

Building Blocks of Matter

Objectives:

- Identify properties of elements, compounds, and mixtures based on whether or elements are chemically combined.
- Develop models to illustrate elements, compounds, and mixtures
- Use coefficients and subscripts to represent the elements and compounds.

Materials:

- Student worksheet (next page – 2 per page)
- PowerPoint used to present the lesson
- Bag of Lego blocks for each group with at least 4 blocks of 4 different colors
Note: I try to keep the same size blocks for a specific color, but not necessarily the same size of that color in all bags. For example, one bag may have 4 red blocks with 4 “bumps” while another bag also has 4 red blocks with 8 “bumps”.

Background:

After discussing the differences between elements, compounds, and mixtures, I use this lesson to allow students to explore these concepts by making models. This lesson also introduces students to the use of symbols, subscripts, and coefficients in the naming or expressing of their models. I walk around the room to make sure students are creating models that match the criteria and reviewing the criteria for each as needed. For instance, some students will snap together two blocks for elements when it should be two separate blocks.

Directions:

- 1) For the first column on elements, students complete three challenges – showing different numbers of atoms for different elements. The slides outline each part and provides examples for each challenge.
- 2) For the second column on compounds, students complete three more challenges with varying difficulty and are challenged to write the chemical formula for each. The slides outline each part and provides examples for each challenge.
- 3) For the last column on mixtures, students create models that would meet the outlined criteria. If it states elements (plural), the mixture must have more than one atom of an element or two or more atoms of different elements. The slides outline each part and provides examples for each challenge.
Note: Many students will get the mixture of compounds just fine but have trouble with the last challenge with a mix of elements and compounds. I often repeat the criteria to get the “light bulb” to turn on and help students see what is wrong with their model and help them understand what is needed.
- 4) At the end of the lesson, I provide some examples of all three types of substances. Students are challenged to write the correct formula or expression that would represent the models shown.

Final Notes:

This lesson is used at the beginning of our chemistry unit. When we get to the Bonding Basics unit, students often refer to this lesson when write chemical formulas for our compounds. This lesson is also used to help students connect writing chemical equations and reinforces what coefficients and subscripts represent.

Although it will be abstract at first, the students quickly catch on with some guidance and examples. They love making up their own compounds and mixtures to challenge their classmates. I often challenge them to use all the Legos and then writing the correct expression. They may make one compound or decide to do several compounds.

Elements

2 atoms of 1 element

3 atoms of 1 element

4 atoms of 1 element

Compounds

Compound with one atom of three different elements

Two atoms of one element with one atom of another

A compound with four different elements

Mixtures

Mixture of Elements

Mixture of Compounds

Mixture of Elements & Compounds

Elements

2 atoms of 1 element

3 atoms of 1 element

4 atoms of 1 element

Compounds

Compound with one atom of three different elements

Two atoms of one element with one atom of another

A compound with four different elements

Mixtures

Mixture of Elements

Mixture of Compounds

Mixture of Elements & Compounds