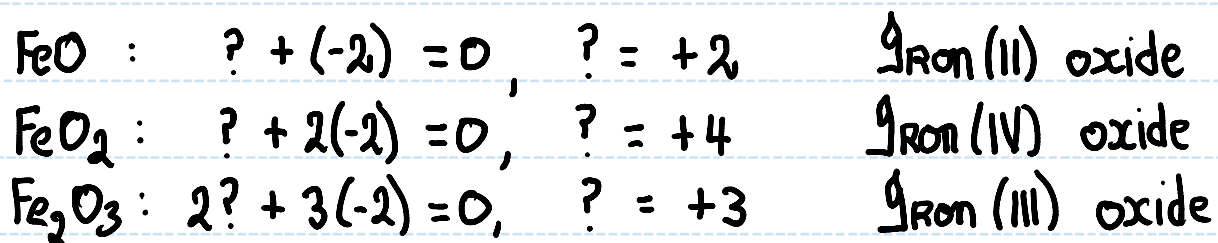
What is the correct chemical formula for the ionic compound Iron oxide?



- a) FeO
- b) FeO<sub>2</sub>
- c) Fe<sub>2</sub>O<sub>3</sub>



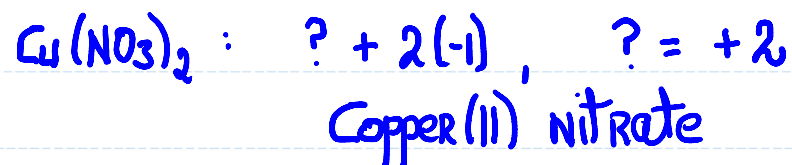
The name given is ambiguous ... you have no way to determine the charge on the metal (Transition Metal) based on the name



Use Roman Numerals to indicate the charge the Transition Metal.

3.6 How Do We Predict Formulas and Name Ionic Compounds.  
B Transition Metals

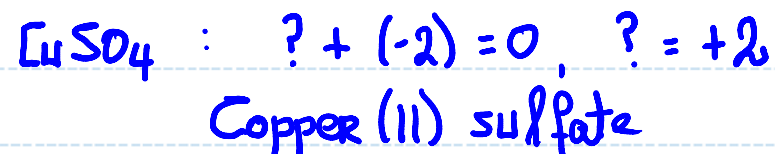
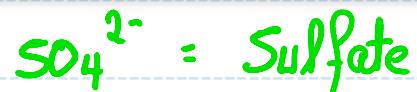
What is the correct name for the ionic compound  $\text{Cu}(\text{NO}_3)_2$



What is the correct name for the ionic compound  $\text{CuSO}_4$

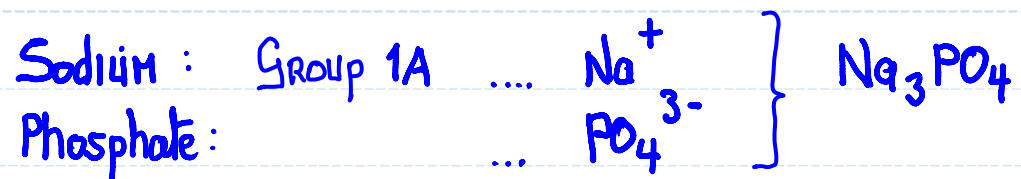


- |                              |                       |
|------------------------------|-----------------------|
| a) Copper(I) sulfate         | b) Copper(I) sulfite  |
| <b>c) Copper(II) sulfate</b> | d) Copper(II) sulfite |



### 3.6 How Do We Predict Formulas and Name Ionic Compounds. C Polyatomics

Give the correct chemical formula for the ionic compound, sodium phosphate.



Give the correct chemical formula for the ionic compound, aluminum carbonate.



Note the use of ( ) when dealing with polyatomic ions





### 4.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships?

What is the mass in grams of 1 mole of Li.

${}^6\text{Li}$ :	6.015 amu	7.42%
${}^7\text{Li}$ :	7.016 amu	92.58%

$$N = 6.0221 \times 10^{23} \text{ mol}^{-1}$$

$$1 \text{ amu} = 1.6606 \times 10^{-24} \text{ g}$$

$$1 \text{ atom: } 0.0742 (6.015) + 0.9258 (7.016) = \boxed{6.9417 \text{ amu}}$$

$$\frac{6.9417 \text{ amu}}{1 \text{ amu}} \times 1.6606 \times 10^{-24} \text{ g} = 1.1527 \times 10^{-23} \text{ g}$$

$$\begin{aligned} 1 \text{ atom of Li} &: 1.1527 \times 10^{-23} \text{ g} \\ 1 \text{ mol of Li} &: 1.1527 \times 10^{-23} \text{ g} (6.0221 \times 10^{23} \text{ mol}^{-1}) \\ &= \boxed{6.9417 \text{ g. mol}^{-1}} \end{aligned}$$