Collecting Micrometeorites

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EDE 4030

Objectives
- In groups, TSWBAT collect and observe micrometeorites present in indoor and/or outdoor environments, using a microscope.
- Using the collected data, TSWBAT identify and illustrate micrometeorites.

Grade Level: 4

National Science Standards
Content Standard D
As a result of their activities in grades K-4, all students should develop an understanding of
- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

Sunshine State Standards
SC.E.2.2.1. - The student will be able to recognize the vastness of the Universe and the Earth’s place in it. The student knows that, in addition to the Sun, there are many other objects that are far away in space.

Competencies and Skills - Science and Technology
21 Knowledge of Earth and Space
1. Identify the components of Earth’s solar system and compare their individual characteristics.

ESOL Performance Standard and Indicators
Standard 4 - Use knowledge of cultural characteristics of Florida’s LEP population to enhance instruction.
Indicator 2 - Adapt items from school curricula to cultural and linguistic differences.

Standard 13 - Evaluate, design, and employ instructional methods and techniques appropriate to learner’s socialization and communication needs, based on knowledge of language as a social phenomenon.
Indicator 3 - Apply ESOL strategies to specific learning styles.

Standard 15 - Evaluate, select, and employ appropriate instructional materials, media, and technology for ESOL at elementary levels.
Indicator 4 - Identify appropriate instructional equipment for ESOL lessons.

Standard 18 - Create a positive classroom environment to accommodate the various learning styles and cultural backgrounds of students.
Indicator 4 - Apply multi-sensory ESOL strategies for instructional purposes.

When and under what conditions are micrometeorites most prevalent?
Micrometeorites

- Submillimeter extraterrestrial particle that has survived entry into the atmosphere without melting.
- Typically metallic pieces of rock broken off from larger chunks of rock and debris, often dating back to the formation of the solar system.
- Extremely common in space, particularly near the Earth.
- While meteoroids tend to remain in stable orbits, micrometeoroids are more likely to fall to Earth, and can provide information on millimeter scale heating events in the solar nebula.
- Fragments of asteroids, comets, Mars, and our moon.

Purpose

- To determine if micrometeorites exist more on sunny days, cloudy days, morning hours, afternoon hours or evening hours and/or indoor environments on earth.

Hypothesis

- We believe that there are more micrometeorites present on clear days.

Experiment

Collecting Micrometeorites

- Materials (per sample group):
  - 2 pieces of 11” x 14” white poster board
  - (6) 12” x 15” piece of Cling Wrap
  - 6 slides with covers or 6 Petri dishes with cover
  - Daily Weather reports
  - Microscope.
  - Labels and Markers (to label samples)
  - Pictures of previously collected samples
  - Magnet (made with magnet strip and tongue depressor)
  - Petroleum jelly
  - Q-Tips
  - Small Paper Plates

Variables

- Outdoor samples collected from three different locations in Lake Wales, at different times of the day, for a period of four days.
- Indoor samples collected from different locations.
- Constant - same size piece of white poster board and same size cling wrap.

Procedures

- This is not a controlled experiment because more than one variable is manipulated at the same time.
  1. Take one piece of 11” x 14” white poster board and cover it with a piece of 12” x 15” Cling Wrap.
  2. Place the paper out side in an open area for at least 3 hours (for outdoor samples) Place a paper in an indoor location for at least 3 days (for indoor sample).
  3. Record the weather conditions for the time your sample is left outside.
  4. Collect the sheet of white poster board and bring inside.
5. Using a magnet, carefully skim the surface of the Cling Wrap looking for magnetic particles. Gently tap magnet onto slide to loosen any particles.

6. Coat slide cover with a thin layer of petroleum jelly and then place slide cover on top the slide in the area that the sample has been placed with the sample in the center.

7. Place slide with sample under the microscope and carefully locate sample by manipulating the slide and the microscope to bring the sample into focus.

8. Using the pictures of previously collected samples of micrometeorites compare your collected sample and then illustrate what you see in the microscope.

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<tr>
<th>Results</th>
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<tbody>
<tr>
<td><strong>Outdoor Samples</strong></td>
</tr>
<tr>
<td>Morning</td>
</tr>
<tr>
<td>Clear - 69°F</td>
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<tr>
<td>Mostly clear - 72°F</td>
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<tr>
<td>Rain - 90°F</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>Indoor Samples</strong></th>
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<tbody>
<tr>
<td>Sample 1 – KB 1</td>
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<td>Sample 2 – ND 1</td>
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<tr>
<td>Sample 3 – SM 0</td>
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<th>Conclusions</th>
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<tbody>
<tr>
<td>• Samples found under mostly clear outdoor conditions</td>
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<td>• Found in environments such as soil, crops, and the air that we breathe</td>
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