

WRITING IONIC FORMULAS III

Formulas for these ionic compounds are written by these rules:

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

Rule 3 Put parentheses around polyatomic ions that have subscripts greater than 1.

The charges on polyatomic ions must be known (memorized!) in order to write formulas.

Examples: potassium carbonate

potassium is K^+ carbonate is CO_3^{2-}

try subscripts 2 (from 2-) and 1 (from 1+) so the formula is K_2CO_3

ammonium chloride

ammonium is NH_4^+ chloride is Cl^-

try subscripts 1 (from 1-) and 1 (from 1+) so the formula is NH_4Cl

chromium(III) sulfate

chromium(III) is Cr^{3+} sulfate is SO_4^{2-}

try subscripts 2 (from 2-) and 3 (from 3+) so the formula is $Cr_2(SO_4)_3$

tin(IV) chromate

tin(IV) is Sn^{4+} chromate is CrO_4^{2-}

try subscripts 2 (2-) and 4 (4+) then divide by 2 so the formula is $Sn(CrO_4)_2$

You should be able to write formulas for these compounds.

a. magnesium carbonate

g. strontium nitrate

m. potassium sulfate

b. silver chromate

h. lead(IV) sulfate

n. calcium thiosulfate

c. iron(III) sulfate

i. copper(II) cyanide

o. sodium phosphate

d. cobalt(III) hydroxide

j. potassium permanganate

p. tin(IV) nitrate

e. lithium dichromate

k. barium acetate

o. cobalt(II) phosphate

f. ammonium carbonate

l. zinc chlorate

p. gold(I) cyanide

Answers are on the other side

NAMING IONIC COMPOUNDS III

The rule for naming these compounds is:

Name the cation; then name the anion.

The rule for naming these compounds is the same as for other compounds, however, these compounds have polyatomic ions--ions with more than one element.

1. The names and formulas (with charges) must be memorized.

- NH_4^+ **ammonium ion** (the only polyatomic cation)
 OH^- **hydroxide ion**
 CN^- **cyanide ion** (There are only two polyatomic "ide" ions.)
 CO_3^{2-} **carbonate ion**
 NO_3^- **nitrate ion** (Note that the "ate" ions have oxygen.)
 ClO_3^- **chlorate ion**
 SO_4^{2-} **sulfate ion**
 PO_4^{3-} **phosphate ion**
 CrO_4^{2-} **chromate ion** $\text{Cr}_2\text{O}_7^{2-}$ **dichromate ion**
 $\text{S}_2\text{O}_3^{2-}$ **thiosulfate ion** ("thio" means replace an O with an S)
 MnO_4^- **permanganate ion**
 O_2^{2-} **peroxide ion**
 $\text{C}_2\text{H}_3\text{O}_2^-$ **acetate ion**

2. Type II cations still need the charge in Roman numerals; type I cations do not.
(Ammonium ion acts like a type I cation with charge +1)

Examples: NaNO_3 is **sodium nitrate**
 $\text{Cu}(\text{OH})_2$ is **copper(II) hydroxide**
 $(\text{NH}_4)_2\text{SO}_4$ is **ammonium sulfate**

You should be able to name the following compounds.

- | | | |
|---------------------------------------|--|---------------------------------|
| a. MgCO_3 | g. $\text{Sr}(\text{NO}_3)_2$ | m. K_2SO_4 |
| b. Ag_2CrO_4 | h. $\text{Pb}(\text{SO}_4)_2$ | n. CaS_2O_3 |
| c. $\text{Fe}_2(\text{SO}_4)_3$ | i. $\text{Cu}(\text{CN})_2$ | o. Na_3PO_4 |
| d. $\text{Co}(\text{OH})_3$ | j. KMnO_4 | p. $\text{Sn}(\text{NO}_3)_4$ |
| e. $\text{Li}_2\text{Cr}_2\text{O}_7$ | k. $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2$ | o. $\text{Co}_3(\text{PO}_4)_2$ |
| f. $(\text{NH}_4)_2\text{CO}_3$ | l. $\text{Zn}(\text{ClO}_3)_2$ | p. AuCN |

Answers are on the other side.