

The Next Generation Science Standards (NGSS)

CHAPTER 3, LESSON 4: DENSITY – SINK AND FLOAT FOR SOLIDS

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 investigate why a piece of clay sinks in water while a heavier candle floats. Students use illustrations of the atoms and molecules that make up wax, water, and clay to help understand why wax is less dense than water and why clay is more dense than water. Students further develop their understanding that atoms and molecules determine a material's characteristic properties, including density, and can explain why it sinks or floats in water.

SCIENCE AND ENGINEERING PRACTICES

Developing and Using Models

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

Engaging in Argument from Evidence

Students investigate the question: Why does a heavier candle float and a lighter piece of clay sink? Students compare the mass of equal volumes of water, wax, and clay to determine their relative densities. Students use a molecular model of water, wax, and clay 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.

CROSSCUTTING 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)

Structure and Function

- Structures can be designed to serve particular functions by taking into account properties of different materials and how materials can be shaped and used. (MS-PS1-3)

Students use molecular-level models of water, wax, and clay to explain how these sub-microscopic characteristics affect the macroscopic observation that wax floats in water and clay sinks in water. An explanation is also given as to how a ship, made from a dense substance like steel, can be made to float. If the ship's structure has a large enough volume, the density becomes low enough for the ship to float.