

## 5-PS1-4 Matter and Its Interactions

Students who demonstrate understanding can:

- 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

#### Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

### Disciplinary Core Ideas

#### PS1.B: Chemical Reactions

- When two or more different substances are mixed, a new substance with different properties may be formed.

### Crosscutting Concepts

#### Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change.

## Observable features of the student performance by the end of the grade:

1	Identifying the phenomenon under investigation	
	a	From the given investigation plan, students describe* the phenomenon under investigation, which includes the mixing of two or more substances.
	b	Students identify the purpose of the investigation, which includes providing evidence for whether new substances are formed by mixing two or more substances, based on the properties of the resulting substance.
2	Identifying the evidence to address the purpose of the investigation	
	a	From the given investigation plan, students describe* the evidence from data that will be collected, including:
		i. Quantitative (e.g., weight) and qualitative properties (e.g., state of matter, color, texture, odor) of the substances to be mixed.
		ii. Quantitative and qualitative properties of the resulting substances.
b	Students describe* how the collected data can serve as evidence for whether the mixing of the two or more tested substances results in one or more new substances.	
3	Planning the investigation	
	a	From the given investigation plan, students describe* how the data will be collected, including:
		i. How quantitative and qualitative properties of the two or more substances to be mixed will be determined and measured.
		ii. How quantitative and qualitative properties of the substances that resulted from the mixture of the two or more substances will be determined and measured.
		iii. Number of trials for the investigation.
iv. How variables will be controlled to ensure a fair test (e.g., the temperature at which the substances are mixed, the number of substances mixed together in each trial).		
4	Collecting the data	
	a	According to the investigation plan, students collaboratively collect and record data, including data about the substances before and after mixing.