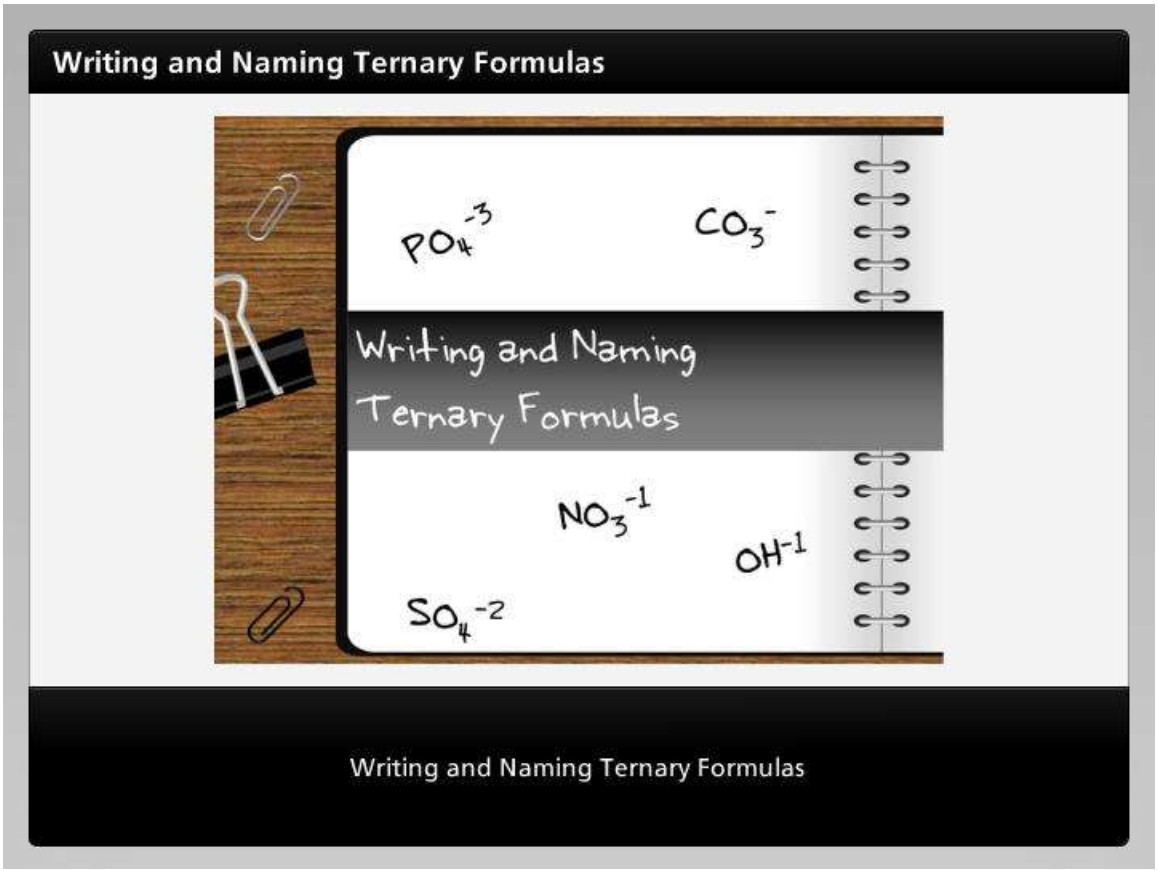
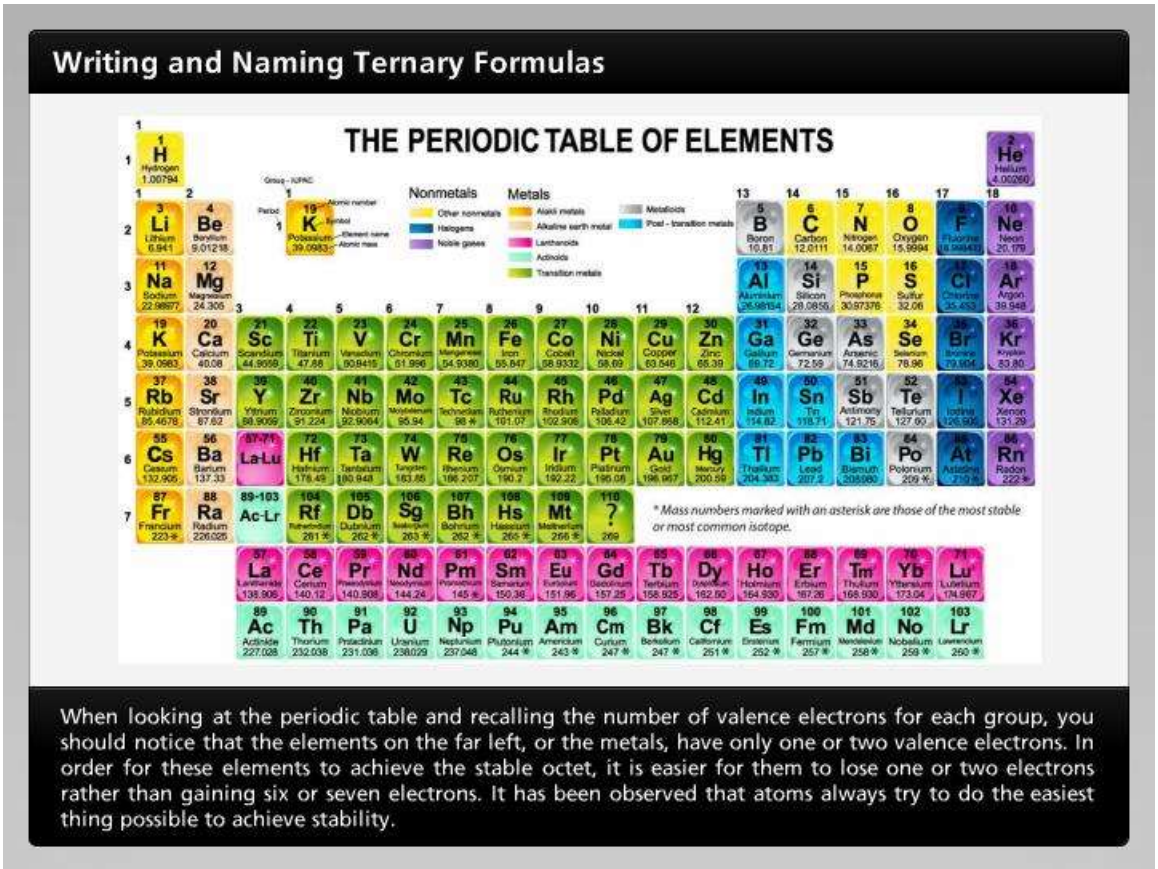
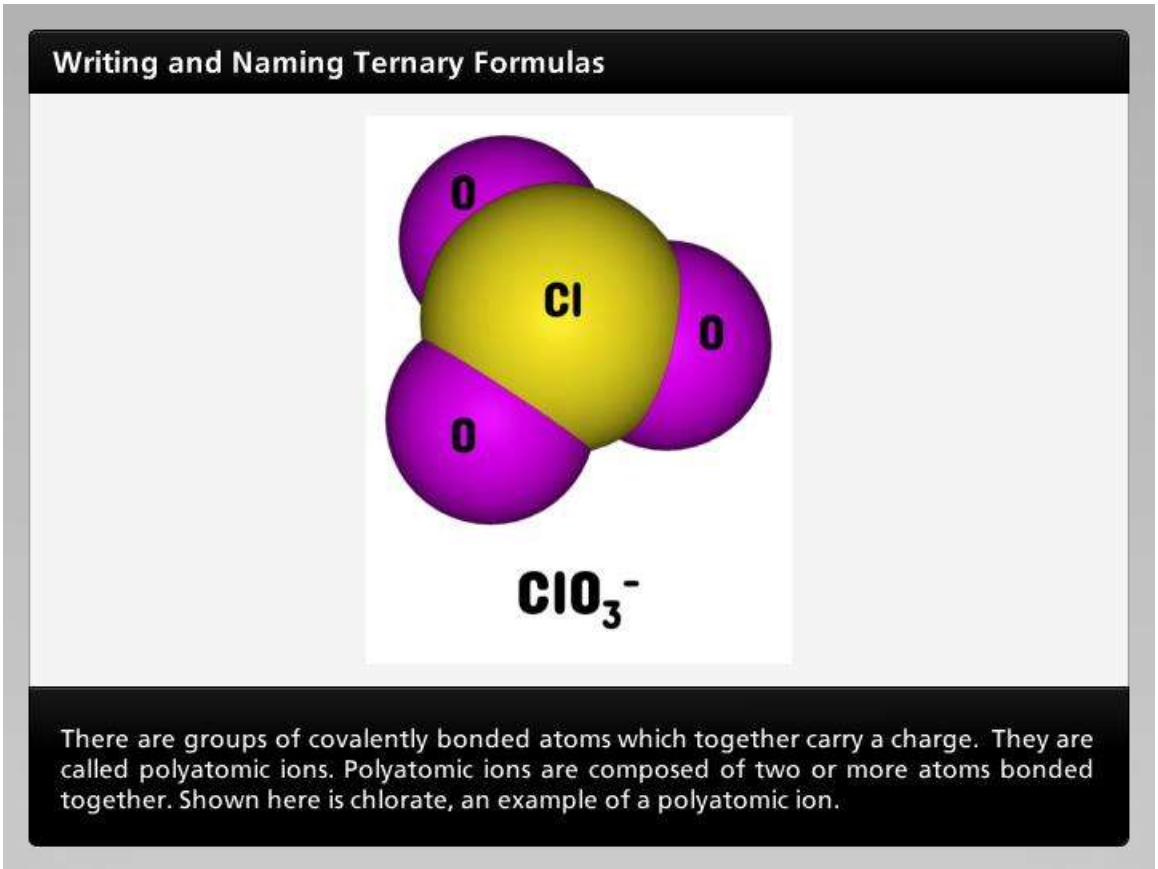
Module 4: Bonding, Formula Writing, and Nomenclature
Topic 4 Content: Writing and Naming Ternary Formulas Notes



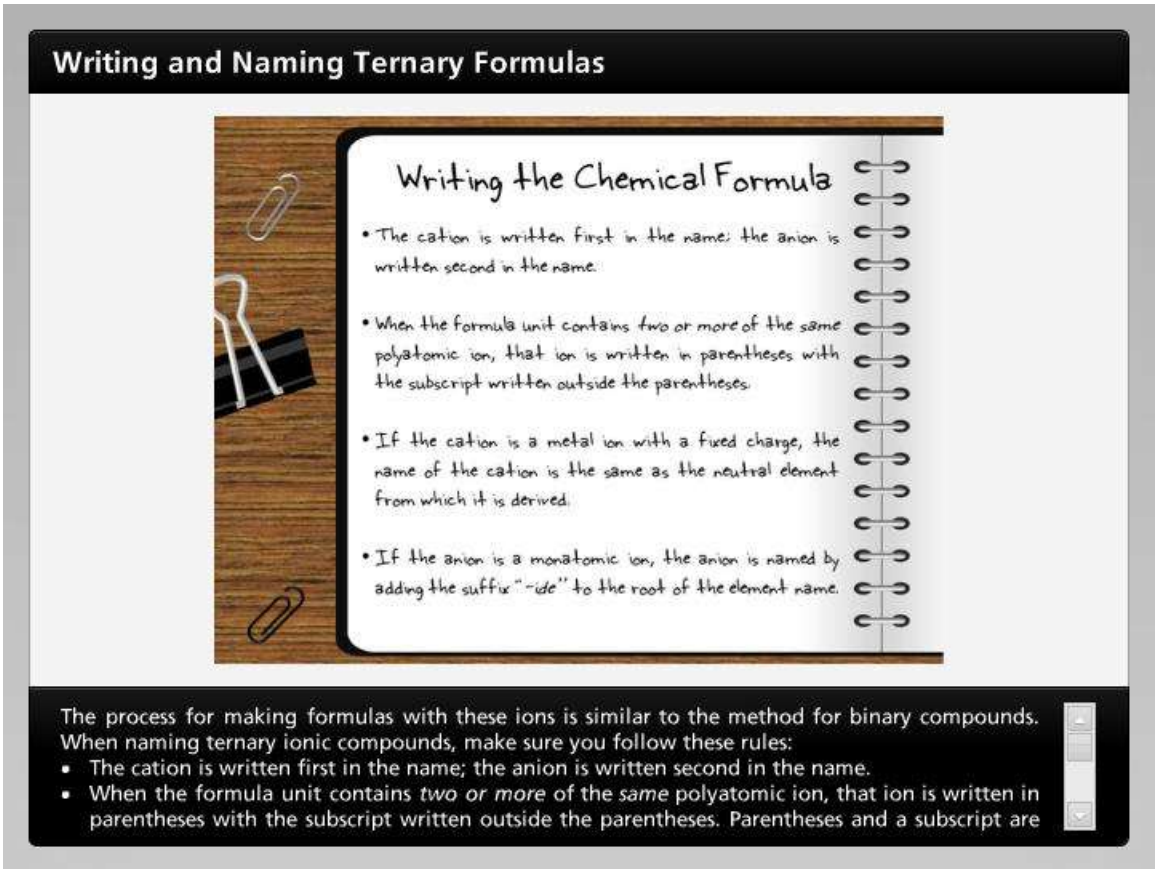
Writing and Naming Ternary Formulas



When looking at the periodic table and recalling the number of valence electrons for each group, you should notice that the elements on the far left, or the metals, have only one or two valence electrons. In order for these elements to achieve the stable octet, it is easier for them to lose one or two electrons rather than gaining six or seven electrons. It has been observed that atoms always try to do the easiest thing possible to achieve stability.

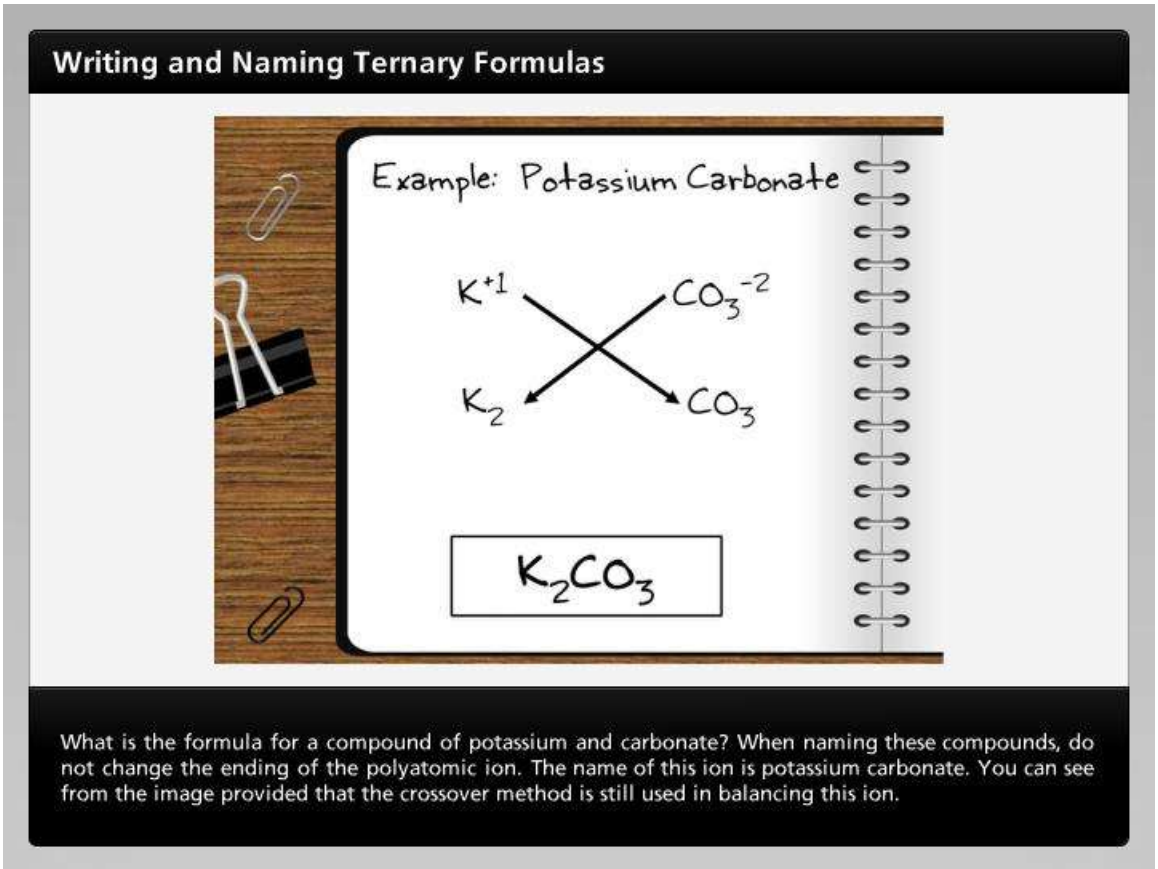


There are groups of covalently bonded atoms which together carry a charge. They are called polyatomic ions. Polyatomic ions are composed of two or more atoms bonded together. Shown here is chlorate, an example of a polyatomic ion.

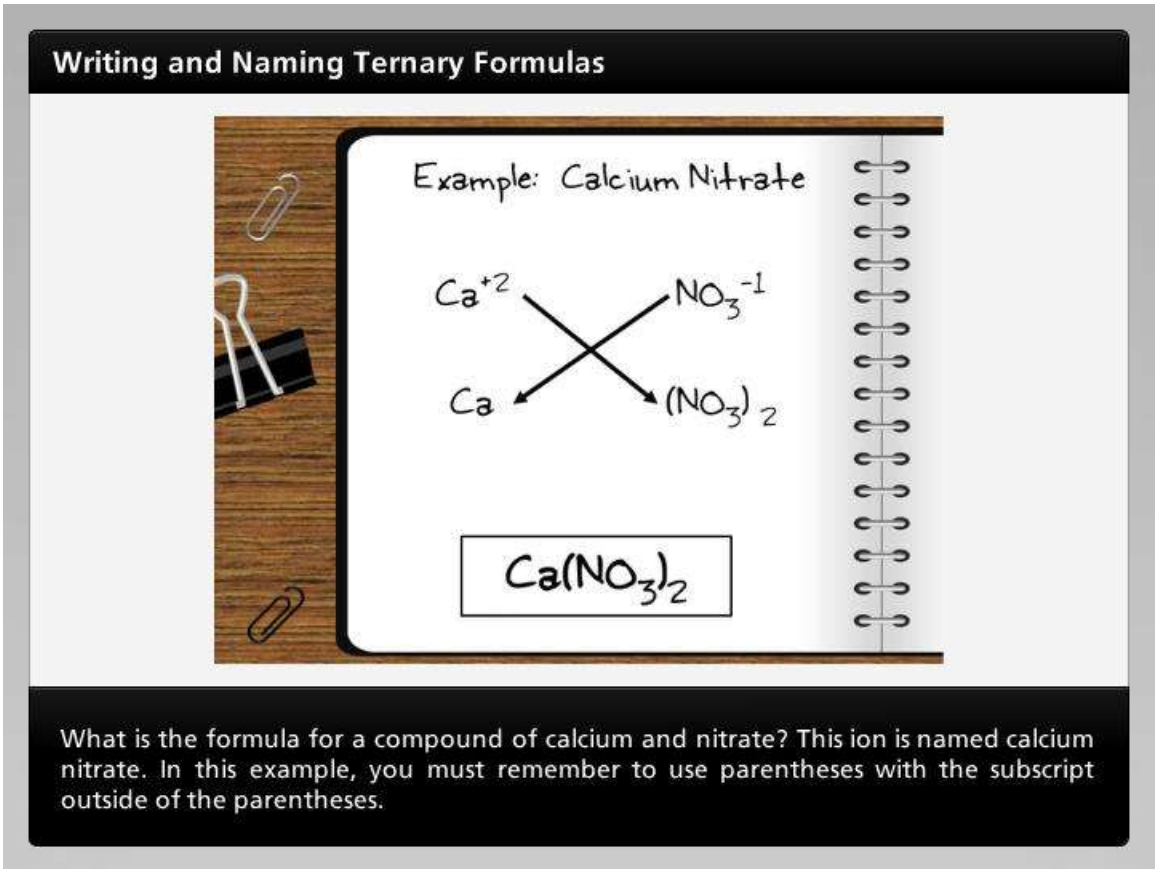


The process for making formulas with these ions is similar to the method for binary compounds. When naming ternary ionic compounds, make sure you follow these rules:

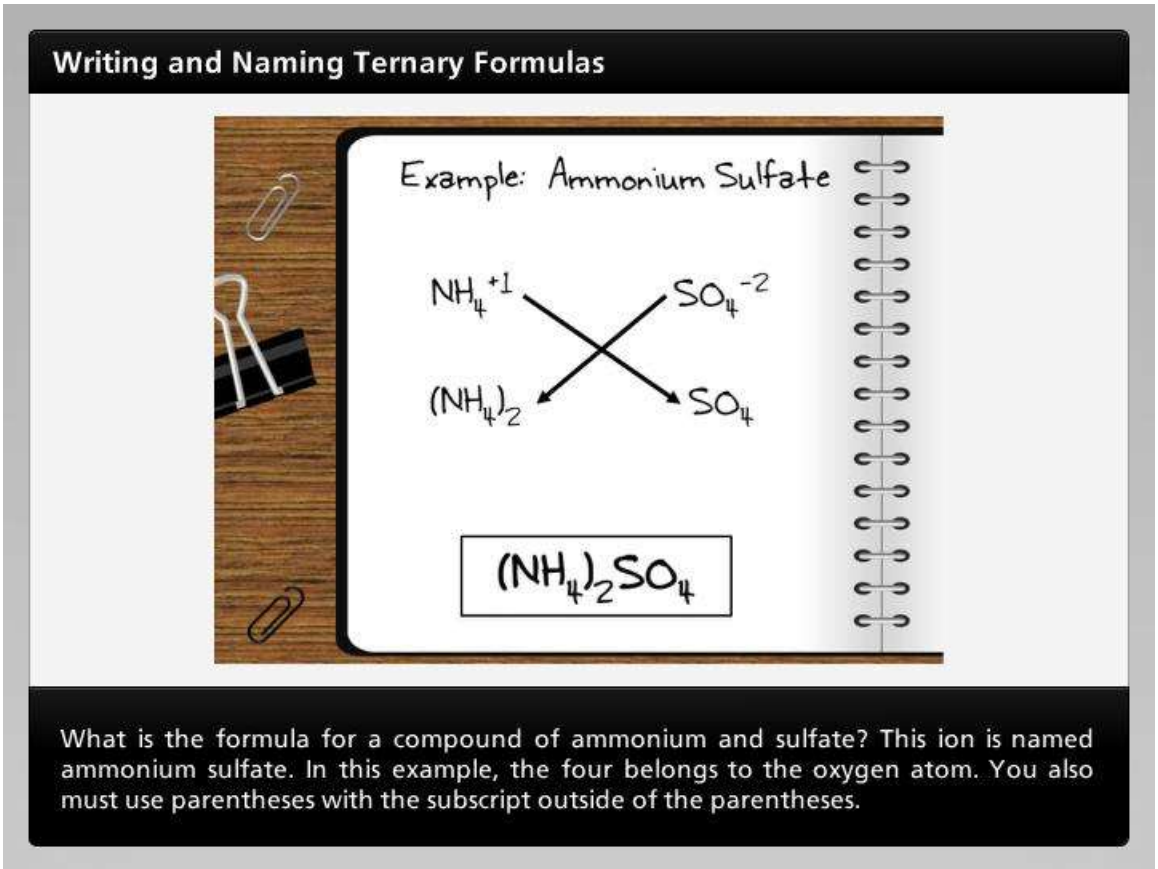
- The cation is written first in the name; the anion is written second in the name.
- When the formula unit contains *two or more* of the *same* polyatomic ion, that ion is written in parentheses with the subscript written outside the parentheses. Parentheses and a subscript are not used unless more than one of a polyatomic ion is present in the formula unit. For example calcium sulfate is written $CaSO_4$.
- If the cation is a metal ion with a fixed charge, the name of the cation is the same as the neutral element from which it is derived. For example Na^+ is written as sodium. If the cation is a metal ion with a variable charge, the charge on the cation is indicated using a Roman numeral, in parentheses, immediately following the name of the cation. For example Fe^{3+} is written as iron with the Roman numeral three.
- If the anion is a monatomic ion, the anion is named by adding the suffix "*-ide"* to the root of the element name.



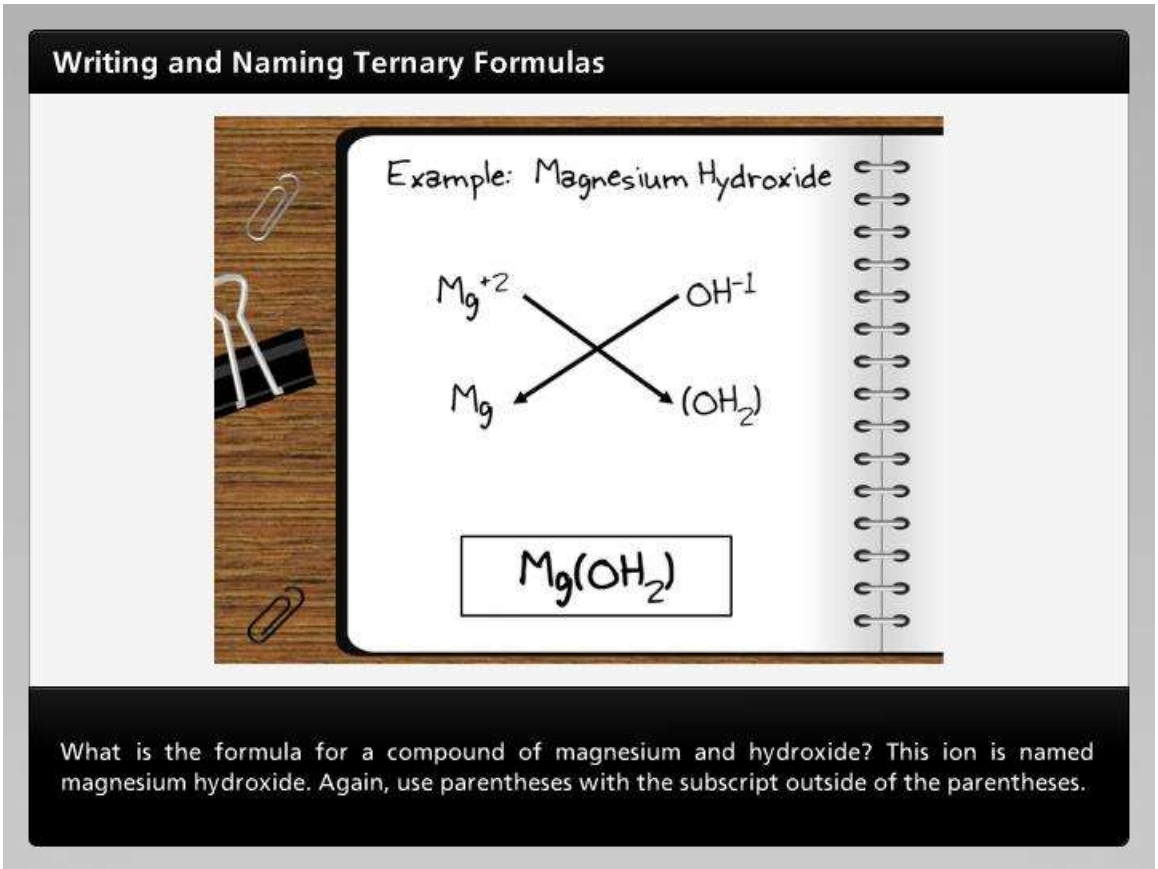
What is the formula for a compound of potassium and carbonate? When naming these compounds, do not change the ending of the polyatomic ion. The name of this ion is potassium carbonate. You can see from the image provided that the crossover method is still used in balancing this ion.



What is the formula for a compound of calcium and nitrate? This ion is named calcium nitrate. In this example, you must remember to use parentheses with the subscript outside of the parentheses.



What is the formula for a compound of ammonium and sulfate? This ion is named ammonium sulfate. In this example, the four belongs to the oxygen atom. You also must use parentheses with the subscript outside of the parentheses.



What is the formula for a compound of magnesium and hydroxide? This ion is named magnesium hydroxide. Again, use parentheses with the subscript outside of the parentheses.