The Next Generation Science Standards (NGSS)

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 the process of dissolving involves the attraction and interaction of the molecules of the liquid and the solid. Students see that four different substances (salt, MSG, Epsom Salt, and sucrose) dissolve to different extents in water. Students look at illustrations of these substances on the molecular level. Students see that the extent to which a substance dissolves in water (solubility) is a characteristic property that can be used to identify the substance.

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

Engaging in argument from evidence

Students investigate the question: Can you identify an unknown using a solubility test? Students plan and conduct a dissolving test to see if they can identify an unknown based on how well it dissolves in water. Students dissolve the unknown (course kosher salt) and four known substances (salt, MSG, Epsom Salt, and sucrose) in the same amount of water to see which dissolves most similarly to the unknown. Students see molecular models of each substance and realize that each substance has its own atoms in a specific

arrangement to form its own 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 of different substances to explain how these sub-microscopic characteristics affect the macroscopic observable characteristic of differences in their dissolving in water.