

Name: _____

Lab: Soil Porosity and Permeability

Prelab Questions:

1. Define Porosity.
2. Define Permeability.
3. Describe the appearance and texture of clay.
4. Describe the appearance and texture of silt.
5. Describe the appearance and texture of sand.
6. Describe the appearance and texture of gravel.
7. Describe the appearance and texture of topsoil.

Procedure (repeat for each soil type):

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. 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 and stop when water drips at less than one drop per second.*
5. Record the total amount of time for each sample in the data table below.
6. Pour the water in the beaker into a graduated cylinder to accurately measure the amount drained. Record in the data table below.
7. Clean all equipment. Place used soil in the designated waste container.

Results:

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				
SILT				
SAND				
GRAVEL				
TOPSOIL				

Analysis Questions:

8. The sample that had the highest drainage rate and retained the least amount of water was the most permeable. Which sample does this describe?
9. Why can some soil samples hold more water than others?
10. Why are pore spaces in soil important to plants and organisms that live there?
11. 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? Is there any connection between soils' permeability and its porosity? EXPLAIN.
12. Which of these samples would you want to use for planting purposes? WHY?
13. 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?
14. Which sample would be most similar to soil you would find here at school? Why do you think this sample best describes GHHS soil?
15. 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?
16. 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.
17. Which of the soil sample would be the best to build a landfill on? WHY?