Educational Resources from *Phenomenon Science Education*

Student Proficiency Goals for **NGSS MS-PS1-2**

Information about MS-PS1-2

NGSS Performance Expectation 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.

Clarification Statement.

Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.

Assessment Limits.

Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.

Science and Engineering Practice (Analyzing and Interpreting Data)

- Analyze and interpret data to determine similarities and differences in findings.

Disciplinary Core Idea (PS1.A: Structure and Properties of Matter)

- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.

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.

Crosscutting Concept (Patterns)

- Macroscopic patterns are related to the nature of microscopic and atomic-level structure.

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Student Proficiency Goals for **NGSS MS-PS1-2**

Student Proficiency Goals

SEP (Analyzing and Interpreting Data):

- Students organize data (including data they collect) related to the chemical and physical properties of substances before and after the substances interact.
- Students analyze data (including data they collect) to determine if substances have the same or different physical and chemical properties after they interact.
- Students interpret data (including data they collect) to determine if a chemical reaction has occurred.

DCI (PS1.A Structure and Properties of Matter):

- Students know that each pure substance has specific physical and chemical properties that can be used to identify it.
- Students know that different substances have different physical and chemical properties.

DCI (PS1.B Chemical Reactions):

- Students know that substances react chemically in specific ways, and that these ways can be characteristic of the substance.
- Students know that in a chemical reaction, the atoms in a substance are rearranged, resulting in the formation of a different, new substance or substances.
- Students know that the characteristics of a substance change when the atoms in that substance are rearranged during a reaction to form a new substance or substances.

CCC (Patterns):

- Students consider patterns of atomic and molecular structures and how they result in physical and chemical properties.
- Students consider how the changes in atomic-level structure that occur during chemical reactions result in different patterns of chemical and physical properties after the reactions.
- Students consider patterns of chemical and physical properties when chemical reactions have occurred and when they have not occurred.