



Classroom Teacher Preparation

Chemistry 14: Viscosity

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

Description:

Students investigate viscosity by using falling sphere viscometers to examine the speed at which a marble drops through tubes of liquids with varying viscosities. Students will formulate hypotheses about the viscosities of these fluids and also variables that might affect their viscosity.

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

3rd-8th

- Define viscosity as a liquid’s resistance to flow
- Differentiate between liquids based on their viscosity

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.
- (6th-8th): The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.

Science & Engineering Practice (SEP)

Planning and Carrying out Investigations

- (3rd-5th): Plan and conduct an Investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
- (6th-8th): Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

Crosscutting Concept (CCC)

Structure and Function

- (3rd-5th): Different materials have different substructures, which can sometimes be observed.
- (6th-8th): Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function.

Preparation:

No preparation is necessary for this lesson.

Room Set Up for Activities:

There are 6 viscosity sets in the kit. Students will work in groups of 3-5 students per group, depending on class size. Students can work at their tables/desks. Instruct students NOT to open the tubes.



Safety:

There are no safety concerns for this lesson.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on Chemistry. Other modules in this sequence include:

Chemistry 2: Chemical Identification – Students investigate the physical and chemical properties of six similar-looking, but chemically different, substances, and use these observations to attempt to identify the substances.

Chemistry 3: Polymers – Students learn about polymers and what makes them different through demonstrations. They then make a cross-linked polymer gel from a common polymer (glue).

Chemistry 4: Separation of Substances – After an introduction to elements, compounds, and mixtures, common methods and reasons for separating mixtures are discussed. Students then design and implement a multi-step purification process.

For other module sequences and groups, look here: <http://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 by experimenting with how temperature affects the viscosity of common household liquids.

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:

- Mythbusters - Swimming in Syrup (4:44): <https://www.youtube.com/watch?v=cG8AuhDvh4o>
- What is Viscosity? (5:43): <https://www.youtube.com/watch?v=1AESWxko4nl>
- Friction Basics: http://www.physics4kids.com/files/motion_friction.html