

Atoms: protons, neutrons, electrons



Descriptive Data

Topic of Lesson

Atoms and the different parts of an atom: protons, neutrons and electrons.

Grade Level

5th Grade

Concepts

Objectives

The students will learn about atoms and the different parts of an atom: protons, neutrons and electrons through a story that is told, and an example of an atom diagram I will have made.

The students will learn about specific elements 1 through 9 and how to read those elements on the periodic table.

The students will learn how to find how many protons, neutrons and electrons are in an element.

The students will learn how to construct a model of an atom with the use of marshmallows.

The students will be able to describe their atom and the different parts of their element.

Assessment

Formative, Summative, and/or Authentic

Complete a rubric to assess both concepts and objectives, which may include paper and pencil assessment, performance assessment, portfolios, diagrams, or other appropriate practices. Provide specific details (through your rubric) about how you will assess the students' 1. understanding of the concepts they are learning; 2. performance on the objectives of the

lesson. In other words, you are assessing both content and process through your rubric.

Rubric

	Target (3 pts)	Acceptable (2 pts)	Unacceptable (1 pt)
Element 1 (1, 33%)	The student can correctly name the element they have chosen and how many protons, neutrons and electrons they have.	The student can correctly name the element they have chosen and that there are protons, neutrons and electrons on their diagram.	The student has an element and the three parts of their atom on their diagram.
Element 2 (1, 33%)	The student has the protons, neutrons and electrons correctly labeled and in the correct place on their diagram.	The student has the protons, neutrons and electrons labeled but not necessarily in the correct place on their diagram.	The student has the three parts of an atom but doesn't know where they belong or how many there should be.
Element 3 (1, 33%)	The student demonstrates a clear understanding of the parts of an atom that have a positive, negative and neutral charge.	The student demonstrates knowledge about parts of an atom but may confuse which ones have a positive, negative and neutral charge.	The student doesn't demonstrate an understanding of the different parts of an atom.

Lesson Background Information

Lesson Background Summary

During this lesson, the students will be learning about atoms and the different parts that make up an atom. They will also learn about elements 1-9 on the periodic table. Some important things to know are that: everything is made up of "matter". All "matter" is made up of elements from the periodic table. These elements can be shown in the form of an "atom" which contains protons, neutrons and electrons. The protons and neutrons are located in the nucleus and the electrons are smaller than the protons and neutrons and are orbiting around the nucleus. These electrons orbit around the nucleus in "shells". There can be up to 2 electrons in the first outer shell outside of the nucleus. There can be up to 8 electrons in the second outer shell, and up to 18 in the third outer shell. Protons have a positive charge. Neutrons have a neutral charge. Electrons have a negative charge. If there is the same number of protons and electrons in an atom, then the atom has a neutral charge. If there are more protons than electrons, then the atom has a positive charge. If there are more electrons than protons, then the atom will have a negative charge. This is how static electricity works, with the bouncing around of electrons.

Standards

Description

Go to "Add Standards" then Select "All" Standards and select "NSES-S" - The National Science Education Standards for Students - Select K-4 Grade Level

Standards

- NETS-S.3.A** > Students use technology tools to enhance learning, increase productivity, and promote creativity.
- NSES-S.K-4.A.2** STANDARD: Science As Inquiry -- As a result of activities in grades K-4, all students should develop understanding about scientific inquiry
- NSES-S.K-4.E.1** STANDARD: Science and Technology -- As a result of activities in grades K-4, all students should develop abilities of technological design

Preparation

Organizational & Management Steps

I need to be prepared to answer question about how to find protons, neutrons and electrons of an element.

I need to have all the materials that are listed ready and available for the students.

I need to have set objectives that I want the students to understand by the end of the lesson.

Materials

Materials & Resources

- Print copies of the "Atoms Family Album" for all the students. (2 pages)
- Have enough construction paper for their atoms.
- Have marshmallows bought and ready for them.
- Have a pre-made example of an atom diagram.
- Have a blank transparency to write down answers from their "Atoms Family" activity.
- Have a list of elements 1-9 printed from the periodic table with element name, atomic number and atomic mass given to them.
- Glue

- Writing Utincils

United Streaming

No resources added.

Procedures

Engage

I start off by asking questions such as:

Who can tell me what matter is or what matter is made of?

Who can tell me where I can find matter?

Explain that all matter is made up of even smaller particles called "atoms".

What can you tell me about atoms? -if they have heard of them

Tell them that we are going to learn about atoms and hopefully get to the point where we can see the affects of atoms, specifically the electrons, by the end of the lesson. I have no idea what these students have previously learned about matter, elements, atoms, etc. so by asking these questions, I will be able to build off of what they already know.

Explore

I will be more of a guide for the students as they are making the diagram of their atoms with their marshmallows.

I will ask questions such as: How did you know how many protons/neutrons/electrons your atom has?

Where do the protons/neutrons/electrons go?

Can you find another person in the class that has the same element as you?

Can you tell who has the same element as you without looking at the name? How can you tell?

Explain

I will ask student to tell me about their element that they chose. This part of the lesson will be more evident in the technology portion when they make up a story about their element and the parts of their atom.

What are important parts of your atom?

Where is it on the periodic table?

What is something new that you learned when making this diagram?

Elaborate

To elaborate on their knowledge about atoms, I would ask them certain questions about their atom such as: tell me something about your atom that you learned while doing this project; what if you changed your atom to "insert a different atom," what would be different? Would there be more or less protons/neutrons/electrons? What are some differences about your atom than the person next to you? I could also give them an atom that wasn't one of the options and have them try to figure out how many protons, neutrons and electrons it has then describe to me the differences.

Evaluate

I will assess the students based on their story that they are going to make up about their atom on the computer. They will need to demonstrate a clear understanding of their element and how many protons, neutrons and electrons they have. They need to show where they are located (protons and neutrons in the nucleus with electrons orbiting around). They should be creative in their story, but this is not necessarily factoring in as part of their grade. They should also be able to orally describe their atom to me.

Independent Practice

They will be assigned to type a story about their atom which they should already know about at this point. They need to explain how many protons, neutrons and electrons it has. Where the atomic mass and atomic number is and where their element can be found on the periodic table. I will be there for assistance if it is needed, but at this point, they should not need it.

Differentiated Instruction

Differentiation & Accommodation

There were some students who really picked up on this topic quickly. They were done before everyone, and I could have differentiated my instruction by having them choose their own element from the periodic table and find the protons, neutrons and electrons from the information on the periodic table. The sheets I gave them had that information for them, so all they had to do was figure out how many neutrons were in the atom by subtracting the atomic number by the atomic mass. But for these students I could have let them choose from the 3rd row on the periodic table which contains more protons, neutrons and electrons. I could actually use this as a follow up procedure as well to really see if they understand what they are doing.

To accommodate the lesson to meet the needs of diverse learners, I could have 8x11 size samples of what I am expecting their model to look like. Then they could just compare the two, but still be expected how many protons, neutrons and electrons they have. My example would just be very specific as to where the protons, neutrons and electrons are located in the atom model. If they are able to see a model that they can keep looking back and comparing to, it may be easier for them to pick up on. I could also have those people in a group and work with those individuals as we all make the same model of an atom together. Then I can instruct them through the process of their models.

Extensions

Enrichment

I would have them try to come up with an example of where they may see the affect of "bouncing electrons" such as: static hair to a balloon. They might have an easier time coming up with a concept after I demonstrate how static electricity works with my "shock machine".

Technology

Hardware (Computer, Calculator, Probeware, GPS, etc.)

Technology is used in this lesson by having the students take pictures of their atom diagram that they make in class. These pictures will then be uploaded onto the server at Ben Franklin where the students can copy and past them into a word document. From there, they will type an authentic story about their atom, hopefully in a creative way, and print to turn in. They know how to work the computers in the lab, so it should go smoothly.

Software

Internet Resources & Tools Description

Please add two internet resources students could use to support their learning of the topic.
Add internet resources in the next section.

Internet Resources & Tools

Rader's CHEM4KIDS <http://www.chem4kids.com/>

A kids website to explore atoms, elements, matter, the periodic table and reactions.

Kids Konnect - Electricity <http://www.kidskonnect.com/content/view/72/27/>

Kids can explore static electricity at this website.

Audiovisual

Other

Reflection

Thoughts regarding the Lesson

After I started the lesson, it was going very smoothly. I asked for volunteers to tell me about matter, elements and atoms? They got a little stuck on what atoms were and the parts of atoms, so we followed that with a story about the "Atom's Family" which talked about the protons, neutrons and electrons. It told about where they are located and how many electrons each "shell" can hold. After we read the story, there is a part that we filled out together. (I have attached the worksheets I handed out and worked through together.) I then went on to explain that we were going to make a model of an atom which I have made an example of. I had a student hand out elements to everyone which were pre-selected. I printed out information about elements 1-9 on the periodic table so they had those to choose from. After I received about 5 requests to switch their element, I decided to put the stack of elements on the back table for them to choose from. Then I explained that they need to put together a model of an atom, just as I had with Nitrogen and posted on the board as an example, and instead of coloring in protons, neutrons and electrons, they had to glue on marshmallows and make a key. After they were done making their atom's they were to take pictures of their atoms which would then be uploaded onto the server in the computer lab, copy and paste their picture to a word

document and make up a story about their atom.

Overall, I can say that the lesson went well. They all made a model of their atom, and from the looks of it, they were accurate. Everything took a lot longer than was expected though. We spent one full hour to go through the "Atom's Family" worksheet and proceed to make a model of their atoms with marshmallows. Of course, they all wanted to eat them, so I made sure that they had their models done first. They also got their pictures taken that day as well. We were supposed to go to the computer lab that day, but it didn't work out that way. So, I set aside a time for the next day to go the computer lab, and then I couldn't get the photos to upload onto the server. So I had them write a story about their atom, and then I just had to print them separately. That was the most frustrating part of the whole lesson. I should have tried to find someone who could save things onto the server, but even the cooperative teacher couldn't do it. So, I just thought this would be the best thing as a last resort. After we couldn't get the pictures uploaded and saved onto the server, there were printer problems on top of that. So, it seemed to just be one thing after another.

Although many things went wrong with the technology part, and the fact that everything took way longer than what was planned, I really think that they understand atoms. They know all the parts of an atom and can tell me about it. It is also demonstrated through their models and stories. One thing I would change is that I would have everyone make a model of an atom together as a class and then make their own model of a different atom. There were a lot of questions, but I feel that they really do understand it now. After we were done with making the models and working in the computer lab, I showed them a "shock machine" which was, in my point of view and probably the kids' as well, the best and most fun part of the whole lesson. They were so excited to explore this "machine" and it was so fun to watch them all get so engaged in this experiment. It was a great way to follow up the lesson and see how they tried to make the connection between what they learned about atoms, and then seeing the affect of atoms.

Attachments  [Atoms_Family.pdf](#),  [Atom_-_Lithium.doc](#)

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