

1. Essential Element

Activity/Lesson Title: Chemical Change

EE: EE.MS.PS1-2: Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).

Teacher: Emma

Grade Level: Middle (6-8)

Student: Felipe

Level: Initial



2. Science and Engineering Practice

SEP 4: Analyzing and Interpreting Data

SEP description: Supports students as they analyze and interpret data to determine similarities and differences in findings.

3. Disciplinary Core Idea

Structure and Properties of Matter

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

4. Crosscutting Concept

Patterns

Concept Description: Students learn that observations about large patterns (macroscopic) help them understand smaller patterns in things that aren't directly observable (microscopic).

5. Linkage Level Descriptors

Initial: Observe and identify examples of change (e.g. state of matter, color, temperature, and odor).

Precursor: Gather data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).

Target: Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).

6. Student's Typical Accessibility Supports

- Tactile objects for representations
- Labelled photographs
- Lessons and activities broken into smaller segments
- Use photographs or objects to record data/evidence

7. Student Prior Experiences, Prior Knowledge

- The student likes to collect coins.
- The student likes to cook.
- The student likes the outdoors and has collected from a tree in different seasons.

8. Phenomenon to Explore

Question: What makes pennies change color?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that

- Chemical changes result only from mixing substances together (not from interactions at the molecular level).
- A change of state (between solid, liquid, gas) indicates a chemical reaction has occurred.
- The rate of chemical reactions are constant over time.
- Chemical reactions are always irreversible.

10. UDL Options and Solutions to Potential Barriers

- Have students work with a buddy to help with the investigation and recording data.
- Use tactile objects.
- Have students take photographs of different stages of the investigation to show understanding.
- Use a graphic organizer (data table).

11. Engage

Think

- How can I make sure to access students' prior learning?
- How can I use the CCC to connect everyday language with scientific language of the phenomenon?
- How can I support student participation by scaffolding the SEP?

Teacher Will

- Show a time-lapse video of what happens to substances as they are heated (wood and raw dough).
- Have students observe those substances before and after they are heated (ashes and baked bread).
- Pose questions like, "What is different about the wood after it burned? What is different about the bread dough after it was baked?"

Students Will

- Observe differences in substances after they are heated.
- Discuss observations about how substances changed after they were heated.

12. Explore

Think

- What is difficult or inaccessible about the phenomenon, and how can I make it more accessible in the Explore phase?
- How can students collect data in a way that helps answer a scientific question?
- How can I encourage students' careful observation and asking good questions vs. looking for only the "right answer"?

Teacher Will

- Assist students in collecting data about how pennies change color as different household substances are applied.
- Set up the materials to allow students to touch the "before" and "after" pennies during the investigation.
- Assist students as they apply substances to the pennies (lemon juice and vinegar) and record the results in a data chart.

Students Will

- Investigate how pennies change color by applying water, lemon juice, and vinegar on pennies.
- Record observations in a data table.
- Discuss their conclusions.

13. Explain

Think

- How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?

Teacher Will

- Assist students in reviewing the data collected.
- Ask prompting, open-ended questions to help students make connections between the data and the question that they are trying to answer (e.g., Why did some pennies change color and not others? Did it make a difference how long we let the penny soak?).
- Assist students in completing a CER organizer.
- Provide support for students' use of descriptive language (like "shinier").

Students Will

Complete a CER statement

Claim: The pennies changed color when some substances were added.

Evidence:

- » I tested pennies soaked in lemon juice. They became shinier. The same thing happened with vinegar.
- » Pennies did not become shinier with water only.

Reasoning: I saw from the data in our chart that pennies changed color to become shinier after adding some substances.

14. Elaborate

Think

- How can I help enrich or extend student ideas? Are there related science concepts that would support and extend student learning?

Teacher Will

- Do a shared reading lesson with students using the Tarheel Reader book called "[Physical and Chemical Changes](#)."
- Have students conduct additional investigations using more substances (e.g., a bath bomb added to water, or vinegar added to baking soda) to observe how they change.

Students Will

- Do a shared reading session in an appropriately leveled book about physical and chemical changes.
- Conduct tests on pennies using new substances (e.g., rubbing alcohol) and on other materials to see how they change.

15. Evaluate

Think

- What do I need to see or hear from my students that assures they have learned the science content? What information must I gather to inform my teaching as I move through the lesson?

Teacher Will

- Provide an exit ticket at the end of the lesson asking about the phenomenon and about what happened during the investigations.
- Use the student responses to inform the evaluation.

Students Will

- Complete the exit ticket.
- Respond to questions posed by the teacher summarizing the investigation, what they did, and what they learned from it.
- Complete the graphic organizer using photographs to label each penny before and after the substances were applied.