

Soil Sizes – Some Surprises!

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The size of soil particles is an important part of making soil either good or not so good at growing different kinds of plants. The smaller the particles, the harder it is for water to move through the soil. You can do a quick experiment to get an idea of the different sizes of soil particles in a sample of soil.

Materials:

- Potting soil (about 1 ½ cups)
- Sand (about ½ cup)
- 2 clear plastic containers with lids (tennis ball cans work well)
- Water
- Paper or plastic cup
- Spoon
- Masking tape
- Pen
- Magnifying glass (optional)

Procedures:

1. Use your masking tape and pen to label one container soil and the other soil + sand.
2. Fill the container labeled soil about ¾ full of water.
3. Fill your cup with soil. Very slowly add the entire cup of soil to the water.



4. Watch as the particles of soil sink. Use a magnifying glass if you have one to get a closer look. What do you notice about the way the soil particles move in the water? Do particles of different sizes seem to sink at different speeds?

5. Now fill the container labeled soil + sand about ¾ full of water. Fill your cup about halfway with soil and the rest with sand. Use a spoon to mix the sand and soil as thoroughly as possible.
6. Very slowly add the entire cup of soil and sand to the water.



7. Watch as the particles sink. Use a magnifying glass if you have one to get a closer look. What do you notice about the way the soil particles move in the water? Do particles of different sizes seem to sink at different speeds?
8. Place a lid securely on each container. With the help of a partner, shake both containers and watch the particles settle again. Allow both containers to stand overnight and observe them the next day.
9. Do you notice any layers in the containers? How would you describe the particles that make up the layers?

Think about this ...

Let's say you had sand grains of three different sizes from smallest to largest like fine sand, medium sand, and coarse sand. If you mixed equal amounts of each type of sand in a cup and then poured the mixed up sand slowly into a tall container of water, do you think the sand would end up in layers? What type of sand do you think the layers would be made of?

Where's the Chemistry?

Most soil is a mixture of sand, silt, clay, and decomposed plants and animal matter. Sand, silt, and clay are made from different rocks and minerals but the other important difference between them is the size of their particles. Sand has the biggest, clay the smallest and silt is in between. The reason why the sinking test works well is because the size of a particle has a lot to do with how fast it sinks in water. Even if two particles are made of the same material and are the same shape, the smaller one will sink more slowly and end up on top of the larger one when they both reach the bottom. You can prove this to yourself by rolling up a very tiny ball of clay (about 1 millimeter in diameter) and a bigger one (about 1 centimeter in diameter). At the same time, place them in a tall glass of water and see which one sinks the fastest.



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Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

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