UKanTeach 5E Lesson Plan

Author (s): Heather Bergmann and Leslie Holmes **Team Members:** Heather and Leslie	**Title of Lesson**: Introduction to the Atom
Lesson # 2 Date lesson will be taught: Grade level: 10	**Lesson Source** (kit, lesson)**:** Learning About Atoms: Introduction to Protons, Neutrons, and Electrons by Amanda Cisneros Found online

Concepts/Main Idea – *in paragraph form give a broad, global statement about the concepts and vocabulary you want students to understand as a result of doing this activity:*

Students will understand the make up of the atom and the history that led up to the modern atomic model. Students will learn the following vocabulary: atom, proton, neutron, electron, nucleus, atomic model.

Objective/s- Write objectives in SWBAT form… ***The Students Will Be Able To:***	**Evaluation** *In the space below, explain the type(s) of evaluation that will provide evidence that students have learned the objectives of the lesson (formative and summative). You will provide student copies at the end of the lesson.*
Students will be able to explain that all matter is made of atoms which may combine to form molecules. Students will be able to explain that each element is made of one kind of atom and that the elements are organized in the periodic table by their chemical properties. Students will be able to discuss the history of the atom and the steps scientists went through to come up with our current understanding of the atom.	The evaluations for this lesson will be formative. The students will make "My Little Atoms" books which will be graded for content. The students will also make 2D models of specific atoms which will also be graded for content. At the end of the block they will write a 3-2-1 journal entry that will be graded on participation. This lesson will not have a summative evaluation.

Kansas Science and Math Standards- Include standard, benchmark and indicator where applicable

Science: (standard, benchmark, indicator)

STANDARD 1: SCIENCE AS INQUIRY Grades 8 - 12

SCIENCE AS INQUIRY – The student will develop the abilities to do scientific inquiry, be able to demonstrate how scientific inquiry is applied, and develop understandings about scientific inquiry.

Benchmark 1: The student will demonstrate abilities necessary to do the processes of scientific inquiry.
The student….

1. actively engages in asking and evaluating research questions.
2. ▲ actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research
3. ▲ actively engages in using technological tools and mathematics in their own scientific investigations.

STANDARD 2A: CHEMISTRY **Grades 8-12**

CHEMISTRY – The student will develop an understanding of the structure of atoms, *compounds,* chemical reactions, and the interactions of energy and matter.

Benchmark 1: The student will understand the structure of the atom.

1. ▲ understands atoms, the fundamental organizational unit of matter, are composed of subatomic particles. Chemists are primarily interested in the protons, electrons, and neutrons found in the atom.

STANDARD 7: HISTORY AND NATURE OF SCIENCE Grades 8-12

HISTORY AND NATURE OF SCIENCE – The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.

Benchmark 3: The student will understand science from historical perspectives.

The student…

1. demonstrates an understanding of the history of science.

Materials list (BE SPECIFIC about quantities)

for Whole Class:

per Group:

Pictures of Atoms, hole punch

per Student:

1 copy of "The Atoms Family" lyrics

1 Piece of white construction paper

Several small circles of 3 different colors

6 4x6 Note cards

1 brad

Advance preparation:

Cut out or buy small circles of 3 different colors.

Accommodations: Include a general statement and any specific student needs

Students who are vision impaired will be given larger pictures of the atoms so they can see easier.

English language learners will work with a Para or an advanced student who can assist them in writing observations in English.

Safety: Include a general statement and any specific safety concerns

This lesson is very safe. Students will not be working with any dangerous materials. Students will need to be careful with the glue when making the 2D models so as not to be wasteful or make a mess.

Engagement: **Estimated Time: ___10 minutes___**		
What the teacher does AND how will the teacher direct students: (Directions)	**Probing Questions: Critical questions that will connect prior knowledge and create a "*Need to know*"**	**Expected Student Responses AND Misconceptions - *think like a student to consider student responses INCLUDING misconceptions:***
Each student will receive a copy of "The Atoms Family" lyrics. Students will listen to the song and highlight/underline words they think are important to the lesson. (Teacher can sing song or students can listen to a class sing it here: http://www.youtube.com/watch?v=sshZjxmzJVI) Students will use those words to make a class word bank (teacher writes on board) that will serve as a reference for the remainder of the lesson.	What words stood out to you? What words were new? What key words were familiar?	Atoms, neutrons, electrons, protons, liquids, solids, gases, masses

Exploration: **Estimated Time: __25 minutes___**		
What the teacher does AND what the teacher will direct students to do: (Directions)	**Probing Questions: Critical questions that will guide students to a "C*ommon set of Experiences*"**	**Expected Student Responses *AND* Misconceptions - think like a student to consider student responses *INCLUDING* misconceptions:**
Students are split up into 5 different groups. Each group is given an atomic model picture (do not tell them which one it is). Models include: Dalton's, Thomson's, Rutherford's, Bohr's, and the current atomic model. Students are given time to make observations about the model and prepare a short presentation for the class concerning their model. After the presentations, the five atomic models are placed on the white board. Students must decide (as a class) in what order they were developed in history.	*During group work:* What sort of things are you noticing? What do you think these circles and symbols mean? Do you recognize anything? What do you think the people who developed this were trying to explain or portray? Which of these five do you think is the earliest atomic model? Why? Which of these five do you think is the second earliest model? Why? (Continue on until they have a timeline.)	Positive and negative signs, circles, clumps, etc. Particles, charges, etc. The positive and negative signs, etc. What everything is made of, an atom, etc. The solid circle (sphere) Because it is the simplest, etc. The one with negative and positive charges floating around. Because there is no center, etc.

Explanation: **Estimated Time: ____20_____**		
What the teacher does AND what the teacher will direct students to do: (Directions)	**Clarifying Questions: Critical questions that will help students "C*larify their Understanding*" and introduce information related to the lesson concepts & vocabulary –** *check for understanding (formative assessment)*	**Expected Student Responses *AND* Misconceptions - think like a student to consider student responses *INCLUDING* misconceptions:**
Students will create a "My Little Atom" book using 4 by 6 notecards. - Students will decorate the cover of their books - On the front of each of the 5 remaining note cards students will illustrate the different atomic models - On the back of each of the card the students will write 3-4 facts they think are most important and 1 fun fact about the model on the front of that card. - They will then hole punch the top left corner of the cards and put the brad through the hole to create a book.	What do you think are the most important facts about Dalton's model? What do you think are the most important facts about Thomson's Model? What do you think are the most important facts about Rutherford's model? What do you think are the most important facts about Bohr's model? What do you think are the most important facts about the current atomic model	He knew it was a sphere but didn't know anything about the charges. He figured out that there were charges but thought they were all just kind of floating around in the atom. He put the protons in the middle of the atom. He figured out that the electrons were in different orbitals and they orbited the nucleus. He figured out that the electrons were in a cloud like structure around the atom.

Elaboration: Estimated Time: ____20_____		
What the teacher does AND what the teacher will direct students to do: (Directions)	**Probing Questions: Critical questions that will help students *"Extend or Apply"* their newly acquired concepts/skills in *new situations***	**Expected Student Responses *AND* Misconceptions - think like a student to consider student responses *INCLUDING* misconceptions:**
Students will be given construction paper, compasses to draw circles, and 3 different colors of small circles to each student. Explain to the class how to use the materials to create a 2D model of an atom: Each student will have a different atom. - 1 color of circles will represent protons, another color will represent neutrons, and another color will represent electrons - Students will first use the compasses to draw a circle in the middle of the construction paper which will represent the nucleus - Students will used the colored circles representing the protons and neutrons to create the nucleus - Students will use the compasses to draw to draw the electron rings around the nucleus then place the electron circles in the correct ring. - On the back of the construction paper the students will describe the atom they created. While students are creating their models, walk around and informally asses students by asking questions about the lesson and have them explain how they know how to make the model	What do the different papers represent? What do the circles on the construction paper represent? How did you know how many electrons go in each orbital? Which of the models you studied does this most closely resemble? Why?	Electrons, Protons, and Neutrons The different orbitals We know that the first orbital only holds 2 electrons, the 2nd orbital can hold 8, and the 3rd orbital can hold 18. Since our atom only has … electrons we only used the first 2 orbitals. It looks like Bohr's model. Our electrons are in circles instead of clouds.

Evaluation: Estimated Time: ____15_____

Critical questions that ask students to demonstrate their understanding of the lesson's performance objectives.

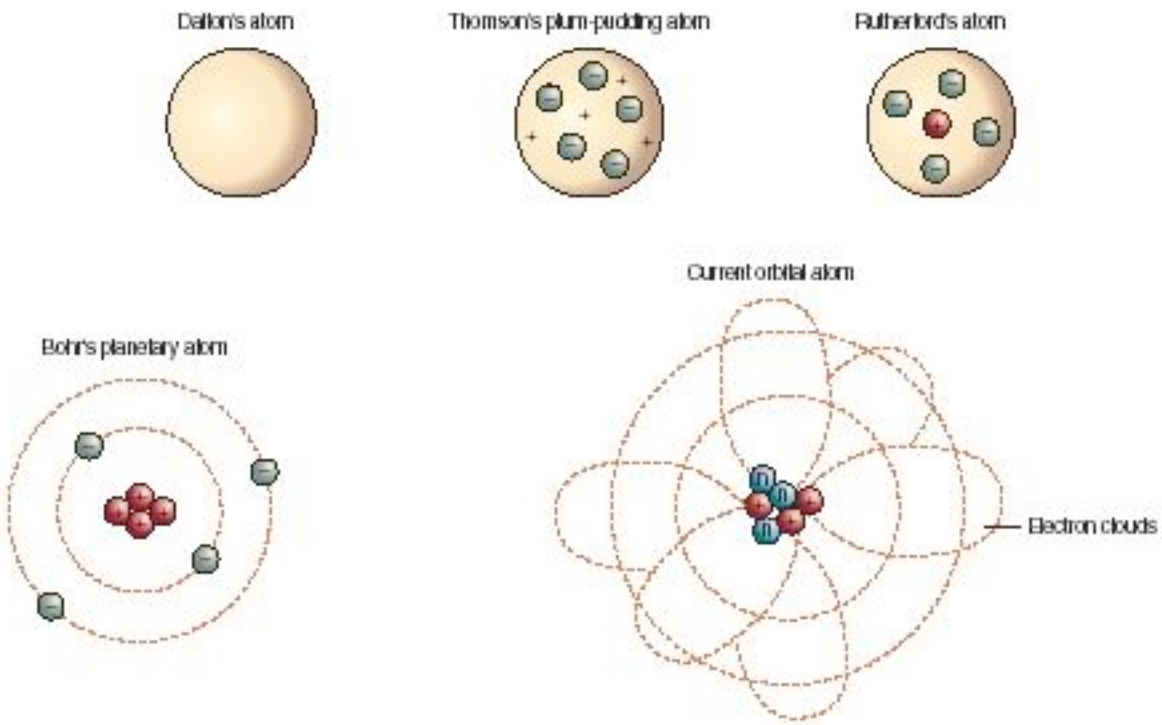
Formative Assessment(s): *In addition to the final assessment (bell ringer or exit slips), how will you determine students' learning within this lesson: (observations, student responses/elaborations, white boards, student questions, etc.)?*

The students will present their atoms explain the parts of the model and how they knew how to make it. After the presentations, the students will individually complete a 3-2-1 reflection in their journals. They will reflect on the activities and instruction and write 3 things that they learned in the lesson, 2 questions they have or things that are still confusing about the concept or activity, and 1 think that they could teach to someone else.

Summative Assessment: *Provide a student copy of the final assessment/exit slips or other summative assessments you use in the lesson*

No Summative assessment for this lesson.

Atom Models


Dalton's atom
Thomson's plum-pudding atom
Rutherford's atom
Bohr's planetary atom
Current orbital atom
Electron clouds

The Atoms Family

1st Verse:
They're tiny and they're teeny,
Much smaller than a beany,
They never can be seeny,
The Atoms Family.
Chorus

2nd Verse:
Together they make gases,
And liquids like molasses,
And all the solid masses,
The Atoms Family
Chorus

3rd Verse:
Neutrons can be found,
Where protons hang around;
Electrons they surround
The Atoms Family.
Chorus

Chorus:
They are so small.
(Snap, snap)
They're round like a ball.
(Snap, snap)
They make up the air.
They're everywhere.
Can't see them at all.
(Snap, snap)

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