COEFFICIENT OF PERMEABILITY

Purpose

To see how hydrostatic pressure effects water flow.
To determine the co-efficient of permeability of loose sediment.

Instructions

1 Record the thickness of sediment in the glass tube. Check that the bottom of the sediment is at 0 on the scale.

2 Record the grain size of the sediment in the tube.

3 Place a container beneath the tube.

4 Fill the tube with water to within 2 centimetres of the top.

5 Start the stopwatch when the top of the water reaches the 140cm point and then record the time at which the top of the water passes each 10cm interval.
Your record should look like this:

Height of water	Time
cm	secs
140	0
130	23

6 Plot water height (on vertical axis) against time (on the horizontal axis).

7 Why does the water fall quickly at first and more slowly when most of the water has passed through?

8 Calculate the coefficient of permeability for the sediment.

$$K = \frac{(h1 - h2) \times 2 \times L}{(t2 - t1) \times (h1 + h2)}$$

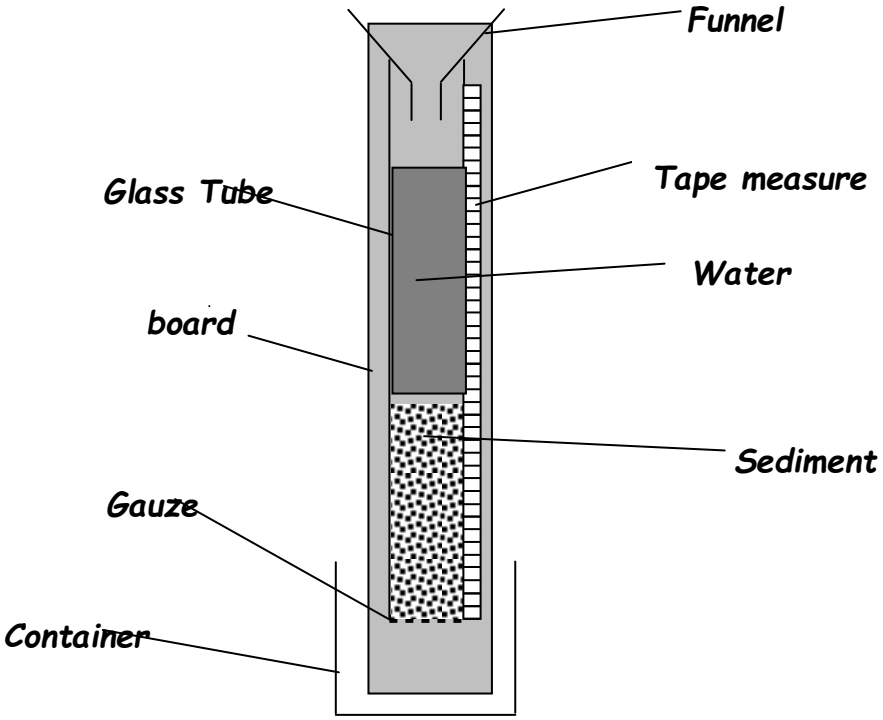
K = coefficient of permeability
h1 = height of water at time t1 (cm)
h2 = height of water at time t2 (cm)
L = thickness of sediment (cm)

Teacher's Section

Requirements

3 Glass tubes 25mm diameter and 1.5m long

Each tube should have gauze tied over the end and should be supported on a board 1.8m by 10cm by spring clips as in the diagram. A tape measure tape should be stuck beside each tube.



Well sorted sand as listed below. Different thicknesses of sand are needed to allow for the water to flow through in a reasonable time.

½ to 1mm	30cm
1 to 2mm	45cm
2 to 4cm	80cm

Container to catch water

Funnels and jugs

Distilled water

Timer

Notes

To determine the permeability of desert sandstone or oolitic limestone, use a disk of rock 1 cm thick. Use sealant to seal it in the bottom of the

tube. The disks can be cut with a pipe hole cutter or chipped into shape. As with most water experiments it is useful to have a cloth available to mop up spills.

Results

K, the co-efficient of permeability=

1.41	*cm per second in sediment*	*2 to 4mm diameter*
0.45		*1 to 2mm*
0.05		*0.5 to 1mm*

Cost

Glass tubes £15 each

Time

About 20 minutes per tube

Complete apparatus

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