

S5P1-2: Physical and Chemical Changes

Dates: 11/9 - 1/8

Key Terms

Physical Properties³

Chemical Properties³

Physical change³

Chemical Change³

Substance²

Mixture²

Separate²

Chemical reaction²

Substance²

Properties²

States of matter²

Solid²

Liquid²

Gas²

Matter²

Bubbling¹

Weight²

Mass²

Gravity²

Matter²

Precipitate/Cloudy³

Framework for Teaching:

Students Will Be Able To:

1. Relate math to science by using the sum of parts to calculate the sum of the whole.
2. Discuss the parts of whole objects that are microscopic in order to understand that the smallest particles that make up everything are atoms.
3. Classify changes as physical or chemical.
4. Compare and contrast physical and chemical changes and properties.
5. Identify different states of matter in water and relate the phase changes of water to a change in temperature.
6. Identify evidence that a chemical change has occurred.
7. Compare and contrast the properties of a chemical change during the multiple steps of a chemical reaction.
8. Observe and verify the process of water going from solid to liquid to gas.
9. Understand that adding or removing heat is the cause of a temperature change and ultimately a phase change. Phase changes can go in either direction (solid \leftarrow \rightarrow liquid)

For the teacher to know for their own understanding and to avoid misconceptions:

1. The purpose of teaching the sum of parts is an introduction to atomic theory. The depth of teaching that you facilitate should be highly differentiated as this is an abstract concept. Integrating math is key as it remediates and enriches math skills and application.
2. Atoms are smaller than cells and they make up cells and organelles. Kids may ask questions about this or have misconceptions. Be cautious of kids thinking that cells and atoms are synonymous. Atoms = smallest complete unit of matter. Cells = smallest complete unit of living things.
3. Use paper as stated in the standard to teach physical changes. Make sure you are careful about saying physical properties and physical changes.
4. Provide evidence that chemical changes have occurred. (Examples provided)
 - a. Heat or light is given off.
 - b. Change in temperature.
 - c. Precipitate formed (cloudiness).
 - d. Gas formed (bubbling) → be cautious of boiling water as there are bubbles but this is a physical change.
 - e. Dissolving is NOT a chemical change.
 - f. Color change is chemical change (NOT adding a colored powder to water).
 - g. Rotting or decomposition.
 - h. Change in composition (paper burning = ash; cake batter cooking)
5. Heat (energy) does not always mean that a temperature change will occur as phase changes require energy (heat). (i.e. changing from one state of matter to another)

Activities (Suggestions)

- ✓ Chemical Change Café (Picture Perfect)
- ✓ Popcorn lab (Picture Perfect).
- ✓ Basic model building. (Weigh the parts before and after construction). Write a report.
- ✓ Stations. Chemical vs. Physical Changes. Have students rotate and decide if a change was chemical or physical (before and after) and provide an argument for their claim.

Notes:

This unit is very abstract in nature and relies heavily on prior knowledge. I suggest a diagnostic of basic information be given before teaching to see where support should be provided. I provided support to avoid misconceptions so please read through this before teaching or making definitive statements about phenomena.