

# Community in the Classroom Presentation Plan

Lesson Name:     The Elements    

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Grade Level   5   Standards Connection(s)   Elements, atoms, chemical properties  

## **Abstract:**

*This presentation will focus on the elements and their properties so students can explore the difference between elements with demonstrations and a hands-on experiment. We'll see how different chemical react to a flame test, causing the flame to change color. These color changes are a visible way to see the differences in the elements. The hands-on experiment will let students use the magnetic property of iron to extract the element from Total breakfast cereal. This experiment will show the magnetic property of iron, as well as showing that elements are found in everyday objects. This is also an easy and safe experiment for students to replicate at home.*

## **Vocabulary/Definitions:**

element: *substances that consist of atoms of only one kind*

atom: *smallest whole particle of an element*

molecule: *a particle of matter made of two or more atoms joined tightly together*

compound: *substances whose molecules contain atoms of different elements*

metal: *elements that are typically opaque, fusible, ductile, often lustrous, good conductors of electricity and heat*

non-metal: *elements that are typically brittle, not lustrous, poor conductors of electricity and heat*

periodic table: *list of all known elements grouped by common properties*

## **Materials:**

The presenter will bring all materials for the experiment and demonstration:

propane torch

chemicals: *please list specific chemicals here*

safety glasses, for presenter and front row of students

Periodic tables

Electric blender

Total cereal

Large ziplock for each pair of students with:

Magnets

Small metal and non-metal objects, pennies, paperclips

Small, sturdy plastic baggies

Plastic cups

Classroom materials: paper, pencils, way to darken room, electric outlet, space on chalkboard

## **Classroom Set-up:**

If possible, students should be able to gather up front for the flame tests and then sit in groups of 2 students at desks for the hands-experiment. The demonstration will be most effective if the classroom can be darkened temporarily. The experiment requires a blender, outlet, and a source of water. During discussion, the presenter will need access to some space on a chalkboard or dry erase board. The set-up before class requires about 10 minutes and clean-up time will be similar.

## **Classroom Visit**

### **1. Personal Introduction:**

**5 Minutes**

Each of us will explain what our major is and what we want to do with it and why we chose it.



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*Comment: make sure this intro is “kid-friendly” – did you get interested in science as a kid. How does your work affect something in their everyday lives.*

## **Topic Introduction:**

**10 Minutes**

I will ask students about their knowledge of the atom and of the periodic table. I will also ask students what they know about elements and where they find them. Then I will give a brief overview of an atom and the periodic table. This is where the vocabulary words will be introduced.

*Comment: The goal is to make this document a guide for your presentation, and to make this document useful to the teacher when they try to replicate the lesson. I recommend expanding this description and take out “I” references. Each underlined word should be written on the board as you talk along with the description you’re giving. For example, here is some introductory language about elements that you could use or modify:*

Today we’re going to talk about elements – the most basic substances that make up all matter around us. Each element consists of only one type of atom with its own unique properties. We summarize what we know about the elements and their properties in the Periodic Table. There are over 100 known elements (112 so far!), although only 83 of those occur naturally. The rest are man-made. All the elements we know are on this Periodic Table. Does anyone know any names of some elements? [Circle on Periodic Table as named] Where can we find these elements?

Does anyone know what elements are found in water? How about some gases in the air? Atoms are usually in some kind of molecule - two or more atoms joined together. Sometimes a molecule consists of several atoms of a single element (like oxygen) and sometimes molecules are a compound or combination of atoms like H<sub>2</sub>O. What does this stand for? Do you know why we use these particular letters to represent water? That’s right, they stand for two hydrogen atoms and one oxygen atoms.

## **2. Learning Experience(s):**

**30 Minutes**

### **Demonstration:**

Elements have all kinds of different properties: color, how shiny it is, how hard it is, how flexible it is, smell, weight of a certain amount of substance, state at room temperature (is it liquid, solid, or gas), how quickly or strongly it reacts with other substances. For example some particular elements are so reactive they explode if they touch water! We’re going to investigate two particular properties today: how some different elements react to flame and magnetic properties.

One of the unique properties of elements is how they react to different levels of heat. Chemists study the temperatures at which an element melts, or evaporates or even turns directly from a solid to a gas. Some elements also react to flame with specific colors. We will be doing a flame test to look at this property. We will test 6 “unknown” chemicals that each burn a different color. Using a reference worksheet we want you to record the elements that we test. When you see a color change look for the chemical on your list that matches that color and raise your hand when you know. Now we’ve tested most of our chemicals, can you find the one we haven’t tested? What is it? What color should it turn? Let’s find out if you’re right!

### **Experiment:**

Ask students to get in partners at their desks and pass out a large ziplock with experiment supplies to each pair. Now let’s move on to another unique property – the ability to react to a magnet. Some elements do and some don’t. In your bag you’ll find some magnets and some different objects. Take them out and explore which of your objects have magnetic properties. What did you find out? Some of the metal objects are magnetic, but not all of them. Iron is one of the most magnetic of all metals.

Let’s see if we can use this property like a chemist might – to actually separate different substances from a mixture. I’m going to take this breakfast cereal and grind it up with water until it’s a thick soupy consistency. There are probably a lot of different elements in this mixture. Let’s see if any of them are magnetic. While I’m pouring out your samples, you can keep exploring to see whether your magnets will work through paper, through your ziplock, if they react to each other ... [Pour samples into small baggies and pass out to pairs of students.]

Now that you each have a sample of the cereal, use your magnets on the outside of the baggie and see what happens. What do you see? What do you think it is? [a metal] We know it’s magnetic so it is a metal. In fact, it is iron (show symbol Fe on periodic table) one of the metals that reacts most strongly to magnetic forces. If we



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look on the box we can even see iron listed as a nutrient. Why do you think they put iron in cereal? Because it's a nutrient that our body needs.

### 3. Wrap-up: Sharing Experiences and Building Connections

10 Minutes

What have we discovered about elements today? They have different properties that help us tell them apart.

What are some different properties? [list answers on board – do you remember some of the other things we mentioned – react to magnets, melting temperature, freezing, burn different colors, how they look, hardness, flexibility, smell, reactivity, state.

What is the periodic table? It's all the elements we know about, organized in terms of their structure and resulting properties.

Could you to take a few minutes to write down what you learned today on your worksheet. [or if running short of time, move to final discussion and leave final part of worksheet for teacher.]

### 4. Close:

5 Minutes

You can also do this experiment at home to show your family how you can use an elemental property to separate a mixture. Take a look at the nutrient labels on some of the foods you have at home and see if you recognize the names of some other elements that our bodies use. As you're walking around today, keep an eye out for the different materials around you and see if you can find out what they're made of. I'll leave a little list with your teacher of some common substances, but you can always do your own investigation on the Internet or in a book.

TOTAL 60 Minutes

## **Follow-up – After Presentation**

We'd love to get a letter from you about our lesson!

Attached "What's Everything Made Of" worksheet and blank student lesson worksheet

See the following websites to find out what things are made of:

"What's That Stuff" in the Chemical and Engineering News site  
<http://pubs.acs.org/cen/whatstuff/stuff.html>

See "Common Molecules" with pictures on the Reciprocal Net site  
<http://www.reciprocalnet.org/edumodules/commonmolecules/index.html>

