OKLAHOMA ROCKS! GROUNDWATER

Lesson 3: Infiltration, Porosity & Moisture Retention

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In this lesson you are asked to conduct a simple "experiment" in the laboratory, classroom, or your home. Your experiment will illustrate the relationships between sediment characteristics and infiltration, porosity and moisture retention. You will build a test apparatus (TA) for each sample.

Materials:

3 small (250 mL – 1 L) plastic bottles or beakers
3 paper cone "water cooler" cups (100mL)
3 varieties of dry sand or soil
1 thumbtack
Scale or balance (up to about 1000g capacity)

Coarse Sand — Fine Sand — Silt

$$V = \frac{1}{3} \pi r^2 h$$

TA 1   TA 2   TA 3

Preliminary Calculations:

• Measure the diameter (d) and height (h) of the conical cups.

• Calculate the volume (V) of the cups (Hint: Use formula where d = 2r)
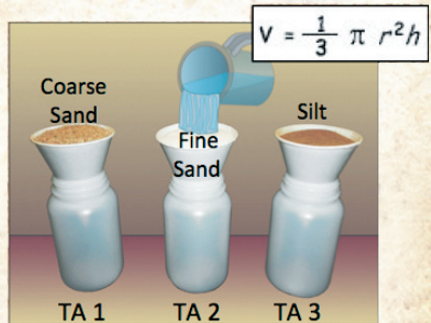
Procedure/Calculations:

• Place the empty cups inside the bottles to form each test apparatus.
• Weigh each test apparatus, record the mass into row A of the data table.
• Fill each cup with a different variety of sediment.
• Weigh each test apparatus, record the mass into row B of the data table.
• Slowly add water to each cup until the sediment samples are saturated.

• Immediately after 5 minutes of gravity drainage, reassemble the test apparatus. Weigh the test apparatus, record into row E of the data table.
• Repeat the 5-minute gravity drainage for the other test apparatus.

How quickly did water drain out of each sample?

Which sample retained the most water?
(i.e., higher percent saturation)

How quickly did the water infiltrate into each sample?

• Weigh the saturated test apparatus, record the mass into row C of the data table.

• Calculate the volume of water added into each test apparatus and record into row D of the data table. (Hint: D = C – B because 1mL H2O weighs 1g)

• Calculate the porosity of each sample, record into row E of the data table. (Hint: E = 100 * D / volume of cup)

• Carefully punch a hole in the tip of one cone and allow the water to drain by gravity into a measuring cup or graduated cylinder for 5 minutes.

Row	Measurement/Calculation	TA 1	TA 2	TA 3
A	Mass when empty (g)			
B	Mass with dry sediment (g)			
C	Mass when saturated (g)			
D	Volume of water added (mL)			
E	Porosity (%)			
F	Mass after drainage (g)			