

NAMING IONIC COMPOUNDS

Binary Ionic Compounds (i.e., compounds that contain only two types of elements)

- Rules
 1. Metal name is written first.
 2. Non-metal name comes second
 3. Change the ending of the non-metal to “ide” if the ion is a simple ion (i.e., ions made of one type of atom)
- Example:
 - lithium and iodine → lithium iodide
 - sodium and oxygen → sodium oxide

Orally: Note that the metal name is not changed from the periodic table but the non-metal is.

When a formula is given, identify the two elements and follow the rules for naming.

- 1a. Li_3N → lithium + nitrogen → lithium nitride
- b. MgBr_2 → magnesium + bromine → magnesium bromide
- c. Ag_2O → silver + oxygen → silver oxide
- d. RbF → rubidium + fluorine → rubidium fluoride
- e. AgI → silver + iodine → silver iodide

Question: How do I name an ionic compound if the metal is multivalent? (i.e., the metal can have more than one charge?)

Answer: Use a roman numeral to indicate the charge on the metal.

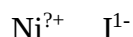
Question: How do I know which roman numeral to use when given the ionic formula?

Answer: The non-metals only have one charge, so we can “undo” crossing over to figure out the charge on the metal.

Lesson 6

- Example: NiI_3

Orally: Looking at the ion sheet for Nickel we see that more than one charge is possible. The iodine has to be -1.



When crossing-over the iodine charge, we see that we will get the correct number of Ni (1). What charge on nickel will yield 3 iodine atoms in the formula? 3!

- nickel (III) iodide

Rule: if the numbers are the same, then the metal's ion charge must be the same as the ion charge of the non-metal

Example: SnS

Since Sulphur has a 2- charge and the number of Sn and S are the same, the charge on the Sn must be the same magnitude to balance the charge (2+)

tin (II) sulphide

Orally: Remember, the roman numeral is the charge on the metal. The largest roman numeral you will be responsible for will be 8.

Roman numerals:

I, II, III, IV, V, VI, VII, VIII

Lesson 6

Practice

- 1a. $\text{Fe}_2\text{O}_3 \rightarrow$ iron (III) oxide
- b. $\text{PbF}_4 \rightarrow$ lead (IV) fluoride
- c. $\text{FeI}_2 \rightarrow$ iron (II) iodide
- d. $\text{HgI}_2 \rightarrow$ mercury (II) iodide
- e. $\text{Hg}_3\text{N}_2 \rightarrow$ mercury (II) nitride

Polyatomic Ions

- A polyatomic ion is an ion made up of more than one type of atom joined by a covalent bond
- When naming ionic compounds that contain a polyatomic atom, use the name given in the data booklet

Chop the element into two pieces only!

Chop after the first element. One exception to this rule is when the ammonium ion is present (NH_4^{1+})

- Example: $\text{KClO}_2 =$ potassium chlorite
 $\text{NH}_4\text{F} =$ ammonium fluoride

Lesson 6

Practice

1. $\text{KCH}_3\text{COO} \rightarrow$ potassium acetate
2. $\text{Ca}(\text{CH}_3\text{COO})_2 \rightarrow$ calcium acetate
3. $(\text{NH}_4)_3\text{P} \rightarrow$ ammonium phosphide
4. $(\text{NH}_4)_3\text{PO}_4 \rightarrow$ ammonium phosphate
5. $\text{Al}(\text{OH})_3 \rightarrow$ aluminum hydroxide
6. $\text{Pb}(\text{OH})_2 \rightarrow$ lead (II) hydroxide
7. $\text{Sn}(\text{OH})_4 \rightarrow$ tin (IV) hydroxide
8. $\text{SnO} \rightarrow$ tin (II) oxide
9. $\text{CuSO}_4 \rightarrow$ copper (II) sulphate
10. $\text{Cu}_2\text{SO}_4 \rightarrow$ copper (I) sulphate

Orally: How do I know that the 4 in the SO_4 of the last question is part of the complex ion, or the number “crossed-over”?

Answer: There were no brackets used, so the 4 must be part of the ion.

Rule: Never reduce a number that is part of a complex ion. Only reduce numbers that you have crossed over.

In #10 above, you may not reduce Cu_2SO_4 to CuSO_2 . SO_4 is the sulphate ion and it must remain sulphate!

Question: What do I do if the metal element is not on my ion sheet?

Answer:

1. use your periodic table to determine the element name.
2. use the non-metal to deduce the charge.
3. use a roman numeral on the metal.

e.g., $\text{VCl}_5 \rightarrow$ Vanadium (III) chloride

Homework: Wkst