The Next Generation Science Standards (NGSS)

CHAPTER 1, LESSON 1 – MOLECULES MATTER

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)

- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)

  By observing water beading up on wax paper and food coloring spreading in water, students are introduced to the idea that a liquid (water) is made of particles that are close together, attracted to each other, and in constant motion. The characteristics of gasses and solids are addressed in later lessons in Chapter 1.

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: Does water hold together well or come apart easily? After making observations of the behavior of water, students are introduced to a molecular model animation of water molecules. 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)

Students use molecular-level models to explain how these sub-microscopic characteristics affect how water behaves on the macroscopic level.