Ionic bonding is straightforward when a metal forms an ionic bond with a halogen because each halogen can accept only one electron. The Group 1/1A metals form an ionic compound with 1 halogen atom

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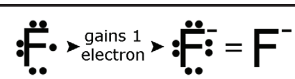
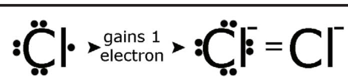
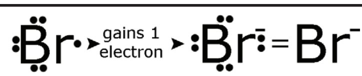
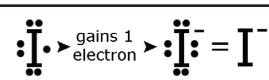
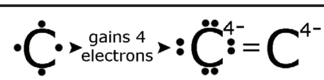
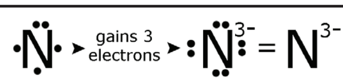
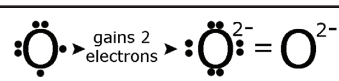
and the Group 2/2A metals form an ionic compound with 2 halogen atoms.

When the anion is not one of the halogens, it gets a little trickier to figure out the bonding relationships, but it isn't impossible to understand. Let's use one of the anions from **Figure 8.5.3** as an example (and we will go through several more examples at the end of the chapter).

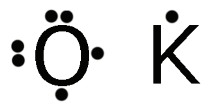
Figure 8.5.3

Some Anions and Their Names

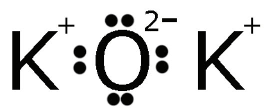
Because they have room for one electron, the halogens (F, Cl, Br, I) all accept one electron from a metal to become a 1- anion. As a result, their electron dot structures all look similar (fluorine, chlorine, bromine and iodine, for example). For non-halogens that become anions, all you need to know is how many electrons they can accept in the outer shell to fulfill the octet rule. Carbon is Group 14/4A, atomic number 6, so it has 2 electrons in its inner shell and 4 in its outer shell; therefore, it can accept four more electrons in its outer shell to fulfill the octet rule. When it accepts 4 electrons, that means it will have 4 more electrons than protons—meaning 4 more negative charges than positive charges—and so it will be charged 4-. Nitrogen is a Group 5/5A atom, atomic number 7, with 2 electrons in its inner shell and 5 in its outer; therefore, it can accept 3 electrons to fulfill the octet rule. When it does that, then it will have 3 more electrons than protons—3 additional negative charges—and so the nitride ion is charged 3-. Note the ending of the anion changes to "-ide" as the suffix.

Element (symbol)	Electron Dot Structure and Ion Symbol	Anion Name
fluorine		fluoride
chlorine		chloride
bromine		bromide
iodine		iodide
carbon		carbide
nitrogen		nitride
oxygen		oxide

For our example, let's name the compound formed between potassium and oxygen. Potassium is K and is a Group 1/1A element. Oxygen is O and is a Group 16/6A element. Since this compound contains a Group 1/1A element, we know this is an ionic compound. K is the metal, and so it is the electron donor; therefore, oxygen is the electron acceptor. Being a Group 1/1A element, potassium has 1 valence electron, and oxygen, in Group 16/6A, has 6 valence electrons:



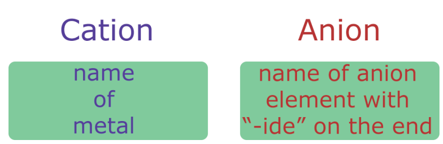
Oxygen needs 2 electrons to fulfill the octet rule and thereby have a filled outer shell and potassium has 1 to donate. Therefore, two K atoms, each giving 1 electron and becoming the K^+ cation, would mean that oxygen acquires those two, becoming the 2^- oxygen anion:



So, the chemical formula for this ionic compound would be K_2O. The name is "cation anion-with-'ide'-at-the-end," so it would be named, "potassium oxide."

Figure 8.5.4

Examples of Ionic Compound Names
Naming ionic compounds is straightforward. I have some random examples below.



Elements that bond	Cation (metal)	Anion (non-metal)	Name
Strontium and sulfur	Strontium	Sulfur	Strontium sulfide
Phosphorus and potassium	Potassium	Phosphorus	Potassium phosphide
Barium and iodine	Barium	Iodine	Barium iodide
Hydrogen and lithium	Lithium	Hydrogen	Lithium hydride