Taste the Electron

Purpose:
This lesson is used to teach basic chemistry concepts. This activity will emphasize the role of valence electrons in the outer shell. It will also highlight important biological elements and their reactions with other elements.

Primary Learning outcome:
Students will use skittles to exemplify electrons that are present in many key elements in biological systems. They will review how to interpret the periodic table with emphases on how to find the number of protons and neutrons. The will also learn the basic structure of an atom, the importance of valence electrons and how these elements interact to form essential molecules such as water and salt.

Additional Learning Outcome:
Students will learn how ionic and covalent bonding of elements forms molecules.

Assessed Georgia Performance Standards

Biology:
SB4. Students will asses the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

b. Explain the flow of matter within their ecosystem by

- Explaining the need for cycling of major nutrients (C, O, H, N, P)

Major concept/ skill:
Matter-energy relationship

Concept/skills to maintain:
Interpret graphs, tables, and charts
Records investigation clearly and accurately

Chemistry
SC3. Students will use the modern atomic theory to explain the characteristics of atoms.

b. Use the orbital configuration of neutral atoms to explain the elements identity.
c. Explain the relationship of the proton number to the elements identity.
e. Compare and contrast types of chemical bonds (i.e. ionic, covalent).

Materials
Skittles (each student should at least have 19 skittles)
Periodic table
Review sheet
Activity sheets

Procedures

Review

Students should have gone over the importance of macromolecules such as lipids, carbohydrates, and proteins. They should also be familiar with the elements that make up the majority of these molecules.
In addition, the teacher should go over the review sheet with the students to make sure they recall and understand the basics of the periodic table and element identification.

Exercise

Understanding elements.

The students should place 19 electrons (skittles) on the atom sheet. The students should be made aware that each shell in an atom has a maximum number of electrons and the little box on each line gives the number. For example, 2e- means that 2 skittles go on that shell. Make sure that the electrons are evenly spaced.

Use the chart to specify the number of electrons that they are to eat and allow the students to identify the element and fill in the chart. For example, the first element (potassium) has nineteen electrons; the students would check the periodic table for that and fill in the chart. You would than instruct the students to eat one more electron and guess the element (which would be Argon) and fill in the chart and so on. Once the students get the hang of it you can allow volunteers to go to the board and fill in the chart for some of the other elements.

Please note that the nucleus does not give the number of protons and neutrons on the activity sheet. For this exercise, assume that each time an electron is taken away the same number of protons is subtracted also to make a new element.

Understanding molecules

The students should be familiar with the valence electrons and should be able to understand how elements bind and form molecules. Explain that all elements really want to have a full outer shell, which is the basis for covalent and ionic bonding of elements. After the chart is full, discuss the molecules at the bottom of the sheet. Allow the students to come up with their own reasoning why these elements combined. Draw diagrams on the board to help them understand. For example, water or H_2O is a molecule that is combined based off of the fact that Oxygen only has six electrons in its outer shell. Two hydrogen bonds lend their electrons to the oxygen molecule making a full shell totaling eight electrons.

Assessment
The student's activity sheets will be turned in and graded.