

Lesson 2: Atomic Configuration: What do individual atoms look like?

Objective: Students will be able to compare and contrast the subatomic particles that make-up an atom, create a table organizing the information necessary to build an atom, and use the periodic table to analyze the atomic composition of the elements 1-20.

Learning goal: Atoms of different elements are composed of specific numbers of subatomic particles, which have different locations and charges. Also, you can identify an element's atom from the atomic number.

Vocabulary: Periodic table, atomic number, proton, electron, neutron, electron shell, electron cloud, nucleus, atomic mass, atomic number

Engage:

1. Students asked to define an atom in their own words (less than 8 words). Teacher records student responses on whiteboard and the class identifies common words/ideas (i.e. smallest particle)
2. Teacher then gives students a variety of materials and scissors, and asks students to cut the material in half until they get something that represents an atom of that material.
 - Teacher note: Students may not all get the same size piece of material (which is okay), this can lead to review that atoms of different materials have different properties (including size).
3. Optional: Teacher can then give students magnifying glass (or microscopes) to allow student to see their material even closer.

Explore:

4. In groups, students are given the periodic table, handouts with multiple images of an element's atom, and a word bank containing necessary vocabulary (Each group receives images of two different element's atom or if available students can use computers to look up images on their own.)
5. Students compare and contrast the pictures and deduce the subatomic particles that every atom is made of and how two atoms of different elements differ.
 - Teacher note: Students should also be led to use the periodic table to find patterns in the number of subatomic particles and information of the periodic table (students can record notes in notebook).
6. Students then make a poster of their element's atomic configuration and label it with the correct vocabulary.
7. Students complete a gallery walk analyzing each group's atom and vocab labels, and then evaluate the poster by leaving comments on post-it notes, and finally completing the handout about the composition of an atom.

Explain:

8. Whole class discusses what was learned and questions they still have. (possible missing information: number of neutrons, electron locations in shells vs. cloud.
9. Teacher leads class (or students work in groups to make) filling out a graphic organizer on subatomic particle information and demonstrates how to calculate the number of protons, neutrons, and electrons (if students did not figure it out in groups). Introduction to isotopes can be included here.

Elaborate:

10. Students are now asked to revise their original drawings of their atoms and include a drawing of an isotope of one of their atoms.
11. Time permitting: Students can do another gallery walk to evaluate the drawings of atoms and isotopes of other groups filling out a handout about lessons learned (ex. Give one – Take one)

Evaluation:

12. Students are given a handout with the first 20 elements and asked to draw the atoms of each.

Follow-up Activities:

- 1) Matching the element to the atom information. The first 20 elements are posted around the room and students are asked to place cards with information about an element's atom on the corresponding poster.
- 2) http://www.middleschoolchemistry.com/multimedia/chapter4/lesson1#protons_and_electrons
This website shows animations of how protons and electrons react to each other as a result of their charge. It also contains a lesson using a plastic grocery bag to demonstrate the charges of protons and electrons and how they react: <http://www.middleschoolchemistry.com/lessonplans/chapter4/lesson1>
- 3) <http://phet.colorado.edu/en/simulation/balloons>

This is also a simulation that shows the attractive force of static electricity

Interactive websites can also be used to reinforce content about atomic configuration.

Interactive Building Atoms Websites:

http://www.ljcreate.com/products/atom_builder.asp

<http://www.kscience.co.uk/animations/atom.htm>

<http://phet.colorado.edu/en/simulation/build-an-atom>

<http://www.pbs.org/wgbh/aso/tryit/atom/builder.html>

Overall Tutorial: http://www.teachersdomain.org/asset/lsp07_int_theatom/