Atoms: the Bohr Model

Lesson Concept Matter has chemical properties. Chemical properties are based on the structure of matter. Matter is made of atoms. Atoms are made of protons, neutrons, and electrons.

Link To observe matter's chemical properties we have to observe on a micro level. So we are going to zoom in on the basic unit of matter, which is an atom. Atoms are all made of protons, neutrons, and electrons. The number of protons in an atom determines the type of element.

Time 75 minutes

Materials

Whole class

Book, "What's Smaller Than Pigmy Shrew?"

Bill Nye Video: Atoms 1 (from Teacher Tube)

1 globe

1 map

1 cup of green peas for electrons

1 cup of white beans for protons

1 cup kidney beans for neutrons

Individual

Glue

Science notebooks

Science textbook

Advance Preparation

1. Put 3 small cups (each type of bean in each cup) for each table group.

2. Check technology connections for video.

Procedure:

Engage ***(15 minutes) Atoms are the smallest structure of matter.***

1. Read aloud from the book "What's Smaller than a Pigmy Shrew?" Facilitate a discussion that leads students to the main idea that an atom makes up all matter.

2. Show Bill Nye: Atoms 1 from Teacher Tube.

Explore ***(30 minutes) Atoms are the building blocks of matter. Atoms are made of protons, electrons, and neutrons.***

3. Tell students to make a list with a partner of 5 things that are made up of atoms. Ask students to share out ideas i.e., desk, pencil, cup, and anything non-living.
4. Ask students to do their own research to find the parts of an atom. Have students use their science textbook, e.g., p. 288 in Houghton-Mifflin.

5. Show students how to make a 4-flap flipbook:
6. Students should include: Nucleus, proton, neutron, and electron on each of the front flaps and beneath the flap the students should write the definition and draw picture of the atom highlighting the specific part.

Explain ***(30 minutes) Atoms are made of protons, electrons, and neutrons. Different combinations of these will make different kind of atoms.***

7. Discuss students' definition and findings.
8. Explain that the model they found in the book is called Bohr's Model (have them include this on their flip book). This model is just one model or view of an atom. Scientists now agree that the atom is really a sphere shaped cloud.
9. Show students a map and then compare to a globe. A map is one way to look at the world, while a globe gives a three dimensional view of the world.
10. Ask students to take the following notes in their notebooks:

    "Neutrons have a neutral charge, protons have a positive charge, and electrons have a negative charge."

    "In every atom the number of protons equals the number of neutrons. Example: In a carbon atom there are always 6 protons and 6 neutrons."

    " The number of protons will equal the atomic number of an element on the periodic table."

11. Show a large image of the periodic table or have students look in their science books. Have students find carbon on the periodic table and locate the atomic number for carbon. Ask how many protons must it have.

12. Give a few more examples of elements and allow the students to find the atomic number and share with a neighbor the number or protons.

Extend ***(10 minutes) Atoms are made of protons, electrons, and neutrons. Different combinations of these will make different kind of atoms.***

13. Tell students to think about the following questions and discuss students' ideas after the video: What is the relationship between the neutron and the proton?
14. Students may be confused about why the electron hides. Explain that the electron does not bond with the protons and neutrons. The electron has to try and bond with other electrons on different atoms. Explain to students that they will come back to this idea more in depth in the next lesson, Gum Drop Molecules.

Evaluate ***(10-15 minutes) Matter has chemical properties. The chemical properties are based on the structure of the matter. Atoms are the building blocks of matter. Atoms are made of protons, neutrons, and electrons. Different combinations of these will make different kinds of atoms.***

15. Distribute Exit cards. Have students complete the following tasks to evaluate student understanding.
16. Show students two elements on the periodic table, e.g., oxygen and carbon. Ask students how many protons does oxygen have? Oxygen's atomic number is 8; therefore there are 8 protons. Likewise, carbon's atomic number is 6; therefore there are 6 protons.
17. Have draw students draw an example of Bohr's Model with 6 protons, 6 neutrons and 6 electrons. Have students use the peas and beans to represent the particles (i.e., white beans for protons, kidney beans for neutrons, and green peas for electrons). Have students glue the beans and peas to their exit card. Be sure to have students label each part of their Bohr Model, including the nucleus.