



Drexel-SDP GK-12 ACTIVITY

Subject Area(s): Chemistry

Associated Unit: None

Associated Lesson: None

Activity Title: Building a Model of an Element

Grade Level: 7 and 8 (7-9)

Activity Dependency: None

Time Required: 45 minutes

Group Size: 2 students

Expendable Cost per Group: US \$1

Summary

Each student is assigned their own element in which calculate the number of protons, neutron and electrons with information they obtain from the periodic table and then research other facts about the element. Then with the information the students obtain, they construct an advertisement for their element that includes a slogan.

Engineering Connection

Elements are the building blocks of materials science and materials engineering. Understanding the fundamentals of atoms such as neutrons, electrons and protons is important to necessary to learn the concepts of materials science and materials engineering.

Keywords atom, proton, neutron, electron, atomic number, atomic mass, peiodic table

Educational Standards

- Science: 3.4.7

- Math: None

Learning Objectives

After this lesson, students should be able to:

- Determine the atomic number and atomic mass of an element from the periodic table.
- Calculate the number of protons in an atom
- Calculate the number of electrons in an atom.
- Calculate the number of neutrons in an atom.

Materials List

Each group needs:

- Worksheet
- 3 colors of Play-Doh

To share with the entire class:

- None

Introduction / Motivation

Everything around us is made up of elements, each of these elements is listed in the periodic table of elements. Each of these elements is made of atoms; and each of these atoms is made up of protons, electrons and neutrons. Understanding how elements, atoms, electrons, protons and neutrons is important to be able to understand the concepts on materials science and materials engineering. The electrons in the atoms/elements are what give materials their specific material properties, such as how they will bond to other materials. How the elements form into different structures is dependent on the electrons on the atom. Understanding elements and atoms at this basic level is important as a building block to be able to start adding more complication materials science concepts.

Vocabulary / Definitions

Word	Definition
Atom	the smallest unit of an element that maintains the properties of that element
Nucleus	in physical science, an atom's central region, which is made up of proton and neutrons
Neutron	a subatomic particle that has no charge and that is found in the nucleus of an atom
Proton	a subatomic particle that has a positive charge and that is found in the nucleus of an atom
Electron	a subatomic particle that has a negative charge
Atomic Mass	the mass of an atom expressed in atomic mass units
Atomic Number	the number of protons in the nucleus of an atom; the atomic number is the same for all atoms of an element

Procedure

Background

The number of protons, neutrons and electrons of an element can be calculated from the atomic number and atomic mass. The atomic number is equal to the number of protons and electron. The atomic mass is the number of protons plus the number of neutrons.

So for example:

Sodium, Na has an atomic number of 11 and an atomic mass of 23 amu. Sodium has 11 protons, 11 electrons and 12 neutrons.

Before the Activity

- Print out the two handouts for each student

With the Students

1. Give out the copies of the handouts.
2. Have the student form groups of two.
3. Give each group 3 colors of Play-Doh..
4. Have students choose which element they are going to model.
5. Let the students work through the worksheet, helping them when necessary.
6. Collect the worksheets from the students when they finish.

Safety Issues

- None

Troubleshooting Tips

There are no common issues with this activity.

Assessment

Pre-Activity Assessment

Class Discussion:

- Talk about the elements, the periodic table and why they are important. Also mention atomic mass and atomic number.
- Talk about atoms, neutrons, electrons and protons.

Activity Embedded Assessment

Handout: Have the students fill out the handout, make the model and review their answers as a measure of the concept comprehension.

Post-Activity Assessment

Verbal Questioning/homework: Ask the students questions to make sure they understand the concepts covered in this activity either verbally or in a written homework assignment with question similar to those on the handout.

References

<http://education.jlab.org>

Owner

Drexel University GK-12 Program

Contributors

Valerie R. Binetti, MSE Department, Drexel University

Copyright

Copyright 2008 Drexel University GK-12 Program. Reproduction permission is granted for non-profit educational use.

Name _____

Building a Model of an Atom!

Find a partner – someone you work well with.

Pick either your element or your partner's element from last week, what element did you pick?

What is the symbol for your group's element? _____

How many neutrons are in your group's element? _____

How many protons are in your group's element (protons are POSTIVELY charged)? _____

How many electrons are in your group's element (electrons are NEGATIVELY charged)? _____

Now Let's Make a Model of your Group's Element!

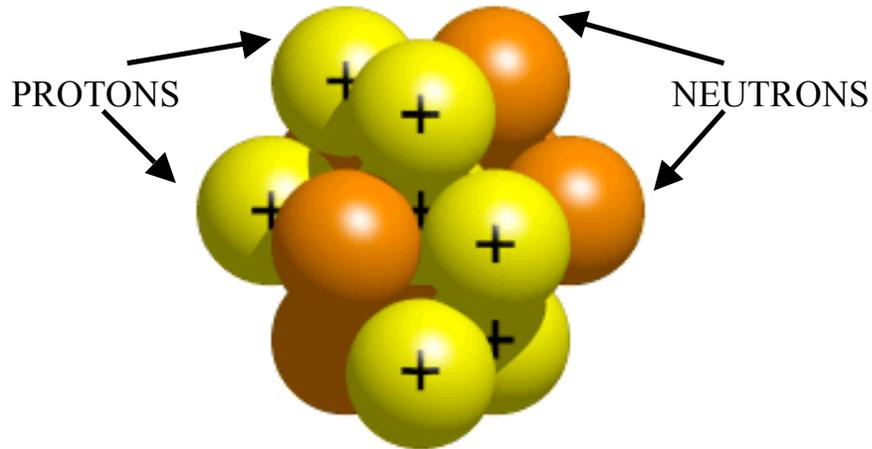
1. Take 3 colors of Play-Doh.
2. Pick 1 color for neutrons, 1 color for protons and 1 color of electrons.

Color for neutrons _____

Color for protons _____

Color for electrons _____

3. Neutrons and protons form together to make the nucleus of the atom (**The neutrons and protons are roughly the same size balls**). Like in the picture below (be careful not to mix the Play-Doh so someone else can use it!):



4. Now for the electrons! Electrons are smaller than neutrons and protons and can be said to be in “orbit” around nucleus (kind of like the planets are around the sun). Follow the picture below for help – though remember this is not the right number of electrons, protons and neutrons for your element!

