

The Next Generation Science Standards (NGSS)

CHAPTER 5, LESSON 7: CAN LIQUIDS DISSOLVE IN WATER?

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

- 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)
- 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 compare how well three different liquids (isopropyl alcohol, mineral oil, and corn syrup) dissolve in water. Students see that the process of dissolving involves the attraction and interaction of the molecules of the solute and the solvent, whether they are a solid and a liquid, or two liquids. Students see that the extent to which these liquids dissolve in water is a characteristic property of the 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

Engaging in argument from evidence

Students investigate the question: Do isopropyl alcohol, mineral oil, and corn syrup dissolve in water? Students plan and conduct an investigation to compare the dissolving of isopropyl alcohol, mineral oil, and corn syrup in water. Students use molecular model illustrations showing the relative polarity of the substances. 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 isopropyl alcohol, mineral oil, corn syrup, and water to explain how these sub-microscopic characteristics affect the macroscopic observable characteristic of the substances dissolving differently in water.