

## **Groundwater Resources**

### **How does soil type affect the movement of ground water?**

Groundwater is water that moves through soil and rocks below Earth's surface.

When groundwater moves through soil, the structure of the soil affects its movement. The three particles that determine soil structure are sand, silt, and clay. Sand particles can be seen with the naked eye and range in width from 0.05 to 2.00 mm. A microscope must be used to see silt particles, which are between 0.002 and 0.05 mm in width. An electron microscope is required to see clay particles, which are less than 0.002 mm wide.

Soil type depends on how much of each kind of particle makes up the soil. There are 13 types of soil.

Groundwater moves through the spaces between soil particles. These spaces are called pores. Not all soils have the same amount of pore space. Porosity depends on the number and size of pores in a soil. You can find the volume of pore space in a soil by determining the volume of water its pores are capable of holding. The volume of pore space divided by the volume of a soil sample determines its porosity. This measurement is given as a percentage of the volume of the soil.

The pores in soil are all connected, allowing water to pass through them. This means that soil is permeable. The ease with which water moves through the soil is called permeability.

A soil with high porosity and many small pores can hold a lot of water, but it takes longer for the water to enter all the pores. This means that when a soil has higher porosity it has lower permeability.

A soil's porosity and permeability are important to many people. Farmers must be aware of these soil conditions so they can determine the best way to grow crops. Builders also consider these conditions in the area they plan to build. Environmentalists are concerned with porosity and permeability when there is a risk that a pollutant might be introduced into the groundwater supply.

In this Virtual Lab, you will investigate how different types of soil hold water. You will collect data and use it to make observations about the relationship of soil porosity to soil permeability.

#### **Objectives:**

- Determine the porosity of various types of soil.
- Define the relationship between porosity and permeability.
- Describe how a soil's porosity and permeability affect the movement of groundwater.

#### **Procedure:**

1. To select a type of soil, change the percentages of sand, silt, and clay by sliding the bars on the Soil Meter.
2. Click the Test This Soil button to move 100 mL of the soil mixture to the funnel.

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3. Click the Pour Water button to begin pouring water on the soil. The water will automatically when the first drop of water begins to form at the bottom of the funnel.
4. Observe the readout that displays how much water was poured. This is the volume of water soil held.
5. To find the porosity of the soil, divide the volume of water the soil held by the total volume of soil. Multiply the decimal by 100 and type this percentage in the Table. In the formula below,  $V_w$  stands for the volume of water and  $V_s$  stands for the volume of soil.  
$$V_w / V_s \times 100 = \% \text{ Porosity}$$
6. Click Reset and repeat steps 1 through 5 for each of the 13 soil types.
7. Complete the Journal questions.