

LAB: Soil Porosity and Permeability

Define these terms:

Porosity –

Permeability –

Procedure:

1. Set up apparatus so the funnel is over the beaker.
2. Place a piece of filter paper in the funnel so that solid material does not flow through.
3. Using a beaker, measure 25 mL of soil type #1 and place it in the funnel, on top of the filter paper.
4. Place the beaker underneath the funnel.
5. Using a graduated cylinder, measure 100 mL of water and slowly pour it into the funnel. Let the water percolate through the soil and collect it in the beaker below. BEGIN TIMING AS SOON AS THE WATER TOUCHES THE SOIL SAMPLE.
6. Continue to time until the water has stopped collecting in the beaker. Record the total amount of time for each sample in the corresponding drainage time data slot below.
7. Measure the amount of water in the beaker and place this number in the data table under the amount of runoff (measure in mL).
8. Clean all equipment. Place used soil in the designated area.
9. Repeat steps #2-6 for soil samples 2-4. Record all data in the data table and be sure to answer all questions.

Results:

Describe the appearance and texture of each soil type:

CLAY –

GRAVEL –

SAND –

SILT –

TOPSOIL -

Soil Type	Drainage Time (sec)	Amount Drained (mL)	Drainage Rate (Amount of water drained / time)	% Water Retained (100 - Amount of water drained, as a %)
CLAY				
GRAVEL				
SAND				
SILT				
TOPSOIL				

Questions and Analysis:

1. The sample that had the highest drainage rate and retained the least amount of water was the most permeable. Which sample does this describe?
2. Why can some soil samples hold more water than others?
3. Why are pore spaces in soil important to plants and organisms that live there?
4. Compare the permeability of these samples with their porosity. The sample that retained the most amount of water had the highest porosity. Was the most permeable sample the most porous as well?
 - a. Is there any connection between soils' permeability and its porosity? EXPLAIN.
5. Which of these samples would you want to use for planting purposes? WHY?
6. Which of these samples would you want to place in an area that is known to get sudden bursts of precipitation? (*meaning a high amount of water very quickly*) WHY?
7. Which sample would be most similar to soil you would find here at school? Why do you think this sample best describes GHHS soil?
8. Water wells are sunk into aquifers, units of rock that store and transmit water, meaning they have good porosity and high permeability. Which of the three sediments would make the best water source for a water well? WHY?
9. Suppose a plant grows in a soil with poor water-retaining capacity. What kind of root system would be most beneficial – a deep tap root or a shallow, wide-spreading root system? Explain.
10. Which of the soil samples would be the best to build a landfill on? WHY?