

Unit 4: Chemical Composition, Lesson Plans

Unit 4 Chemical Composition

Lesson 4.1 Particles

Unit Overview: This unit looks at the basic building blocks of all matter. It starts at the most fundamental level, that of particles. The particles are connected together to form atoms. In turn, atoms bond together to form molecules. Perhaps the one point that needs to be really hammered home during this whole unit is that we are talking about all matter, not just the chemicals in the jars.

Lesson Overview: This lesson is a four-day lesson.

Objectives:

- Students will be able to name the three particles.
- Students will be able to describe the mass and charge of the three particles.
- Students will be able to locate each of the three particles on an atomic diagram.

Content Overview: This lesson discusses the three basic particles that all matter is made of, protons, neutrons and electrons.

Skills Covered:

- Memorization of key facts.
- Visualizing abstract ideas.
- Inferring information.

Day 1: 4.1

Materials: Worksheet 4:44 - Chemical Composition Unit Map, Class Notes 4:1 - Chemical Composition Unit Map

Procedure: Make sure each student has a copy of Worksheet 4:44, titled Chemical Composition Unit Map, and complete the cells in the unit map together using Class Notes 4:1. Discuss the relationship between particles, atoms and molecules as you fill in the organizer. Have the students fill in the key unit questions at the bottom of the map. Remind them to use these questions as a guide to studying for the test at the end of the unit.

Teaching Strategy: Use this analogy to help describe what the relationship between particles atoms and molecules are. There are twenty-six letters in the alphabet. We combine each of these in different combinations to form words. There are as many as a million or more words in the English language, depending on how you count. These million words get added together to form sentences. There is probably no limit to the number of sentences possible in the English language. Likewise, all matter is made of three particles. These particles combine to form atoms. There are about 118 different possible atoms depending on how you count. These atoms are combined to form molecules. There is probably no limit to the number of possible molecules.

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Day 2: 4.1

Materials: Worksheet 4:45 - Particles Lesson Diagram, Worksheet 4:46 - Particles Assignment, Class Notes 4:2 - Particles Lesson Diagram

Procedure: Make sure each student has a copy of Worksheet 4:45, titled Particles Lesson Diagram, and complete the cells in the diagram together using Class Notes 4:2. This chart is designed to help them organize the properties of the three particles. After filling the cells in discuss possible ways to help students remember the details.

Afterwards, draw a picture of two circles, with one smaller circle inside the larger one. Tell them that this is roughly what an atom looks like and that when we say the Protons and Neutrons are in the nucleus, we mean that they are in the small circle in the center. Electrons are located in the electron cloud, meaning they are somewhere in the outer circle. It is a good idea to explain at this point that electrons are not tiny specks moving around in this cloud. They are the entire cloud. They can overlap each other like ghosts and do not have well-defined positions or dimensions.

Teaching Strategy: Memorization is not very popular in education, but the students need to have the ideas of mass and charge committed to memory deeply in order to perform the skills expected of them later in chemistry. Develop mnemonic devices together, letting them come up with ideas. Mnemonics only works when it is meaningful to the student. For example students might remember the charge of an electron by thinking that it would be a very “negative” thing to be electrocuted. It’s a little silly, but silly works in mnemonics.

Homework: In the time that remains assign the Particles Assignment and allow them to work ahead on it now. Tell them it is due on the day of the quiz.

Reading Assignment: At this time you may wish to assign a reading assignment from a textbook. There is a place for students to record the page numbers on the lesson diagram. Locate the page numbers to assign by looking for the word *Protons* or *Neutrons* in the index.

Day 3: 4.1

Materials: Worksheet 4:47 - Particles Within Atoms.

Teaching Strategy: The subject is a little dry, so begin with a joke:

Two neutrons walk into a deli and order a few sandwiches. The first neutron orders an Italian sub and a large Coke. The second neutron gets a Reuben with a bag of chips and a root beer. After lunch the first neutron offers to get the tab, but the second neutron insists. “You paid last time; it’s my turn to get the check.” The second neutron goes up to the counter and asks the man working there how much the sandwiches had cost. The man turns around and looks surprised. “Hey, aren’t you that neutron?” the man asks. “Why, yes I am” the neutron replies. “For you, there’s **no charge!**”