

Educational Resources from *Phenomenon Science Education*
Student Proficiency Goals for **NGSS MS-PS1-5**



Information about MS-PS1-5

NGSS Performance Expectation 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.

Clarification Statement.

Emphasis is on the law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.

Assessment Limits.

Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.

Science and Engineering Practice (Developing and Using Models)

- Develop a model to describe unobservable mechanisms.

Disciplinary Core Idea (PS1.B: Chemical Reactions)

- 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.
- The total number of each type of atom is conserved, and thus the mass does not change.

Crosscutting Concept (Energy and Matter)

- Matter is conserved because atoms are conserved in physical and chemical processes.

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Student Proficiency Goals

SEP (Developing and Using Models):

- Students identify the components needed in their models and assign those components to roles within the models.
- Students develop models capable of describing the numbers of atoms in the products and reactants of chemical reactions.
- Students use their models to describe and show how the numbers of atoms do not change during chemical reactions.

DCI (PS1.B Chemical Reactions):

- Students know that different substances have different physical and chemical properties.
- Students know that in a chemical reaction the atoms of the reactants are regrouped into different substances that are called the products of that chemical reaction.
- Students know that the products of a chemical reaction have different properties than the reactants of that reaction.
- Students know that the total number and type of atoms does not change during a chemical reaction.
- Students know that because the atoms do not change during a chemical reaction, the total mass does not change during the reaction therefore mass is conserved.

CCC (Energy and Matter):

- Students examine atoms involved in reactions before the reactions begin and after the reactions are completed to understand how matter flows in chemical reactions.
- Students recognize that the same atoms are present before a chemical reaction begins and after a chemical reaction ends.