

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 metals not in groups IA, IIA, except Ag, Zn, and Al must include the charge (oxidation number) in the name.
3. The charge on the cation must be deduced from the formula using the subscripts and the charge on the anion so 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 cobalt 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 vanadium is V^{5+} or **vanadium(V)**.
 V_2O_5 is named **vanadium(V) oxide**.

You should be able to name the following:

- | | | |
|----------------------------|----------------------------|--------------------|
| a. FeS | g. SnI_2 | m. CrP |
| b. Au_2O_3 | h. CoO | n. HgBr_2 |
| c. MnO_2 | i. FeI_3 | o. AuCl_3 |
| d. SnF_4 | j. Fe_2O_3 | p. HgS |
| e. PbO_2 | k. SnS | q. CrCl_3 |
| f. NiF_2 | l. Cu_3N | r. MnBr_2 |

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 (|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:

a. iron(II) sulfide

g. tin(II) iodide

m. chromium(III) phosphide

b. gold(III) oxide

h. cobalt(II) oxide

n. mercury(II) bromide

c. manganese(IV) oxide

i. iron(III) iodide

o. gold(III) chloride

d. tin(IV) fluoride

j. iron(III) oxide

p. mercury(II) sulfide

e. lead(IV) oxide

k. tin(II) sulfide

q. chromium(III) chloride

f. nickel(II) fluoride

l. copper(I) nitride

r. manganese(II) bromide

Answers are on the other side.