Grade 7 Science

Week of December 14– December 18

Atoms and Ions

Introduction

Exploring Types of Chemicals

You have learned about **atoms** and many of the elements on the periodic table. What happens when elements combine? In this section, you will learn what happens when different elements combine to make new compounds.

$C_{12}H_{22}O_{11}$ =

Scientists use symbols and chemical formulas to communicate with other scientists. This common language helps them to talk about and understand chemistry.

Just like letters can be put together in many ways to make different words, there are many ways to combine elements to make different substances or compounds. There are over 115 elements that can combine to make millions and millions of substances. Get ready to learn a new language—the language of chemistry!

Atoms vs. Ions

In this lesson, you will learn about how electrons can move from one atom to another. Why do they move? Electrons move from one element's atom to the next to help fill their outer shells. You can move electrons, too! You will learn how atoms form ions, and what makes atoms different from ions. For example, copper ***ion*** (bluish) is a different colour than a copper ***atom*** (reddish).

Bohr Diagrams

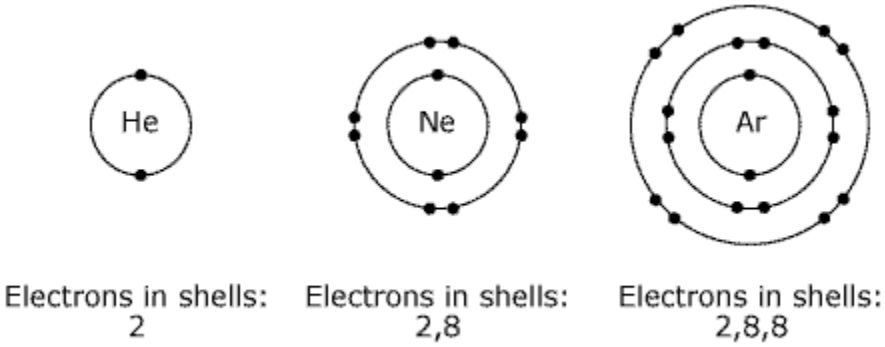
Bohr Diagrams of Ions: https://youtu.be/KC8XIZEuNWQ

Ions

Recall the three subatomic particles: protons, electrons, and neutrons, and the arrangement of electrons around the nucleus. Using your new knowledge on Bohr Diagrams, you will now find out how atoms become **ions** by gaining or losing electrons.

Stable Ions

Look carefully at the following Bohr models of three noble gases:



Each of these atoms has its outer shell completely full. When an atom has filled its outer shell, it is very stable.

Metals and Non-Metals

Metals like to form positive ions by losing electrons.

The following video shows the difference between atoms and ions and explains how metal atoms lose electrons to form stable positive ions. It also shows how the periodic table can be used to find common ion charges of some metal elements.

Metal Ions: https://youtu.be/KyH9D5zNl8M

Nonmetals like to form negative ions by gaining electrons.

The following video explains how nonmetal atoms gain electrons to form stable negative ions, and shows how the periodic table can be used to find common ion charges of some nonmetal elements.

Non-metal Ions: https://youtu.be/3M0tqwgq5eE

Summary

- All atoms like to have full electron shells.
- An atom becomes an ion by losing or gaining electrons.
- Metals like to form positive ions.
- A sodium atom has 1 electron in its outermost shell. It gives up its electron to become a positive ion.
- Nonmetals like to gain electrons to form negative ions.
- An atom of chlorine has seven electrons in its outer shell. Chlorine likes to gain one electron to have a full shell with eight electrons

Atoms and Ions

1. When metal atoms form compounds they _____ electrons to form _____ ions called

_____.

2. When non-metal atoms form compounds they _____ electrons to form _____ ions called _____.

3. Classify each of the following as an atom, molecule or ion.

Particle	**Atom, Molecule, or Ion**
H_2	
Ca	
Cl^{-1}	
H_2O	
H^{+1}	
Br	
CO_2	
Ca^{+2}	