Inspiring Greatness
ISD
INDEPENDENCE SCHOOL DISTRICT

High School Science Virtual Learning

College Chemistry
Chemical Bonding Virtual Lab

April 29, 2020

High School College Chemistry
Lesson: April 29, 2020

Objective/Learning Target:
Students will complete lab activities to learn about chemical bonding.

Let’s Get Started:

1. Give one example of an ionic compound.

2. Give an example of a covalent compound.

Let's Get Started: Answer Key

1. See linked list: List of Ionic Bond Examples

2. See linked list: List of Covalent Bond Examples

Lesson Activity:

- Just like the lessons from earlier this week, this activity will be split between two days.
- Today you will watch the lab video and complete the lab worksheet. There are some review concepts, so there are some additional notes added after the lab.
- Tomorrow you will check your answers and watch a deeper explanation of the lab.

Lesson Activity:

Directions

- Watch this video.
- Answer the questions on your lab worksheet.
- The data for the lab worksheet can be found here.

NOTES:

Types of Elements

- Metal - majority of elements found naturally on Earth
- Metalloid - has properties of both metals and nonmetals
- Non-Metal

NOTES:

Properties of Metals

- Mostly solid at room temperature - exception is mercury, which is liquid at room temperature
- Conducts electricity and head well
- Does not dissolve in water or oil
- Has high melting point
- Shiny appearance
- Malleable - ability to bend
- Ductile - ability to be drawn into a wire
- Tend to become cations

NOTES:

Properties of Nonmetals

- Can be solid, liquid, or gas at room temperature
- Low melting points and low boiling points
- Does not conduct electricity or heat well
- If solid, substance is very brittle
- Dull appearance
- Not ductile or malleable
- Tend to become anions

NOTES:

Ionic Compounds vs. Covalent Compounds

- Ionic Compounds - is a compound composed of cations and anions and held together by electrostatic forces.
  - Cation - an element/group of elements all possessing a positive oxidation state
  - Anion - an element/group of elements all possessing a negative oxidation state
  - Electrostatic force - force of attraction created by the opposite charges created by anions and cations

NOTES:

Ionic Compounds vs. Covalent Compounds

- Covalent Compounds - is a compound composed of nonmetals and held together by the sharing of electrons.
  - Two atoms held together by sharing one pair of electrons are joined by a single covalent bond.
  - A double covalent bond is a bond that involves two shared pairs of electrons.
  - Similarly, a bond formed by sharing three pairs of electrons is a triple covalent bond.

NOTES:

Properties Ionic Compounds

- Most ionic compounds are crystalline solids at room temperature.
- Tend to have high melting points and high boiling points due to strong bonds between ions
- Can conduct an electric current when melted or dissolved in water.
- Most are soluble in water, but not soluble in organic substances, like oil.

NOTES:

Properties of Covalent Compounds

- Exists as a solid, liquid, or gas at room temperature
- Require a large amount of energy to break the bond between atoms (High Bond Dissociation Energy)
- Low melting point and low boiling point due to weak bonds between molecules
- Do no conduct electricity
- Most covalent compounds are not soluble in water, but are soluble in organic substances like oil

NOTES:

Nonpolar vs. Polar Covalent Molecules

- Nonpolar covalent molecules exists when the electrons within the bond are shared equally.
- Nonpolar molecules exists when covalent molecules do not share electrons evenly. Usually due to a difference in electronegativity.
  - Electronegativity - atoms ability to obtain an electron
- See link for additional information: Polar and Nonpolar Covalent Bond Notes

Practice

Complete the following questions using the information you learned during the lesson activity.

Questions:

1. Fill in the table below.

Compound	Element 1: Metal or Nonmetal	Element 2: Metal or Nonmetal	Bond Type
NO_2			
NaCl			
SO_2			
$MgBr_2$			

Questions:

2. An unknown solid substance experimentally had high melting point, but did not conduct electricity in its solid state. What type of compound was it?
3. An unknown solid substance experimentally had a low melting point, was dissolvable in water, but did not conduct electricity when in the water. What type of compound was it?

Answer Key:

1. Fill in the table below.

Compound	Element 1: Metal or Nonmetal	Element 2: Metal or Nonmetal	Bond Type
NO_2	Nonmetal	Nonmetal	Covalent
NaCl	Metal	Nonmetal	Ionic
SO_2	Nonmetal	Nonmetal	Covalent
$MgBr_2$	Metal	Nonmetal	Ionic

Answer Key:

2. An unknown solid substance experimentally had high melting point, not soluble in water, but did conduct electricity in its solid state. What type of compound was it? Metal
3. An unknown solid substance experimentally had a low melting point, was dissolvable in water, but did not conduct electricity when in the water. What type of compound was it? Covalent