

The Next Generation Science Standards (NGSS)

CHAPTER 3, LESSON 5: DENSITY – SINK AND FLOAT FOR LIQUIDS

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Each pure substance has characteristic physical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3)

Students see that isopropyl alcohol floats on vegetable oil and that vegetable oil floats on water. Students compare the mass of equal volumes of the liquids and look at molecular model illustrations of alcohol, oil, and water to help explain why these liquids either float or sink relative to each other. Students develop their understanding that atoms and molecules determine a material's characteristic properties, including density, and can explain why a liquid sinks or floats in another liquid.

SCIENCE AND ENGINEERING PRACTICES

Developing and Using Models

- Develop a model to predict and/or describe phenomena. (MS-PS1-1), (MS-PS1-4)

Planning and carrying out investigations

Analyzing and interpreting data

Using mathematics and computational thinking

Engaging in Argument from Evidence

Students investigate the question: Why does water sink in oil but alcohol floats on oil? Students measure the volume and mass of a sample of each liquid and calculate the density of each. Students also use a molecular model of alcohol, oil, and water to understand the relative densities of these substances on the molecular level. Students use and further develop this molecular model and apply it to evidence they have observed to explain their observations on the molecular level and to answer the question to investigate.

CROSCUTTING CONCEPTS

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)

Students use molecular-level models of water, wax, and clay to explain how these sub-microscopic characteristics affect the macroscopic observation that oil floats on water and alcohol floats on oil.