

In the next step, you will measure the time required for the head to drop from h_0 to h_1 , with an intermediate reading at $(h_0 h_1)^{1/2}$. Read through steps 8 through 11 before starting.

8. When ready to begin timing, open the clamp to start water flow. Start timing when the water level reaches the top reference mark (h_0).
9. Observe and record the time for the water level to fall to the $(h_0 h_1)^{1/2}$ point.
10. When the water level in the tubing falls to the bottom reference point (h_1), **stop timing and close the clamp!** **Do not allow the sand column to become unsaturated** (see note under step 2 of constant-head procedure).
11. Record the times and the temperature (T).
12. The time required for head decline from h_0 to $(h_0 h_1)^{1/2}$ should about equal the time for head decline from $(h_0 h_1)^{1/2}$ to h_1 (agreement decreases as clay content of the sample increases).
13. Repeat steps 7 through 12 to obtain three sets of data.

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14. Switch to the other permeameter and repeat steps 1 through 13 for the second sample.
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15. K can be calculated from the falling-head permeameter equation

$$K_T = \frac{a}{A} \frac{\Delta l}{t} \ln \frac{h_0}{h_1}$$

16. Correct K for temperature, and calculate permeability.
17. For each of the tests, calculate a Reynolds number, using $N_R = \rho V d / \mu$, where V is specific discharge (not velocity) and d , the median grain diameter, is taken to be the median pore diameter.

Does each test appear to be valid in terms of probable linear laminar flow—that is, is the flow Darcian? Record answers in Table 7.4.

18. Estimate sources of error in this procedure.
19. Complete Table 7.4.

Table 7.4—SUMMARY						
Sample ID	Grain Size	Sorting	K (m/day)	$k(\mu\text{m}^2)$	N_R	Darcian?

20. Describe the relationship of permeability to grain size.
21. Describe the relationship of permeability to sorting.
22. Darcy apparently did not recognize the effect of fluid properties on flow. Does the temperature of the water affect hydraulic conductivity significantly? If so, what temperature-dependent property of water is most influential?