

# *Introduction to Chemistry*

(Chapter 14)

**Student Learning Outcome:** Distinguish between physical and chemical properties; analyze a system and determine whether a physical or chemical change has occurred; and classify, compare, name, and identify chemical quantities.

1. *What is chemistry?*
2. *What are some physical and chemical properties?*
3. *How are elements, molecules, compounds and mixtures defined?*
4. *What are some rules for naming compounds?*

*What is chemistry?*

- ❖ Chemistry is the study of atoms/elements, how they exist naturally, and how they combine.
- ❖ It is the study of how to make new substances.
- ❖ Chemistry is the study of the **microscopic** world.
- ❖ Physics is a study of the **macroscopic** world.

**Question:** Is surface tension a microscopic or macroscopic property of matter?

*What are some physical and chemical properties?*

- ❖ **Physical properties are the macroscopic properties of a material that are visible to us.**
  - Density
  - Phase
  - Appearance
  - Size

**Question:** Name the macroscopic properties of water.

- ❖ The physical properties of a substance **can** change without changing what the substance is.

❖ **Chemical properties are the microscopic properties that give a substance its characteristics.**

- Atomic make-up
- Structure
- Reactivity

**Question:** Name the microscopic properties of water.

❖ The chemical properties of a substance **cannot** change without changing what the substance is.

**Question:** How does carbon dioxide (CO<sub>2</sub>) compare to water (H<sub>2</sub>O)?

- ❖ **The primary difference between a physical change and a chemical change is that a chemical change produces a new substance.**
- ❖ Physical changes are changes in appearance.
- ❖ Chemical changes are changes in atomic make-up.

*Some Indicators of Chemical Change*

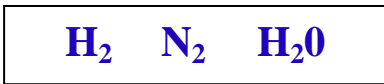
Color change  
Spontaneous production of a gas  
Spontaneous temperature change  
Light  
Sound

**Question:** What is an example for each of the chemical change indicators?

*How are elements, molecules, compounds and mixtures defined?*

- ❖ A **chemical bond** is an attraction between atoms that results in a new substance.
  - The electrons are shared in some way between the two atoms.

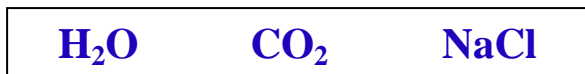
- ❖ A **molecule** is the smallest unit of a compound that retains the chemical characteristics of a compound. It is 2 or more atoms in a chemical bond.



*Types of Molecules*

Type	Atom Number
<b>Diatomic</b>	2
<b>Triatomic</b>	3
<b>Polyatomic</b>	4+

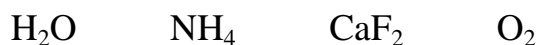
- ❖ A **compound** is 2 or more different types of atoms in a chemical bond.



- ❖ A **mixture** contains 2 or more different molecules and each substance maintains its individual chemical properties.
- ❖ A **molecular formula** shows the numbers of atoms of each type within one molecule of the compound.

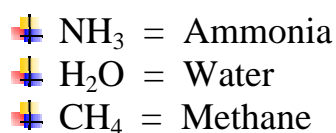
**Questions:**

- 1) What is an example of a mixture?
- 2) Which of the following molecules is not a compound? How many atoms are contained in each of these molecules?



*What are some rules for naming compounds?*

- ❖ Traditional



❖ Metal + Nonmetal Compounds

**Rule:** “Left” then “Right + ide”

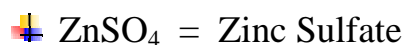


❖ Prefixes



❖ Metal + Polyatomic Ion

**Rule:** “Metal” then “Ion + ate”



1. Mono
2. Di
3. Tri
4. Tetra
5. Penta
6. Hexa
7. Hept
8. Oct

**Questions:**

1. What is the technical name?

- a. O<sub>2</sub>
- b. H<sub>2</sub>O
- c. KBr
- d. O<sub>3</sub>
- e. PCl<sub>5</sub>
- f. SF<sub>6</sub>
- g. K<sub>3</sub>PO<sub>4</sub>
- h. NaCO<sub>3</sub>

2. What is the common name of NaCl?