

## Bonding: Let's Get Together

In order to create all the variety of matter or stuff that exists in the world, atoms must combine. There are only about 100 different kinds of atoms but many, many different kinds of matter. All of these different kinds of matter are created by links that hold atoms together. These links are called **bonds**. Chemical bonds are not an actual structure like a bridge, but they are a chemical attraction that holds more than one atom together. Two of the most common kinds of bonds are ionic and covalent.

In order to understand bonding, you need to know what an atom is like. Atoms are made of three smaller parts – protons, neutrons, and **electrons**. Protons and neutrons are in the center of an atom but electrons orbit around the outside of the atom. Electrons are very tiny and have negative charges. Electrons fill the orbits around the nucleus in order. Electrons first fill the orbit closest to the nucleus and then work outward. Atoms are most stable when their outermost electron orbit is full. An atom's **outermost** electrons are the only ones that are able to interact with the electrons of other atoms. So atoms **lose, gain, or share** outer electrons by forming bonds in order to fill their outermost orbit.

Some kinds of atoms already have a full set of outer electrons. These kinds of atoms are very stable and do not form bonds with other atoms. Examples are the **noble gases** such as helium and neon. Because helium is very unreactive it is a good, safe choice for filling hot air balloons.

**Ionic bonds** are created when electrons are **lost** by one kind of atom and **gained** by another. This is helpful for both types of atoms involved because it helps them to fill their outermost electron orbits and be stable. An example of an ionic compound that is created by giving and taking of electrons is **sodium chloride**. Sodium (Na) is a type of atom that is in need of one electron to be stable. Chlorine (Cl) is an atom that has an extra electron that it needs to give away to be stable. This problem is solved when sodium and chlorine interact and form an ionic bond. The compound that is created is called sodium chloride or NaCl which is table salt.

Another very common type of bond is a **covalent** bond. Covalent bonds are created when electrons are **shared** between atoms. Again, this helps both atoms by filling their outer electron orbits and making them more stable. When atoms come together and form covalent bonds the result is a **molecule**. There are many examples of molecules including **water, sugar, and carbon dioxide**. Every tissue in our bodies contains molecules held together by covalent bonds.

### Bonding: Let's Get Together Questions

1. True or False. Chemical bonds between atoms are necessary to form the variety of matter that exists in the world.
2. True or False. Chemical bonds are actually a physical connection between two atoms similar to a bridge.
3. What part of an atom is important in bonding?
  - a. nucleus
  - b. protons
  - c. electrons
  - d. neutrons
4. Which kind of electrons are able to interact with the electrons of another atom?
  - a. inner
  - b. outer
5. The \_\_\_\_\_ gases are very stable and do not easily form bonds.
6. A \_\_\_\_\_ bond is created by giving and taking of electrons between atoms.
7. Give an example of a compound formed by an ionic bond.
8. Covalent bonds are created by \_\_\_\_\_ of electrons.
9. When atoms form covalent bonds a \_\_\_\_\_ is created.
  - a. orbit
  - b. nucleus
  - c. element
  - d. molecule
10. Give an example of a molecule formed by covalent bonding.

## Bonding: Let's Get Together Answers

1. **True** or False. Chemical bonds between atoms are necessary to form the variety of matter that exists in the world.
2. True or **False**. Chemical bonds are actually a physical connection between two atoms similar to a bridge.
3. What part of an atom is important in bonding?
  - a. nucleus
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  - c. electrons**
  - d. neutrons
4. Which kind of electrons are able to interact with the electrons of another atom?
  - a. inner
  - b. outer**
5. The **noble** gases are very stable and do not easily form bonds.
6. An **ionic** bond is created by giving and taking of electrons between atoms.
7. Give an example of a compound formed by an ionic bond.  
**Sodium chloride**
8. Covalent bonds are created by **sharing** of electrons.
9. When atoms form covalent bonds a \_\_\_\_\_ is created.
  - a. orbit
  - b. nucleus
  - c. element
  - d. molecule**
10. Give an example of a molecule formed by covalent bonding.  
**Water, sugar, carbon dioxide...**