



## THE TIES THAT BIND SOIL TOGETHER

### GRADES 9-12

#### BACKGROUND INFORMATION

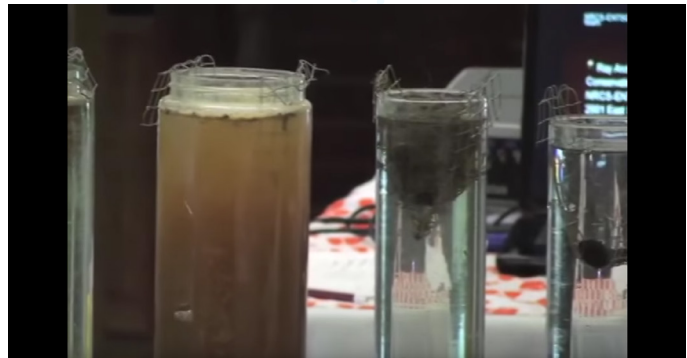
Soil that is “alive” is filled with many microscopic organisms. These organisms play an important role in soil structure. As organisms in the soil break down organic matter, soil particles form bonds with one another called soil aggregates. Aggregates, or clumps of soil, can form from plant roots, the clay in soil, and even by sticky “gums” that are formed by bacteria and fungi that digest organic matter and live in the soil.

The texture of soil can play a role in soil aggregate stability. However, the way that soil is managed can also play a role. Growing more plants in soil creates more roots and organic matter in the soil, which can help with soil aggregation. Tillage, or the disturbance of soil, can break soil aggregates into smaller pieces, leaving the soil more vulnerable to erosion and reducing the capacity for water infiltration.

The Slake Test is one way to see soil aggregation in action! You can easily replicate this test in your classroom with a few materials.

Watch this quick video from the Natural Resources Conservation Service (NRCS) to get an idea of how the experiment works:

[https://www.youtube.com/watch?v=9\\_ItEhCrLoQ](https://www.youtube.com/watch?v=9_ItEhCrLoQ)



#### PREPARATION

- Two large, clear jars, containers, beakers or vases (glass or clear plastic)
- Several pieces of wire frame, mesh cloth netting with relatively large holes, or a shelf with slats. The frame will need to hold the soil clumps in place within the clear containers while they are submerged in water.
- At least two large clumps of soil about the same size from different fields/environments. Note where you collected the soil samples from. If possible, try to vary your collection sources. Soil aggregate stability will be different depending on soil texture, the amount of clay and organic matter in the soil and the amount of microbial activity in the soil. Aggregates can also vary based on land management practices such as tillage and the use of cover crops. Examples of areas to sample include a lawn, a construction site, a farmer’s field that has been plowed, and a farmer’s field that has not been plowed.

## PROCEDURE

1. Fill the two containers with tap water.
2. Secure the wire frame, netting, or shelf to the top of each container so that it is submerged in water and will not fall to the bottom of the container when soil is added. It should create a bowl shape.
3. Place a soil clump in each container, making sure that clumps are fully submerged in water.
4. Repeat the experiment with fresh water and fresh soil clumps in each container.

Questions to consider:

- Which soil clump will disintegrate the fastest? Why?
- What are soil aggregates? What factors affect soil aggregation?
- What is soil pore space? How is it formed?
- How might soil pore space play a role in the Slake Test?

## OPTIONAL EXPANSION ACTIVITY

Contact your local NRCS office and invite a representative to your classroom. The NRCS has a variety of tools, tests, and in-depth soil information available – a great local resource! Most offices also have the materials to present a Slake Test already on hand.

Iowa NRCS Service Center Locator: <https://offices.sc.egov.usda.gov/locator/app?state=ia>