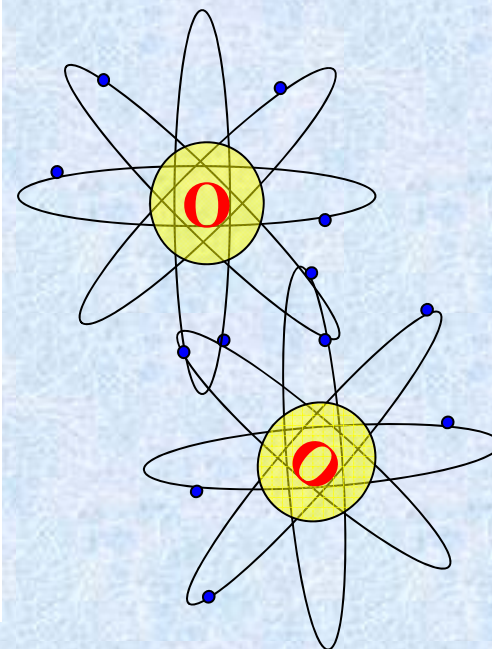
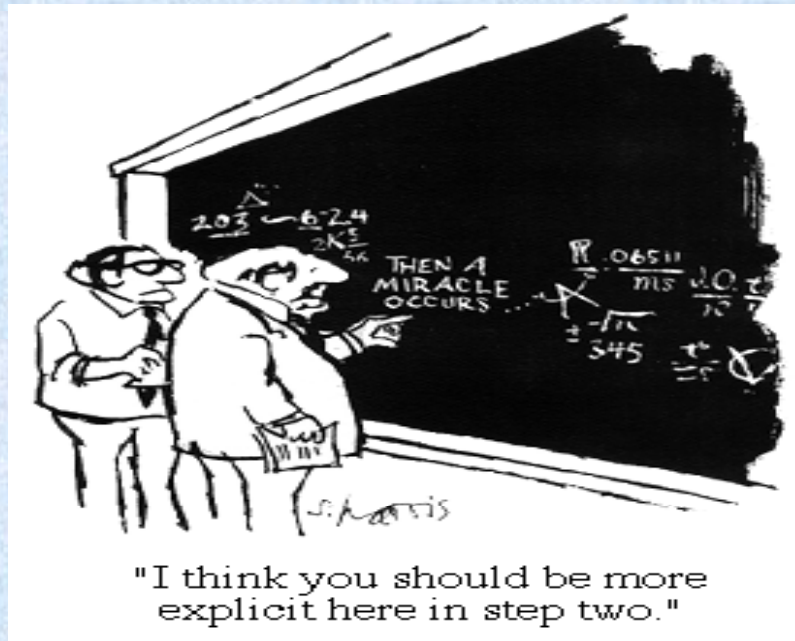
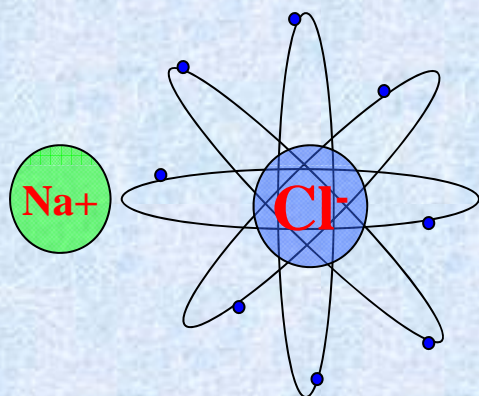


# Writing Compounds



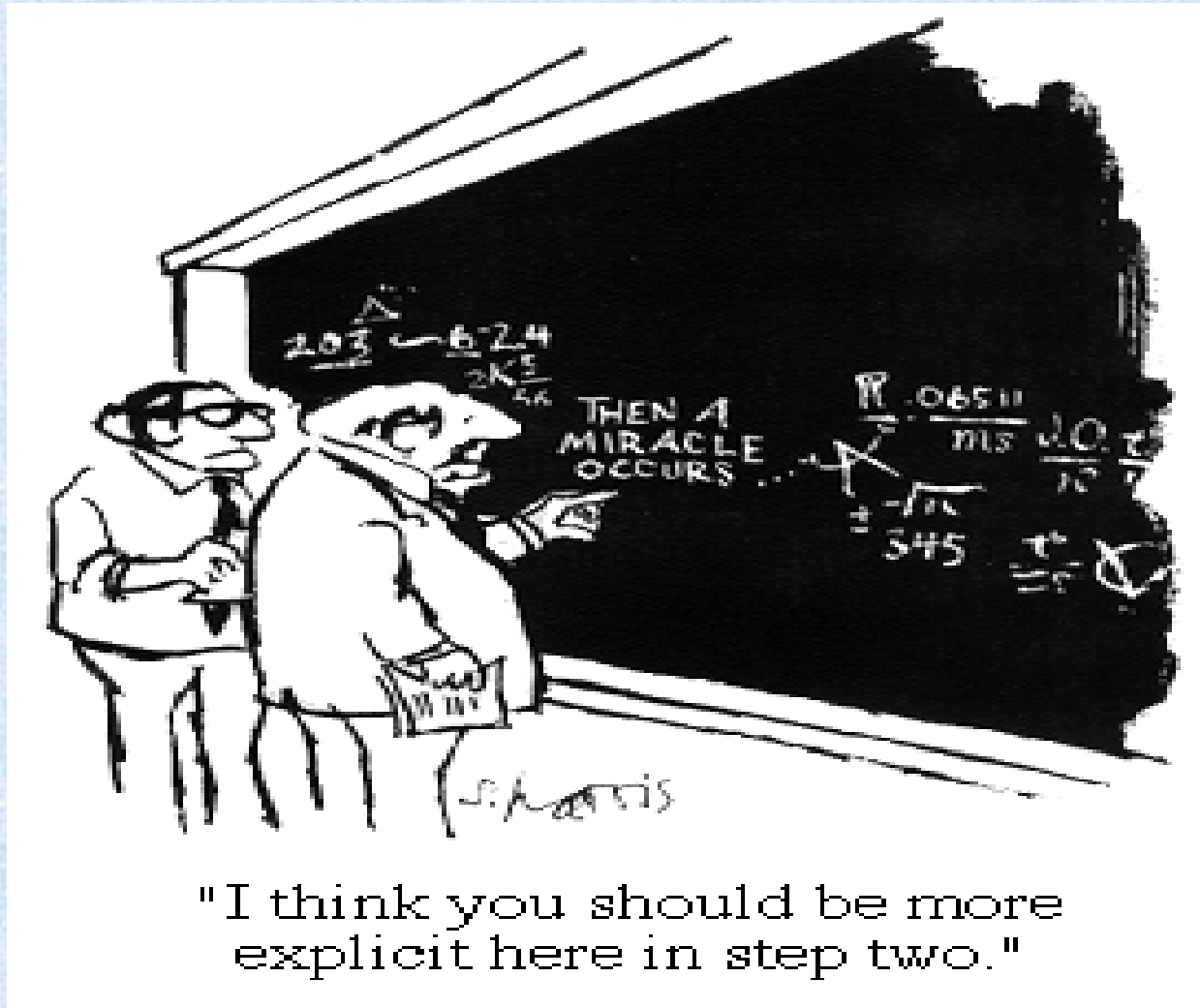
**Chemistry**

**Energy Concepts Inc.**

**Karl Steffin, 2001**

**1/12/2010**

# Writing Compounds



- The best way to show is through examples.

# **Ionic Compounds (Salts)**

- **Review: An ionic bond is the joining of a positive and negative ion.**
- **To write an ionic compound we must know two things:**
  1. **Whether an element is a cation or anion.**
  2. **What is the charge of the ions.**

# Ionic Example 1

## 1. What is the formula for Mercury (I) Borate?

- Hint: The Cation (+) is written first.

A) Mercury (I) is  $\text{Hg}^+$ , Borate is  $\text{B}_4\text{O}_7^{-2}$ .

So we have a +1 and a -2 charge. We need another +1.



- Hint: We dropped the + and - in the final answer.

## Ionic Example 2

1. What is the formula for Lead (IV) Citrate?

A) Lead (IV) is  $\text{Pb}^{+4}$ , Citrate is  $\text{C}_6\text{H}_5\text{O}_7^{-3}$ .

So we have a +4 and a -3 charge.

We need three +4, and four -3.

$(3 \times 4 = 12, 4 \times -3 = -12 \rightarrow 12 - 12 = 0)$

**$\text{Pb}_3(\text{C}_6\text{H}_5\text{O}_7)_4$** .

- Hint: We have parenthesis only when we have to have multiple complex ions. Otherwise we have  $\text{C}_6\text{H}_5\text{O}_7$ .
- Hint: This is as hard as ionic formulas gets.

# Ionic Example 3

1. What is  $\text{NH}_4\text{CN}$ ?

A)  $\text{NH}_4$  is Ammonium, CN is Cyanide.

**Ammonium Cyanide.**

- Hint: Yes it is this easy.

# Ionic Example 4

1. What is  $\text{PbS}_2$ ?

A) Pb is Lead (??), S is Sulfide.

We know that Sulfide has a  $-2$  charge.

So we have a total of  $-4$  anion ( $-2 \times 2 = -4$ ).

Since there is only one Lead, it must be a  $+4$  cation.

**Lead (IV) Sulfide.**

- Hint: A little harder but not too bad.

# Covalent bonding

- **Review: A Covalent Bond is the joining of two non-metals.**
- **To write a covalent compound we must know two things.**
  1. **Is this a Covalent Bond?**
  2. **What are the prefixes I need to know?**

# Covalent Prefixes

Subscript	Prefix
1	mono
2	di
3	tri
4	tetra
5	pent
6	hexa
7	sept
8	octa
9	nona
10	deca

# Covalent Example 1

## 1. What is Carbon Dioxide?

A) Carbon is C, Oxygen is O. Di = two O.



Hint: Easy!!!

## 2. What is Dibromine Pentoxide?



Hint: Notice that the elements are not capitalized when led by a prefix.

# Covalent Example 2

1. What is CO?

A) Carbon is C, Oxygen is O.

**Carbon Monoxide.**

Hint: The last word normally gets a prefix.

2. What is O<sub>3</sub>?

**A) Trioxide or Ozone.**

Hint: Some bonds have other names (B<sub>4</sub>O<sub>7</sub><sup>-2</sup>).

# Metallic Bonds

- **Metals form matrices (think of the MGM).**
- **Other elements introduced into the matrix form useful alloys.**



- **It would take you 13 years, 8 months to spend a night in every hotel room in the MGM Grand.**

# Alloys

- **Alnico (Al,Ni,Co) - Used for permanent magnets.**
- **Nambé (Al) - Created in Los Alamos Labs, NM. Eight metals used in fine serving pieces.**
- **Brass (Cu,Zn) - 25 different forms used for door fixtures and machines.**
- **Bronze (Cu,Sn) - Used in maritime and sculptures.**
- **Electum (Au,Ag,Cu), Rose Gold (Au,Cu), White Gold (Au,Ni,Pd) – Used for Drinking vessels, jewelry and coinage**

# Alloys

- **Steel (Fe,C,???) - Various structural and tool uses.**
- **Solder (Pb, Sn) - Electrical connections.**
- **Amalgam (Mg,???) - Dental work.**
- **Nichrome (Ni,Cr) - Heating elements.**
- **Nitinol (Ni,Ti) - Memory wire, glasses.**
- **Sterling Silver (Ag,Cu,???) - Jewelry.**
- **Pewter (Sn,Pb,Cu) - Cooking/Serving, ornamental.**

# Acids: Two Types

- **Acids are special Ionic Bonds.**
- **There are two types of acids:**
  - **Binary: Two elements forming an ionic bond**
  - **Ternary: Three or more elements forming an ionic bond.**

# Binary

- **Binary acids must have a  $H^+$  as the cation**
- **Its anion then must have only a  $-1$  charge.**
- **Halogens are used for Binary Acid.**
- **Ex:        HF: **Hydrofluoric** Acid.**  
              HCl: **Hydrochloric** Acid.  
              HBr: **Hydrobromic** Acid.

# Ternary

- Ternary Acids involve polyatomic anions.
- If you have not noticed  $\text{SO}_4$ , and  $\text{SO}_3$  are both similar in name. (Sulfate, Sulfite).
- They are but one O apart and a suffix different.
- If we know the most common anion, we can determine the acid name and the formula.

# Ternary Chart

Ion			Acid		
Formula	Add	Ex (S...)	Formula	Add	Name
XO <sub>5</sub>	per...ate	persulfate	H <sub>2</sub> SO <sub>5</sub>	per...ic	persulfuric
XO <sub>4</sub>	...ate	sulfate	H <sub>2</sub> SO <sub>4</sub>	...ic	sulfuric
XO <sub>3</sub>	...ite	sulfite	H <sub>2</sub> SO <sub>3</sub>	...ous	sulfurous
XO <sub>2</sub>	hypo...ite	hyposulfite	H <sub>2</sub> SO <sub>2</sub>	hypo...ous	hyposulfurous

- The Red line indicates the most common anion.

# Ternary Example

- **Given that the  $\text{NO}_3$  is the most common, Predict:  $\text{Fe}(\text{NO}_3)_2$ ,  $\text{Fe}(\text{NO}_2)_3$  and  $\text{Fe}(\text{NO}_4)_2$ .**
  - $\text{NO}_3 \rightarrow$  is Nitrate<sup>+</sup> so Iron (II) Nitrate.
  - $\text{NO}_2 \rightarrow$  One less O is Nitrite<sup>+</sup> so Iron (III) Nitrite.
  - $\text{NO}_4 \rightarrow$  One extra O is Pernitrate<sup>+</sup> so Iron (II) Pernitrate.
- **Predict HNO**
  - $\text{NO} \rightarrow$  Two less O is Hyponitrite<sup>+</sup> so Hydrogen Hyponitrite... but the Hydrogen is a marker for 'Acid'
  - Using the acid chart: hyponitrous acid