

Bonding Basics

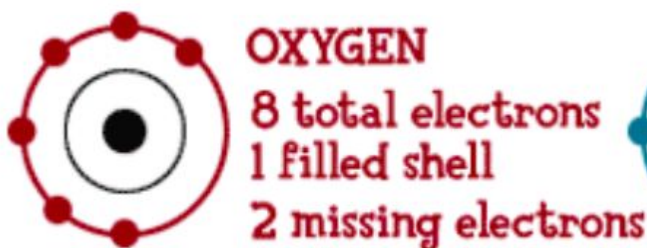
You must first learn why atoms **bond** together. We use a concept called "Happy Atoms." We figure that most atoms want to be happy, just like you. The idea behind Happy Atoms is that atomic **shells** like to be full. That's it. If you are an **atom** and you have a shell, you want your shell to be full. Some atoms have too many **electrons** (one or two extra). These atoms like to give up their electrons. Some atoms are really close to having a full shell. Those atoms go around looking for other atoms who want to give up an electron.

Let's take a look at some examples.



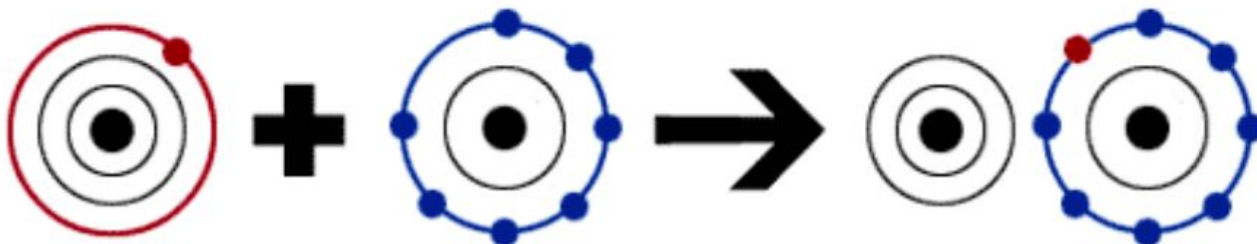
We should start with the atoms that have atomic numbers between 1 and 18. There is a 2-8-8 rule for these elements. The first shell is filled with 2 electrons, the second is filled with 8 electrons, and the third is filled with 8. You can see that **sodium** (Na) and **magnesium** (Mg) have a couple of extra electrons. They, like all atoms, want to be happy. They have two possibilities: they can try to get to eight electrons to fill up their third shell, or they can give up a few electrons and have a filled second shell. It is always easier to give away one or two electrons than it is to go out and find six or seven to fill your shells.

What a coincidence! Many other atoms are interested in gaining a few extra electrons.



Oxygen (O) and **fluorine** (F) are two good examples. Each of those elements is looking for a couple of electrons to make a filled shell. They each have one filled shell with two electrons, but their second shells want to have eight. There are a couple of ways they can get the electrons. They can share electrons, making a **covalent** bond, or they can just borrow them, and make an **ionic** bond (also called **electrovalent** bond).

So, let's say we've got a sodium atom that has an extra electron. We've also got a fluorine atom that is looking for one.



When they work together, they can both wind up happy! Sodium gives up its extra electron. The sodium then has a full second shell and the fluorine (F) also has a full second shell. Two happy atoms! When an atom gives up an electron, it becomes positive like the sodium ion (Na^+). When an atom gets an extra electron, it becomes negatively charged like the fluorine ion (F^-). The positive and negative charges continue to attract each other like magnets. The attraction of opposite charges is the way they form and maintain the bond. Any atoms in an ionic/electrovalent bond can get or give up electrons.

Name _____ **Thinking Questions:**

1. What are two other atoms that will work with each other in a similar way to Sodium and Fluorine? Why would these elements be similar?

2. Can Oxygen and Magnesium work together? Why or why not?

3. It is possible Sodium to bond with oxygen, it's just not as straight forward as the last two examples. What do you think has to happen to make this work?
Feel free to use this space just to brainstorm, draw a diagram, and/or give a thorough response

4. What is wrong with with the last diagrams from the reading?