7th grade Atomic Structure Core Knowledge Standards:

I. Atomic Structure

Review (from grade 5): Structure of atoms: protons, neutron, electrons

Molecules

- Compounds are formed by combining two or more elements and have properties different from the constituent elements.

Early theories of matter

- The early Greek theory of four elements: earth, air, fire, and water
- Later theories of Democritus: everything is made of atoms and nothing else ("atom" in Greek means that which can't be cut or divided); atoms of the same kind form a pure "element"

Alchemy in middle ages

- Start of modern chemistry
- Lavoisier and oxygen: the idea that matter is not gained or lost in chemical reactions
- John Dalton revives the theory of the atom.
- Mendeleev develops the Periodic Table, showing that the properties of atoms of elements come in repeating (periodic) groups.
- Niels Bohr develops a model of the atom in shells that hold a certain number of electrons.
- Bohr's model, plus the discovery of neutrons, helped explain the Periodic Table: atomic number, atomic weight, and isotopes.

CONTENT UNCOVERED ON THURSDAY, SEPTEMBER 6

- Positively charged protons and neutral neutrons make up the nucleus of an atom.
- Negatively charged electrons surround the nucleus and exist in different orbits or energy levels.
- The first energy level is closest to the nucleus and can fit 2 electrons.
- The second energy level, which surrounds the first energy level, can fit 8 electrons.
- The third energy level, which surround the second energy level, can fit 8 electrons.
- Atoms that lose or gain an electron have a charge and are called ions.

First lesson on atomic structure.

We used white boards for students to draw what they remember about atomic structure. As a class we shared what we remembered and generated a traditional model of atoms having a nucleus with protons and neutrons surrounded by electrons that existed at different energy levels. The image we viewed was at universetoday.com

Next we built models of sodium (Na) and fluorine (F) atoms. We used play doh to make protons and used a cotton ball to represent neutrons. We placed those in a snack size ziplock bag and sealed it up. Then we formed very small electrons out of play doh and put 2 in a sandwich bag and added the nucleus and sealed it. This represented the protons and neutrons in the nucleus surrounded by the first energy level bag of 2 electrons. The quart size zip lock was the second energy level and had room for 8 electrons. Students who were modeling sodium, which has 11

protons and 11 electrons, filled the second energy level bag with the sandwich bag and 8 electrons and sealed it. Those modeling Fluorine, which has 9 protons and 9 electrons only needed to add 7 electrons in the second energy level. There was room for 8, so they put the 7 electrons in the second energy bag along with the first energy level bag. They did not seal it though because there was still room for one more electron. The students modeling sodium had one more electron which they put in the third energy level gallon size zip lock bag along with the second energy level bag. They did not seal it because it had only one electron and room for seven more.

We reviewed what we had modeled and then learned about ions. We modeled how ions form when one electron leaves a nearly empty energy level of an atom ,like sodium, to help fill a nearly full energy level of another atom, like fluorine.