**Bonding**Unit 5 Page 3

**Learning Target:**

**I can** name ionic compounds containing main group or transition metals using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules.

**Criteria for Success:**

**I can** write the chemical formulas and chemical names of common polyatomic ions, ionic compounds containing main group or transition metals.

**Notes: Chemical Names and Formulas for Ionic Compounds (IUPAC rules)**

**Monatomic Ions**

**A.** Monatomic ions are charged atoms that form from a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atom.

**Naming Monatomic Ions**

**1.** Monatomic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are named simply by the element’s name.

**2.** Monatomic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are named by changing the ending of the element’s name to \_\_\_\_\_\_\_\_\_\_.

**Binary Ionic Compounds**

**A.** Compounds composed of \_\_\_\_\_\_\_\_\_\_ different ions, a cation and an anion, are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ ionic compounds. Despite being made of ions, the overall charge of the compound is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Steps to Determine the Formula of a Binary Ionic Compound**

**1.** Write the symbols of the ions side by side. Write the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ first.

**2.** Cross over the charges by using the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ value of each ion’s charge as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the other ion.

**3.** Check the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and divide them by their largest common factor to give the smallest possible whole-number \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of ions.

**4.** Write the final formula WITHOUT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This represents one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the ionic compound.

Example 1: magnesium chloride Example 2: magnesium oxide

**Steps to Determine the Name of a Binary Ionic Compound**

**1.** Write the name of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ first.

**2.** Write the name of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ second.

Example 1: NaCl Example 2: Li3N

**The Stock System of Nomenclature**

**A.** The Stock System uses a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to indicate an ion’s charge.

1. A Roman numeral is used when the cation is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ metal (also Sn & Pb)

a. EXCEPTIONS to this are: \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_

**Compounds Containing Polyatomic Ions**

**A.** Polyatomic ions are charged \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of covalently bonded atoms.

**Naming Ionic Compounds Containing Polyatomic Ions**

**1.** Polyatomic ions have unique names and require \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**2.** Compounds containing polyatomic ions are named in the \_\_\_\_\_\_\_\_\_\_\_\_\_ manner as binary ionic compounds. **3.** When naming the name of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is given first, followed by the name of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Example 1: KMnO4 Example 2: CaSO4

Example 3: lithium phosphate Example 4: ammonium nitrate

**Hydrated Ionic Compounds**

**A.** Hydrated ionic compounds, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, have a specific number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules in their chemical formula. In the solid, these water molecules are part of the structure of the compound.

1. The waters are separated by a raised \_\_\_\_\_\_\_\_\_.

2. The number of water molecules are indicated using a Greek \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Greek prefixes: 1 = \_\_\_\_\_\_\_\_\_\_\_\_ 6 = \_\_\_\_\_\_\_\_\_\_\_\_

2 = \_\_\_\_\_\_\_\_\_\_\_\_ 7 = \_\_\_\_\_\_\_\_\_\_\_\_

3 = \_\_\_\_\_\_\_\_\_\_\_\_ 8 = \_\_\_\_\_\_\_\_\_\_\_\_

4 = \_\_\_\_\_\_\_\_\_\_\_\_ 9 = \_\_\_\_\_\_\_\_\_\_\_\_

5 = \_\_\_\_\_\_\_\_\_\_\_\_ 10 = \_\_\_\_\_\_\_\_\_\_\_\_

Example 1: copper (II) chloride dihydrate Example 2: MgSO4•7H2O

**Guided Practice**

1. lithium fluoride

2. copper (II) chloride

3. lithium dichromate

4. magnesium acetate

5. sodium arsenate

6. chromium (II) hydroxide

7. lead (IV) sulfate

8. magnesium sulfate heptahydrate

9. ammonium nitrate

1. CaCl2

2. FeCl3

3. Fe2(SO4)3

4. Na3PO4

5. KIO3

6. Cu(ClO4)2 ∙ 6H2O

7. NaHSO4

8. CuS2O3

9. PbF2

**Practice, practice, practice!**

Formula to Name

1. NaF
2. K2CO3
3. MgCl2
4. Be(OH)2
5. SrS
6. Cu2S
7. ZnI2
8. Ca3(PO4)2
9. NH4I
10. Mn(NO3)3
11. FePO4
12. CoCO3
13. HgCl
14. Fe2O3
15. BeO

Name to Formula

1. potassium fluoride
2. ammonium sulfate
3. magnesium iodide
4. copper (II) sulfite
5. aluminum phosphate
6. lead (II) nitrite
7. cobalt (II) selenide
8. silver cyanide
9. copper (II) bicarbonate
10. iron (II) oxide
11. lithium cyanide
12. lead (IV) sulfite
13. potassium permanganate
14. vanadium (III) selenide
15. copper (II) chloride