My Soil's Better Than Your Soil
Comparing the Organic Content from Soil Samples

Essential Question:
Do different soils have different amounts of organic matter?

At a Glance: Learners add hydrogen peroxide to different soil samples. It reacts with carbon in the soil forming CO2 bubbles. Learners discover that t he soil that bubbles the longest has more organic matter.

Location: Classroom; soil samples will be collected outside at chosen sites

Objectives: *Learners will*
1) test the amount of available carbon (organic matter) in the soil.
2) describe how levels of organic matter can affect plants.

Skills: data collection, observation, analysis, communication, inference

Supplies:
- six clear glasses or plastic cups
- marker to label soil samples in cups
- 6% hydrogen peroxide (available in any drugstore)
- sticks for stirring the soil
- wrist watch or clock
- soil auger (or small trowel)
- *My Soil is Better than Your Soil* Standards Check data sheets

Subjects: science, math

Time: 20 minutes

Background Information:
The remains of living things found in soil are called organic matter. Organic matter can contain many different elements, but always has a large amount of carbon.

Organic matter improves soil productivity; plants grow better in soils with high organic content. There are many reasons for this. First, the decomposition of organic materials adds vital nutrients to the soil (organic materials contribute nitrogen, phosphorus, potassium, and many other micro-nutrients). Organic material also improves the soil structure and keeps nutrients from being washed away by rain before the plants can use them. Organic matter also acts like a sponge, helping retain moisture in the soil.

The plants in a forest help protect the organic matter on the forest floor. When land is cleared, erosion can wash away topsoil and organic matter. Once topsoil has washed away, it is difficult to establish other plants on the site.

In this experiment, learners compare the amounts of organic matter in different soils on their site. A chemical reaction between soil carbon and hydrogen peroxide makes this possible.

Soil is mixed with hydrogen peroxide (H_2O_2). The carbon from the organic matter in the soil bonds with the oxygen (0_2) in the peroxide to form carbon dioxide (CO_2) bubbles and water. The carbon dioxide (a gas) occurs as bubbles that the learners can observe. Vigorous, long-lasting bubbling indicates a large amount of organic matter. Since the carbon is bonding with the oxygen, scientists say that the organic material has been "oxidized". You will notice that once the bubbling process is complete, the soil has changed color.

Getting Ready:
Find sites that you would like to test. If doing this as part of your Standards Check Log, the sites should be located at your Checkpoints. Alternatively, you may look for sites that have different amounts of organic matter and will be located in different areas. A forest or wooded area or a

garden would have high organic matter. A badly eroded playground would have low organic matter. A roadside or lawn would probably be somewhere in the middle.

Procedure:

1. Start at Checkpoints and walk two paces to the north, south, east or west. Mark your location on the Standards Check data sheet.
2. Using an auger or trowel have learners remove a sample of soil about five cm deep from each test site and place the soil in different cups and bring them back to the classroom.
3. In the classroom, learners will label the cups so that they will know which soil came from each site.
4. Learners will place two tablespoons of each type of soil in a separate cup.
5. Learners will add three to four tablespoons of hydrogen peroxide to the soil in the cups until the soil is completely covered. This should produce bubbles.
6. Using a watch with a second hand, learners will record the length of time bubbling occurs. If there is not enough time to record how long the soil bubbles, learners can stir their soil and watch their cups for five minutes and then report the amount of bubbling.


Parkside Elementary

7. Record the length (or amount) of bubbling. Ask the groups to report their findings.

Discussion/Assessment:

The amount of bubbling reflects the amount of organic material present. Explain to learners the process that caused the bubbling in the soil cups. Ask them if they think organic matter is important. Why? What did the sites that had the most organic matter look like? What did the site with the least amount of organic matter look like? Where does organic matter come from? What happens to soil when organic material is removed?

Soil and Recycling Department
ECO-STANDARDS CHECK

MY SOIL'S BETTER THAN YOUR SOIL

Team Members _____Date _____Time _____

Checkpoint # or Name _____Direction (circle): N NE NW S SE SW E W

Weather Conditions: Temperature _____ Cloud Cover/Sun _____ Wind _____

INSTRUCTIONS:

1. From your Checkpoint, walk two paces to the north, south, east or west as instructed by your club leader. Collect soil samples from Checkpoints as demonstrated by the leader.
2. Place two tablespoons of each type of soil in a separate cup. Add three to four tablespoons of hydrogen peroxide to the soil in the cups until the soil is completely covered. This should produce bubbles.
3. Using a watch with a second hand or a timer, record the start time, end time and the total length of time bubbling occurs on the *My Soil is Better than Your Soil* Standards Checks data sheet.

Time: 15 minutes

Start Time	**End Time**	**Total Bubbling Time**	**Color of Soil**