**Notes: Compounds with Multivalent Metals** (p. 88–90)

Some metals have more than one possible ***ion charge***. These metals are multivalent Most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_metals have this characteristic. The periodic table lists the charges for ions. The most common charge is listed on top.

To distinguish between ions, \_\_\_\_\_ \_\_numerals are used to name the ion.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ROMAN NUMERALS USED TO REPRESENT METAL ION CHARGES FROM 1+ TO 7+** | | | | | | |
| I | II | III | IV | V | VI | VII |
| 1+ | 2+ | 3+ | 4+ | 5+ | 6+ | 7+ |

Eg. Iron (Fe) can form ions with charges two different charges  
 Fe \_+  ioniscalled iron(\_\_) and Fe \_+  ion is called iron(\_\_)

**WRITING FORMULAS:** Must still put the metal first followed by non-metal!

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ tells you which ion to use to create chemical formula.

|  |  |  |
| --- | --- | --- |
| **NAME OF COMPOUND** | **CHEMICAL**  **FORMULA** | **ORDER** |
| **copper(I) sulphide** | **Cu2S** | **Metal Non-metal** |

|  |  |  |
| --- | --- | --- |
| Steps for writing the formula for multivalent compounds containing a multivalent metal | Examples | |
| iron(III)sulphide | iron (II) sulphide |
| 1. LOOK UP ion symbols and identify charges |  |  |
| 1. BALANCE the positive and negative charges |
| 1. Determine the RATIO of positive to negative ions |  |  |
| 1. Write CHEMICAL FORMULA |  |  |

TRY THESE:

|  |  |
| --- | --- |
| copper(II) chloride  LOOK UP  BALANCE  RATIO :  CHEM. FORM. | copper (I) chloride  LOOK UP  BALANCE  RATIO :  CHEM. FORM. |

**DO pg. 89 Practice Problems**

**NAMING MULTIVALENT COMPOUNDS**

Given the formula, we can figure out the name. If the metal is multivalent, we MUST write a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to represent the \_\_\_\_\_\_\_\_\_\_\_ on the metal ion.

**NAME: METAL (ROMAN NUMERAL) NON-METAL {IDE ENDING}**

|  |  |  |
| --- | --- | --- |
|  |  | EXAMPLE **Cu3P** |
| Step #1 LOOK UP | LOOK UP & write down the names of elements in the formula. | Cu P |
| Step #2 ENDING | cross out the ENDING of the non-metal name and replace with “ide” |  |
| Step #3 CHECK | CHECK for metals with more than one ion charge. | Possibilities for copper ions  vs |
| Step #4 BALANCE  CHARGES | The subscripts in the chemical formula determine the number of metal ions vs non-metal ions “X” this by the charge value.  + charge = - charge | |  |  |  | | --- | --- | --- | | Metal |  | Non-metal | | \_\_\_x \_\_\_  +\_\_\_ | = | \_\_\_ x \_\_\_  -\_\_\_ | |
| Step #5 STATE NAME | Metal ion name (ROMAN NUMERAL to show charge of metal ion) non-metal name |  |

Eg. WRITE THE CHEMICAL NAME FOR: **MnO2**

Ion Possibilities: Mn\_\_\_with O \_- **OR** Mn with O \_- **OR** Mn with O \_-

Which metal ion creates MnO2?

Start with non-metal ion first to find overall negative charge multiply the non-metal charge by the number of Oxygen atoms in the compound **Mn02**

Balance the charges to figure it out:

|  |  |  |
| --- | --- | --- |
| Which Metal ion ? **Mn \_+ Mn \_+ Mn \_+** |  | Non-metal  **O \_-** |
| \_\_\_\_ x \_\_\_\_  +  This “metal ion” must be +\_\_\_\_, to get -\_\_\_\_ so we are using   ion Mn--+ to form MnO2 | = | \_\_\_\_x \_\_\_\_  - |

**Chemical Name**

**Name this compound: US3**

1. **Determine elements in compound.**
2. **Look up element ion possibilities!**
3. **Determine overall non-metal charge.**
4. **Which metal ion makes compound?**
5. **Write Chemical Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DO pg. 90 Practice Problems; Worksheet “BLM 1-37”**