ELEMENTS

Introduction

This is best as a first day demonstration and first week laboratory project for a chemistry course.

Many courses start out with the scientific method and a math review. In many courses, students may not encounter chemistry for several classes or, in some cases, for several weeks. Math is a tool used in a chemistry course, not the main topic.

Materials Needed and Procedure

Meteorites

Obtain small meteorite samples. One should be a carbonaceous condrite (a rocky meteorite) with a 90% or better crust and one should be an iron-nickel meteorite. Try to get samples approximately the same physical size. Do not purchase expensive samples, these will be handled by your students. (I have had good success finding reasonable priced meteorites at The Meteorite Market http://www.meteoritemarket.com If uncertain, send them an email and tell them what you are looking for and that they will be used in class and handled by students.)

A carbonaceous condrite
(28 g)

An iron-nickel meteorite
(48 g)

Pass the meteorites around the class before starting any class introductions or discussions. Tell the class these are samples and that they will be asked questions about them.

After all the students has seen and handled the meteorites, ask them about the samples. These will be physical properties.

As the class, “Based on physical properties, can anyone identify these samples?” (Most common response is that they are “rocks”.)

You can tell the class where the samples were found, but that you don’t know where they came from.

With a little prompting, someone will finally ask if the samples are meteorites.

Tell the class a little about the composition of the meteorites and that all the elements correspond to those on the periodic table. Next tell the class that, contrary to what they see in science fiction shows and movies, there are no other elements in the universe other than those on the periodic table.

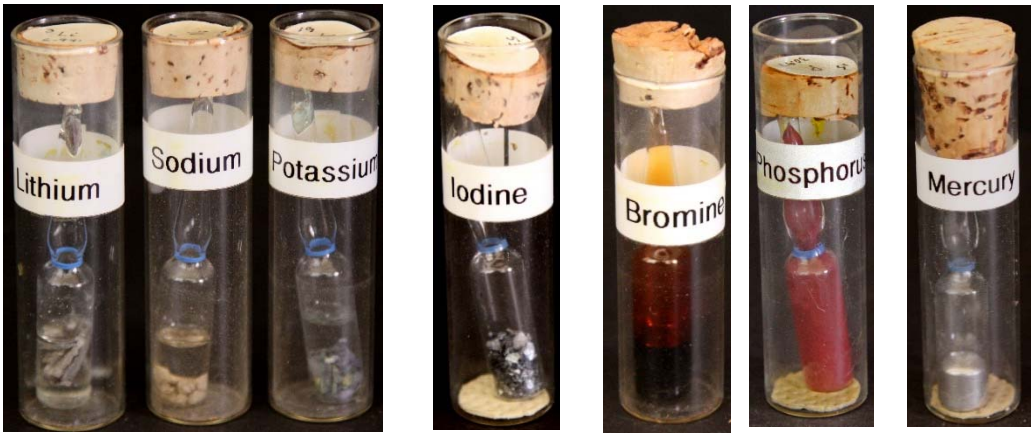
Explain how spectroscopy is used to determine elements in space. (An appropriate laboratory experiment is Build a Spectroscope. http://www.chymist.com/Make%20a%20Spectroscope.pdf)

Elements

Show the "Forging of the Elements" section of the NOVA program ***Origins: Back to the Beginning***. Watch the entire program (split into 6 chapters) or just select the *Forging the Elements* chapter. http://www.pbs.org/wgbh/nova/space/origins-series-overview.html#origins-back-beginning

Pass around element samples to your class. Element samples should be contained in labeled glass or PETE vials. Try to assemble at least 30 or more elements. (Author's note: I have over 70 elements.)

Try to obtain sheet, shot, granular, ribbon or wire samples of elements rather than powders. Samples of reactive elements such as lithium, sodium, potassium, strontium and barium should be stored under mineral oil, sealed in glass ampules, and then placed in the vials. Red phosphorus, mercury, bromine, and iodine should be sealed in glass ampules and then placed in vials. Any gaseous elements should be sealed in ampules and placed in vials.



Some large samples of elements such as titanium, tin foil, aluminum foil, a lead fishing weight, a small ingot of silver, etc., can be passed around.

Ask the class about the elements. What do they look like? (mostly metals) Where are they located on the periodic table? (metals, non-metals, and metalloids) If possible, place the element samples on a large periodic table located on a desk or table in the room.

Tell stories about discovery or use of some of the elements as time permits. (Save some stories for placement in appropriate topics during the school year.)

Tell about alchemy and the quest to turn base metals into gold. (An appropriate laboratory experiment is An Experiment in Alchemy: Copper to Silver to Gold http://www.chymist.com/copper%20silver%20gold%202013.pdf)

Homework

Have the class learn the names and symbols of the 40 to 50 most common elements. (Schedule a quiz for an upcoming class.)