

NAMING IONIC COMPOUNDS II

These ionic compounds are named by the simple rule:

Name the cation: then name the anion.

However, to avoid ambiguity the names of these cations must indicate the charge (oxidation number) on the metal ion.

1. The charge (oxidation number) is given by Roman numeral in parentheses after the name of the metal. Examples:

Cu^+ is **copper(I)** ion, so CuCl is named **copper(I) chloride**
 Cu^{2+} is **copper(II)** ion, so CuCl_2 is named **copper(II) chloride**
 Fe^{3+} is **iron(III)** ion, so FeCl_3 is named **iron(III) chloride**
 Sn^{4+} is **tin(IV)** ion, so SnCl_4 is named **tin(IV) chloride**

2. **All type II metals**, i.e., all metals that are not type I (those metals in groups IA, IIA, and Ag, Zn, and Al are type I metals), **must include the charge** (oxidation number) **in the name of the cation**.
3. The charge on the cation must be determined from the formula using the subscripts, the charge on the anion, and the fact that all ionic charges sum to zero. Examples:

In CoCl_3 let Z = cobalt charge; -1 is the chloride charge;
since $Z + (-1) \times 3 = 0$, $Z = 3$; so the cobalt ion is Co^{3+} or **cobalt(III)**.
 CoCl_3 is named **cobalt(III) chloride**

In V_2O_5 let Z = vanadium charge; -2 is the oxide charge;
since $Z \times 2 + (-2) \times 5 = 0$, $Z = 5$; so the vanadium ion is V^{5+} or **vanadium(V)**.
 V_2O_5 is named **vanadium(V) oxide**.

You should be able to name the following:

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|-----------------------------|----------------------------|----------------------------|
| a. FeS | g. Bi_2O_5 | m. CrP |
| b. Au_2Se_3 | h. GaTe | n. WBr_5 |
| c. MnO_2 | i. FeF_3 | o. PtF_6 |
| d. SnF_4 | j. Ti_2O_3 | p. Hg_2S |
| e. Ni_3As_2 | k. VS_4 | q. UCl_5 |
| f. ScI_3 | l. Cu_3N | r. Mn_2O_7 |

Answers are on the other side.

WRITING IONIC FORMULAS II

Formulas for ionic compounds are written by these rules:

Rule 1 Write the formula (symbol) for the cation (without the charge) followed by a subscript; write the formula (symbol) for the anion (without the charge) followed by a subscript.

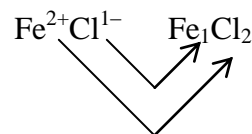
Rule 2 Subscripts are chosen so that the charges in a compound add to zero.

These rules are the same as for IONIC FORMULAS I. However for these compounds the cation charge (oxidation number) is given in the name.

iron(II) chloride is written as follows:

iron(II) is Fe^{2+} (charge +2) chloride is Cl^- (charge -1)
try subscripts 1 ($|\text{charge}|$ on anion) and 2 (charge on cation)
formula is **FeCl_2**

note: $(+2) \times 1 + (-1) \times 2 = 0$



chromium(III) oxide is written as follows:

chromium(III) is Cr^{3+} (charge +3) oxide is O^{2-} (charge -2)
try subscripts 2 and 3; so formula is **Cr_2O_3**

note: $(+3) \times 2 + (-2) \times 3 = 0$

lead(IV) sulfide is written as follows:

lead(IV) is Pb^{4+} (charge +4) sulfide is S^{2-} (charge -2)
try subscripts 2 and 4 so formula is Pb_2S_4
this should be reduced to simpler numbers **PbS_2**

note: $(+4) \times 1 + (-2) \times 2 = 0$

You should be able to write formulas for the following:

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|-------------------------|---------------------------|----------------------------|
| a. iron(II) sulfide | g. bismuth(V) oxide | m. chromium(III) phosphide |
| b. gold(III) selenide | h. gallium(II) telluride | n. tungsten(V) bromide |
| c. manganese(IV) oxide | i. iron(III) fluoride | o. platinum(VI) fluoride |
| d. tin(IV) fluoride | j. titanium(III) oxide | p. mercury(I) sulfide |
| e. nickel(II) arsenide | k. vanadium(VIII) sulfide | q. uranium(V) chloride |
| f. scandium(III) iodide | l. copper(I) nitride | r. manganese(VII) oxide |

Answers are on the other side.