

WRITING IONIC FORMULAS I

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.

Notes:

1. The charges on the ions must be known before the formula can be written.

The ionic charges are as follows:

Group IA metals always form +1 ions: Li^+ , Na^+ , K^+ , etc.

Group IIA metals always form +2 ions: Be^{2+} , Mg^{2+} , Ca^{2+} , Ba^{2+} , etc.

Aluminum (in IIIA) always forms a +3 ion: Al^{3+} .

Zinc (in IIB) always forms a +2 ion: Zn^{2+} .

Silver (in IB) always forms a +1 ion: Ag^+ .

Group VIIA always form -1 ions: F^- , Cl^- , Br^- , I^- .

Group VIA always form -2 ions: O^{2-} , S^{2-} .

Group VA always form -3 ions: N^{3-} , P^{3-} .

2. The subscript after the ionic formula indicates the number of those ions in the compound.
3. A subscript of one (1) is not written.
4. The cation charge times its subscript plus the anion charge times its subscript must equal zero.
5. Usually the subscripts can be determined by making the charge on an anion the subscript on the cation (leave off the minus sign) and making the charge on the cation the subscript on the anion.
6. Subscripts should be reduced to the lowest integer numbers.

To write the formula for magnesium fluoride,

Determine the charges: magnesium ion is Mg^{2+} and the fluoride ion is F^- .

Try subscripts 1 (the |charge| of the anion) and 2 (the charge of the cation)

The formula is: MgF_2

The sum of the charges equals zero: $1 \times (+2) + 2 \times (-1) = 0$

You should be able to write formulas for the following:

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| a. sodium iodide | h. sodium oxide | o. beryllium iodide |
| b. potassium bromide | i. lithium nitride | p. zinc bromide |
| c. magnesium fluoride | j. zinc sulfide | q. calcium fluoride |
| d. calcium oxide | k. aluminum nitride | r. silver oxide |
| e. barium sulfide | l. silver chloride | s. barium oxide |
| f. calcium iodide | m. potassium fluoride | t. sodium phosphide |
| g. aluminum chloride | n. aluminum sulfide | |