# Chapter \_\_\_\_\_\_ Bonding and Chemical Compounds (p. 356-385)

# I. Lesson 1: Atoms and Bonding

## A. Valence Electrons

### When atoms combine they form \_\_\_\_\_\_

### \_\_\_\_\_\_ \_\_\_\_\_\_ of an atom are those electrons that have the highest energy; they are also involved in \_\_\_\_\_\_ \_\_\_\_\_\_

### The number of valence electrons in each atom helps determine the \_\_\_\_\_\_ \_\_\_\_\_\_ of that element

### Each atom of an element has a certain number of \_\_\_\_\_\_ \_\_\_\_\_\_

### Different \_\_\_\_\_\_ can have from 1 to 8 valence electrons

### An \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ includes the symbol for the element surrounded by dots; each \_\_\_\_\_\_ stands for one valence electron

### Atoms tend to be more \_\_\_\_\_\_ when they have 8 valence electrons like the \_\_\_\_\_\_ \_\_\_\_\_\_ (and trust me, atoms *really* \_\_\_\_\_\_ to be stable)

### When atoms bond their valence electrons may be \_\_\_\_\_\_ or \_\_\_\_\_\_

### A chemical bond is the force of \_\_\_\_\_\_ that holds atoms together as a result of the rearrangement of electrons between them

B. Applying the Periodic Table

1. The \_\_\_\_\_\_ \_\_\_\_\_\_ also gives you information about the valence electrons in the atoms

2. The number of valence electrons \_\_\_\_\_\_ from left to right

a. Group 1- \_\_\_\_\_\_ \_\_\_\_\_\_ have 1 valence electron

1. Alkali metals are the most \_\_\_\_\_\_ metals in their period

b. Group 2- \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ have 2 valence electrons

c. Groups 3-13- follow a slightly \_\_\_\_\_\_ pattern but most have 3

d. Group 14- \_\_\_\_\_\_ family has 4 valence electrons

e. Group 15- \_\_\_\_\_\_ family has 5 valence electrons

d. Group 16- \_\_\_\_\_\_ family has 6 valence electrons

f. Group 17- \_\_\_\_\_\_ have 7 valence electrons

1. Halogens react easily because they have 7 valence electrons and only need \_\_\_\_\_\_ more to complete their shell

g. Group 18- \_\_\_\_\_\_ \_\_\_\_\_\_ have 8 valence electrons (a \_\_\_\_\_\_ shell), with the exception of helium which has 2 valence electrons

1. Noble gases do not react easily with other elements because of their \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_

**II. Lesson 2: Elements Forming Compounds**

A. Ions

1. An \_\_\_\_\_\_ is an atom or group of atoms that forms has an \_\_\_\_\_\_ \_\_\_\_\_\_ (positive or negative)

a. When a neutral atom loses an electron it becomes \_\_\_\_\_\_

b. When a neutral atom gains an electron it becomes \_\_\_\_\_\_

2. Metal atoms tend to \_\_\_\_\_\_ electrons to have a stable arrangement of 8 electrons at the lower level

3. Nonmetal atoms are likely to \_\_\_\_\_\_ electrons so that they have 8 valence electrons

B. Common \_\_\_\_\_\_

1. (Li+, K+, F-, Cl-, etc.) page 366

C. Ionic Bonds

1. When atoms that easily \_\_\_\_\_\_ electrons react with atoms that easily \_\_\_\_\_\_ electrons, valence electrons are \_\_\_\_\_\_ from one type of atom to another

2. Oppositely charged particles \_\_\_\_\_\_ and form an \_\_\_\_\_\_ \_\_\_\_\_\_

3. An ionic compound is made up of positive and negative ions, but the overall charge of the compound is \_\_\_\_\_\_ an example: Na+ + Cl- →NaCl

D. Formulas of Ionic Compounds

1. A chemical formula is a group of symbols that shows the \_\_\_\_\_ of elements in a \_\_\_\_

a. example: CaCl2

b. Ca and Cl are \_\_\_\_\_\_ \_\_\_\_\_\_ and 2 is a subscript which tells the ratio in a compound

c. If no subscript is written, the subscript is \_\_\_\_\_\_

E. Naming Ionic Compounds

1. For an ionic compound, the name of the \_\_\_\_\_\_ ion is \_\_\_\_\_\_, followed by the negative ion

2. If the negative ion is a \_\_\_\_\_\_ atom, the end of its name changes to –*ide*

3. If the negative ion is \_\_\_\_\_\_ (multiple or many atoms) the end of the name changes to –*ate* or -*ite*

F. Electron Sharing

1. A \_\_\_\_\_\_ \_\_\_\_\_\_ is a compound that is made up of molecules

2. A molecule is a \_\_\_\_\_\_ group of atoms joined by \_\_\_\_\_\_ bonds

a. example: H2O

3. \_\_\_\_\_\_ = attraction of ions and \_\_\_\_\_\_ = sharing electrons

G. How Many Bonds?

1. 1 bond= \_\_\_\_\_\_ bond (H2O)

2. 2 bonds= \_\_\_\_\_\_ bond (CO2)

3. 3 bonds= \_\_\_\_\_\_ bond (NO2)

H. Nonpolar and Polar Bonds

1. A \_\_\_\_\_\_ bond is a covalent bond in which electrons are shared \_\_\_\_\_\_

2. A \_\_\_\_\_\_ bond is when electrons are \_\_\_\_\_\_ \_\_\_\_\_\_ equally

a. When electrons in a covalent bond are not shared equally, the atom with a \_\_\_\_\_\_ pull gains a slightly \_\_\_\_\_\_ charge and the atom with the \_\_\_\_\_\_ pull gains a slightly \_\_\_\_\_\_ charge

I. Polar Bonds in Molecules

1. A molecule is \_\_\_\_\_\_ if it has a positively charged end and a negatively charged end

2. Molecules with polar bonds are not always polar \_\_\_\_\_\_

a. example: H2O is \_\_\_\_\_\_ b. example: CO2 is \_\_\_\_\_\_

J. Attractions between molecules

1. Polar molecules are connected to each other by \_\_\_\_\_\_ attractions between their slight positive and slight negative attractions, and these attractions are called \_\_\_\_\_ \_\_\_\_\_

2. The \_\_\_\_\_\_ of polar and nonpolar compounds are different because of differences in attractions between their molecules

K. Properties of Metals

1. Each \_\_\_\_\_\_ of metal is determined by the \_\_\_\_\_\_ of metal atoms and the \_\_\_\_\_\_ between their valence electrons

2. When metal atoms combine chemically with atoms of other elements, they usually \_\_\_\_\_\_ valence electrons because they do not hold onto them very strongly

3. Each metal ion is held together by a \_\_\_\_\_\_ \_\_\_\_\_\_ —an attraction between a positive metal ion and the electrons surrounding it

**III. Lesson 3: Classifying Chemical Compounds**

A. Properties of Ionic and Molecular Compounds

1. Crystals

a. Ionic compounds form solids by building up \_\_\_\_\_\_ \_\_\_\_\_\_ of ions which is a 3-D arrangement called a crystal (example: NaCl)

2. Melting Points and Boiling Points

a. The ions in an ionic compound must break apart for a compound to \_\_\_\_\_\_

b. It takes a huge amount of \_\_\_\_\_\_ \_\_\_\_\_\_ to break apart the ions and that is why ionic compounds have \_\_\_\_\_\_ melting points

c. Compared to ionic compounds, \_\_\_\_\_\_ \_\_\_\_\_\_ have much \_\_\_\_\_\_ boiling and melting points

3. Electrical Conductivity

a. Electrical current is the flow of \_\_\_\_\_\_ \_\_\_\_\_\_

b. Ionic compounds in a solid form do not \_\_\_\_\_\_ electrical current well because the charged particles do not move easily; \_\_\_\_\_\_ forms are good conductors

c. Most molecular compounds do not \_\_\_\_\_\_ current well for the same reason (example: plastic and rubber)

B. What are the properties of acids, bases, and salts?

1. Acids

a. \_\_\_\_\_\_ are compounds with specific characteristic \_\_\_\_\_\_: react with metals and carbonates, tastes sour, and turns blue litmus paper \_\_\_\_\_\_

1. Acids \_\_\_\_\_\_ metals and carbonates like limestone

2. Acids taste sour (example: lemons, limes, and oranges)

3. Litmus paper is one type of \_\_\_\_\_\_, which is a compound that changes color when it comes in contact with acid

2. Bases

a. \_\_\_\_\_\_ are another group of compounds that can be identified by their \_\_\_\_\_\_: tastes bitter, feels slippery, and turn litmus paper blue

1. Tonic water, almonds, and cocoa beans are \_\_\_\_\_\_

2. \_\_\_\_\_\_ and detergents contain bases that is why they feel slippery, strong bases can be just as dangerous as acid

3. \_\_\_\_\_\_ \_\_\_\_\_\_ can also be used to test bases and it turns blue

3. Salts

a. A reaction between an \_\_\_\_\_\_ and a \_\_\_\_\_\_ is called \_\_\_\_\_\_, which results in the formation of salt

b. A \_\_\_\_\_\_ is any ionic compound that can be made from a neutralization compound; they are made from the \_\_\_\_\_\_ ion of a \_\_\_\_\_\_ and the \_\_\_\_\_\_ ion of an \_\_\_\_\_\_

c. Since salts are made from ions, they share the same properties of ionic compounds, including \_\_\_\_\_\_ shape, \_\_\_\_\_\_ melting and boiling points, and electrical \_\_\_\_\_\_

4. pH Scale

a. Acids and bases are measured using a \_\_\_ \_\_\_\_\_\_ which ranges from 0 to 14

b. Most \_\_\_\_\_\_ substances are found at the \_\_\_\_\_\_ end of the scale and \_\_\_\_\_\_ substances are found at the \_\_\_\_\_\_ end

c. \_\_\_\_\_\_ \_\_\_\_\_\_ like litmus paper tells you the pH of a substance

d. A pH lower than 7 is \_\_\_\_\_\_ and a pH higher than 7 is \_\_\_\_\_\_

e. If a pH is \_\_\_\_\_\_ 7 the substance is ­­­\_\_\_\_\_\_ like pure water

THE END!!!