

# The Next Generation Science Standards (NGSS)

## CHAPTER 5, LESSON 2: SURFACE TENSION

**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 apply what they have learned about the structure and polarity of water and alcohol molecules and how this relates to surface tension. Students see that the surface tension of water and isopropyl alcohol is different and that surface tension is a characteristic property that can be used to distinguish between the two substances.*

### SCIENCE AND ENGINEERING PRACTICES

*Developing and Using Models*

- Develop a model to describe unobservable mechanisms. (MS-PS3-2)

*Planning and carrying out investigations*

*Analyzing and interpreting data*

*Engaging in argument from evidence*

- Students investigate the question: How much water can you add to a full test tube? Students plan and conduct a simple surface tension test between water and alcohol on the surface of a penny. After observing that more water than alcohol can be placed on the penny, students see how much water they can add beyond the top rim of a test tube. Students then see a molecular model of the interaction between water molecules at the surface of a drop of water. 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 of water and alcohol to explain how these sub-microscopic characteristics affect the macroscopic observable characteristic of differences in surface tension.*