

# Naming Ionic Compounds

## Part 2: Writing Empirical Formulas for Ionic Compounds

By Shawn P. Shields, Ph.D.



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# Writing Formulas for Ionic Compounds

**Key concept: Ionic compounds are electrically neutral!**

This means that the positive charge on the cation will completely "cancel out" the negative charge on the anion.

For instance, the charge on a +2 cation will be completely "neutralized" or canceled by a -2 anion

$$+2 + (-2) = 0$$




# Determining the Charges on Cations and Anions in Ionic Compounds

Given the elements that form a particular ionic compound, we want to determine its empirical formula.

Basically, we need to determine the ratio of atoms in that ionic compound.

How? Start by first determining the charge on the cation and the anion involved in the compound, remembering that we need to balance or "cancel out" all of the charges in the compound.



# Determining the Charges on Cations and Anions in Ionic Compounds

Example: Determine the charges on the ions for a compound involving potassium (K) and bromine (Br)

K forms a +1 cation (since it is a metal in group 1)

Br forms a -1 anion (since it is a nonmetal in group 7)

# Balancing Charges in Ionic Compounds

Now, determine the lowest number of  $\text{K}^+$  ions that can completely “cancel out” the charge on the  $\text{Br}^-$  anion.

Create a neutral compound by balancing the charges.

K forms a +1 cation, and Br forms a -1 anion, so the neutral compound have a 1:1 ratio of  $\text{K}^+$  and  $\text{Br}^-$

# Finally: Writing the Empirical Formula for Ionic Compounds

The neutral compound would be  $\text{K}^+\text{Br}^-$

$$+1 + (-1) = 0$$

However, it is *incorrect* to leave the charges on the ions in the compound!

Write the empirical formula for the compound without showing the charges

$\text{KBr}$  (potassium bromide)





## Mini Quiz: Writing Formulas for Ionic Compounds

Write the formula for a compound formed from lithium (Li) and Fluorine (F).



## Mini Quiz: Writing Formulas for Ionic Compounds

Write the formula for a compound formed from lithium (Li) and Fluorine (F).

Step 1: Determine the charge on the cation and anion.

Li is a metal, so it forms a cation. Since it is in group 1, the charge is +1.

F is a nonmetal, so it forms an anion. Since it is in group 7, the charge is -1.



# Mini Quiz: Writing Formulas for Ionic Compounds

Step 2: Determine the number of  $\text{Li}^+$  ions that can completely cancel out the negative charge on the  $\text{F}^-$  anion

Since the charge is +1 on Li and -1 on F, there is a one-to-one ratio of Li to F in the compound.

Write the formula for the compound (metal first) without showing the charges:

$\text{LiF}$  (Lithium fluoride)