



Classroom Teacher Preparation

Chemistry 1: Properties of Water

Please use the following to prepare for the next SfS lesson.

Description:

This lesson demonstrates the unique properties of water through a series of simple experiments that encourage students to ask questions about what they observe. Students will explore cohesion, adhesion, and surface tension. The lesson culminates with a discussion of student observations and modeling of water molecule's interactions.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-5th

- Design questions to investigate water's cohesion, adhesion, and surface tension
- Construct a model of water based on its unique properties

Disciplinary Core Idea (DCI)

PS1 Matter and its Interactions - PS1.A Structure of Matter

- (3rd-5th) Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials.

Science & Engineering Practice (SEP)

Asking Questions and Defining Problems

- (3rd-5th) Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationship

Crosscutting Concept (CCC)

Structure and Function

- (3rd-5th) Different materials have different substructures, which can sometimes be observed.

Preparation:

This lesson serves as an introduction to water. A basic understanding of atomic structure is helpful, but not required.

Room Set Up for Activities:

Students will work in small groups and individually at desks or tables.

Safety:

We will be working with water and rubbing alcohol. Students should not smell or taste the liquids in the activities.



Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Properties of Matter**. Modules include:

Chemistry 11: States of Matter – Introduces the three commonly observed states of matter (solid, liquid, gas), the most commonly-occurring one (plasma, which makes up the stars), and allows students to observe many of the transitions between the different states.

Earth Science 12: Water Cycle – Presents a game that explains how water cycles through different forms and storage types on Earth and in Earth's atmosphere. Students act as water molecules and move around the room to the different places water is found on Earth.

Chemistry 14: Viscosity – Students work in groups to examine the viscosity of five liquids (honey, shampoo, corn syrup, pancake syrup, and olive oil) using falling sphere viscometers.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state:

www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson with two fun experiments: in the first experiment, water 'walks' from cup to cup to create a rainbow of colors; while the second experiment explores adhesion in plants by coloring a white flower with food dye.

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- Properties of Water Video – the Amoeba Sisters (6:51): <https://www.youtube.com/watch?v=3jwAGWky98c>

Water's properties are even more unique in space!

- Experiments with water in zero gravity - <https://www.youtube.com/watch?v=ntQ7qGilqZE>
- Wringing out a washcloth - <https://www.youtube.com/watch?v=KFPvdNbftOY>
- Liquid ping pong - https://www.youtube.com/watch?v=TLbhrMCM4_0