

# The Next Generation Science Standards (NGSS)

## CHAPTER 6, LESSON 1: WHAT IS A CHEMICAL REACTION?

**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)
- The total number of each type of atom is conserved and thus the mass does not change. (MS-PS1-5)

*Students observe a demonstration of a burning candle to begin to learn about reactants and products in chemical reactions. Students see a molecular model animation of a combustion reaction and note that the atoms in the molecules of the reactants rearrange to form the molecules of the products. Students see that the total number of each type of atom is conserved.*

### SCIENCE AND ENGINEERING PRACTICES

#### *Developing and Using Models*

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

#### *Engaging in argument from evidence*

*Students investigate the question: Where do the atoms in the products of a chemical reaction come from? In addition to seeing the burning candle and a molecular model animation, students make their own cut-outs of atoms and use them to model the rearrangement of atoms from reactants to products in a chemical reaction. 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)

### *Energy and Matter*

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)

*Students use molecular-level models of reactants forming products to explain how the interaction and rearrangement of atoms in a combustion reaction results in the macroscopic observation of light, heat, and the formation of the products of the reaction.*