

Unit 10 Applications Physical Hydrometeorology

You have the choice between task 1, which is an easy to do experiment, and task 2. Task 2 gives you the same intellectual challenges minus the skills you gain from doing the measurements yourself. This means in task 2, you determine the same soil quantities, but use other students' data.

1. We will determine the porosity of a soil sample. You will need a package of pot soil, a scale, ruler, a containers, water, and a plastic foil. Your container should be a cylinder, cube or rectangular box, i.e. an easy geometric form. Thus, a Gladys's box doesn't work. Note that the weight of pot soils varies strongly dependent on the mix. Thus, don't let the numbers given in task 2 irritate you. Instructions:
 - a. Put the plastic foil onto the table so the table wouldn't get dirty.
 - b. Determine the weight of your container.
 - c. Put some pot soil in the container so it is half full. Weight the filled container
 - d. Measure the diameter or length of the sides of the soil container and the depth of the soil samples in the containers.
 - e. Calculate the soil volume.
 - f. Then pour water slowly into the container with the soil sample until no further water can be added. Make sure you record the amount of water that you pour into the soil while you add water to the soil. Note there shouldn't form a puddle on the soil sample.
 - g. Determine the weight of the soil sample water mix, i.e. subtract the weight of the container.
 - h. Calculate the porosity just using the soil volume, soil dry weight, and soil-water-mix weight.
 - i. Now convert the amount of water (measured in liter) to volume. Recall 1 liter is 1 dm^3 . Then use the soil and water volume values to determine porosity.
 - j. Compare your results and discuss them.
 - k. What other quantities can you derive from these two experiments? Calculate them for extra credit.

2. When you decided to not do the (fun) lab part, use these values that students found in two different lab experiments. In the first experiment, they found for the mass of the container, mass of the dry soil and the soil-water mix 22g, 76g and 316g. Calculate the porosity. Determine the mass of water they had poured into the container. In second experiment, they used a $0.155\text{m} \times 0.113\text{m}$ container with a weight of 22g and 61g soil. In the container, the soil depth was 2.4 cm. They poured 234g water into the soil. Calculate the mass of the soil water mix. Determine the volume of the water and the volume of the soil and calculate soil porosity. Discuss whether the students took soil from the same sample in the two experiments.