

The Next Generation Science Standards (NGSS)

CHAPTER 6, LESSON 6: USING CHEMICAL CHANGE TO IDENTIFY AN UNKNOWN

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2), (MS-PS1-5)

Students see that each of four substances has a different set of reactions with four different test liquids. Students discover that substances react chemically in characteristic ways. Students use their observations to identify an unknown substance.

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: Can the characteristic way substances react be used to identify an unknown powder? Students plan and conduct an investigation to test four known substances with four different test liquids to identify an unknown substance. After making and recording their observations, students conduct the same tests on the unknown substance and are able to identify the unknown. Students see molecular model illustrations of the different substances and see that they are composed of different atoms arranged in a specific way. 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 reason that the different atoms composing different substances results in their characteristic observable reactions when test liquids are added to them.