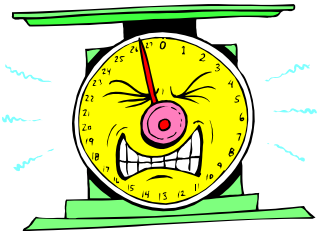
Biocomplexity Lab Activity: Permeability

Objective: To predict and test the permeability of sediments with particles of different sizes

Warm Up: Describe what you think an aquifer is or does.

Materials:

1) Different size glass spheres (0.210-0.297, 0.250-0.350, 0.297-0.420, 0.350-0.500, 0.420-0.590) (50 grams of each size)
2) Water (250 ml)
3) Holding Bottle - use picture below to create (1 per group)
4) Collection Bottle - use picture below to create (1 per group)
5) Stopwatch
6) Graduated Cylinder
7) Funnel
8) 200 Micrometer screen filter
9) Scale
10) Weighing paper



Background:

How does water move through materials such as rocks or sand? That question is answered, in part, by **permeability**. **Permeability** is the measure of how easily water can flow through a material (like rocks, soil or an **aquifer**). In this activity we will measure the **permeability** of water through glass spheres to represent the movement of water in sand, an **aquifer** or another sediment.

Procedure:

1. Students will create a hypothesis within their groups about when they think will happen among the different groups experiments.
2. Obtain the lab bucket containing all the material and equipment for the lab.
3. Screw on the special-made top to the holding bottle. This top will contain a 200 micrometer filter screen.
4. Using the attached diagram, students will create the model in which to do the lab.

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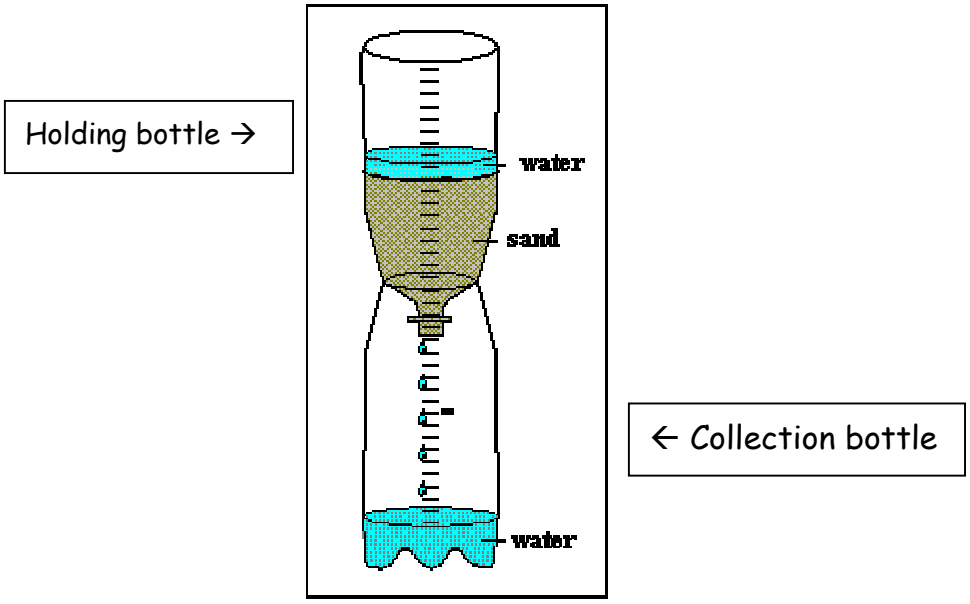
5. Using a graduated cylinder, students will measure out approximately 50 grams of glass spheres of the specific size they chose and record this weight on the Permeability Data Chart (each group or student will choose 1 out of 5 different sphere sizes).
6. Pour the glass spheres into the holding bottle and then insert the end with the screened cap into the opening of the collection bottle.
7. Slowly pour water into the holding bottle. Try to keep the water level above the glass spheres (around 50 ml above).
8. When water starts to come out of the holding bottle and into the collection bottle, start timing using a stopwatch.
9. Continue to add water to the holding bottle, keeping all the glass spheres wet.
10. When the collection bottle reaches 80 milliliters, stop pouring water, stop the timer and record the time on the Permeability Data Chart.
11. Let the remainder of the water run into the collection bottle and then repeat the process four more times and record each time.
12. Clean up.

Data/Calculations:

Permeability flow rate should be expressed as a volume per time (liters per minute).

0.8 liters of water **.8 liters**

time for 0.8 liters to flow (minutes) minutes =_____



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Follow Up: After doing 5 runs of this experiment, have students compare their findings aloud. Students will record the data for each size glass spheres and then use the data to create a graph on Excel.

Students will then use their graphs to come up with a conclusion as to why they think these results have occurred.

Assessment: Observation of class participation in Lab Activity and review Lab Sheet and Graph.

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Name _____

Date _____

Lab Activity: Permeability

permeability: _____

_____

hypothesis: _____

_____

_____

_____

Permeability Data Chart

Your Data:

Date	Sample ID	Sample Weight (grams)	Elapsed Time(s)
/ /			
/ /			
/ /			
/ /			
/ /			

Other Groups Data:

Date	Sample ID	Sample Weight (grams)	Elapsed Time(s)
/ /			
/ /			
/ /			
/ /			

Conclusion: _____

_____

_____

_____

_____

_____

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