

Chemistry All Around Us!

Week 5: Grades 6-8

Day 3: Elements Vs. Compounds

Teacher/Parent Background:

Matter is everything that you can see, touch, taste, and feel. Anything that has mass and takes up space is matter. Matter can be made from only one kind of material, or it can be a mixture of different kinds of materials.

When matter is made of different types of materials, it is called a mixture. When matter is made of only one kind of material, it is a pure substance. A pure substance is matter that is uniform throughout and has consistent properties. All matter is made up of very small particles called atoms.

Atoms are the building blocks of all matter. When a substance contains only one type of atom, it is called an element. Each element has a special name and unique properties that are different from all the rest of the elements. All known elements are organized on a chart called the periodic table of elements. An element is a pure substance and is made of only one type of atom; it cannot be broken down into a simpler substance.

Overview:

In this activity, students practice using the periodic table to look up chemical symbols of elements and use paper circles to construct and compare models of elements and compounds.

Related Standards:

Develop and use models to represent that matter is made up of smaller particles called atoms

Key Terms:

- Atom: The smallest particle of an element, made of electrons, protons and neutrons.
- Element: A pure substance composed of the same type of atom throughout.
- Compound: A substance made of two or more elements that are chemically combined in fixed amounts.

- Periodic Table of Elements: A table in which all the known elements are arranged by properties and are represented by one or two letters, referred to as chemical symbols.

Materials List:

- Scissors
- Glue
- Colored Pencils/Crayons/Markers
- Legos-optional
- Student Resource

Activity Description:

1. Provide students with the Student Resource pages and ask them to follow the instructions.

Closure:

Discuss the following with students:

Why is oxygen considered to be an element in the atmosphere but a compound in Earth and in the ocean? *In the atmosphere oxygen exists as a gas, where the particles of matter are far apart. In solid Earth and the ocean, oxygen exists as a solid or a liquid, where the particles of matter are closer together and are more likely to form compounds.*

Do you think Earth's appearance and composition would be different if the temperature of Earth were increased or decreased by 100C? *The average temperature on Mars is around -55C. What do you think the surface of the red planet is like? Earth's composition would be different if Earth's temperature decreased by 100C because all the water would freeze. If the temperature increased by 100C, all the water would disappear because it would have vaporized. The difference in temperature on Mars is enough to guarantee that if there is water on Mars it is frozen solid. At -55C, many other elements and compounds will be solid as well. The surface of Mars probably does not have any life and is a frozen wasteland.*

Extensions:

Chemistry Comic Strip: Have students design a comic strip about the elements to create a story about the elements that compose water, the atmosphere, the solid parts of the Earth, and living matter.

Student Resources

PART 1: Chemical symbols are written with the first letter a capital letter and any other letters as lower case letters. Write the name and chemical symbols for four different elements (you choose the elements.)

2. What is the symbol for Copper? _____

3. What is the symbol for Chlorine? _____

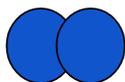
4. What element has the symbol He? _____

5. What element has the symbol Ca? _____

PART 2: On the following page you have blank circles. The circles represent atoms of different elements. Color the circles accordingly. (You could also use lego blocks, if you have them!)

10 Blue = oxygen; 2 red = carbon; 9 yellow = hydrogen; 2 green = nitrogen; 2 white = chlorine. Cut all the circles out and stack them by element.

1. First make oxygen gas, or O_2 , by placing 2 blue circles, side-by-side.



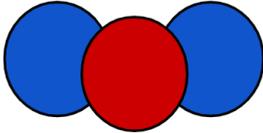
Like this:

Is O_2 an element or compound? Recall that an element is a pure substance made of only one kind of atom, so O_2 is an element.

2. Next use the circles to make a model of carbon dioxide, or CO_2 . Is carbon dioxide an element or a compound? Carbon dioxide is a pure substance made from two different elements so it is a compound.

3. Use the circles to make a model of the compound water, H_2O . How do you know by just looking at this model that it is a compound? Compare the single model of water to the models of oxygen that you made earlier. These models clearly show when a substance is an element or a compound simply by looking at their colors.

4. Now analyze the compounds on the table below. Identify the elements that make up each compound and then use the circles to create a model of each compound and glue your model into the third column.

Analyzing Compounds		
Compound	Element Name and Symbol	Model
CO ₂	Carbon- C Oxygen- O	
H ₂ O		
NO ₂		
ClO ₂		
HCl		
NH ₄		

