Environmental Geology – Darcy's Law and Hydraulic Conductivity

Fall 2019

The purpose of the laboratory activity is to gain a better understanding of fluid flow in porous media. A permeameter was used to measure the hydraulic conductivity of sediments. Please address the following issues in the paper.

Content
Explain Darcy's Law, how it is used, and its shortcomings; be sure to include a discussion of the Reynold's number.

Explain hydraulic conductivity (K) and the factors that influence K.

Describe how falling head and constant head permeameters can be used to measure K. Furthermore, K can be estimated from the Hazen method. Why does the Hazen method work?

Use Excel to create well-labeled, clear, uncluttered graphs – use data from the constant-head permeameter. Mark those data points on the figure where the Reynold's number indicates that the flow is not Darcian. Note: slow double-click on a data point allows the color of that data point to be altered.

Create the following graphs and discuss them in the text.
1. Q and AH/L   (the slope of the best-fit line is K)
2. Q and K
3. K and H
4. Q and H/L
5. Compare K values from the falling head permeameter, constant head permeameter, and the Hazen method.

Note: figures 1-4 should be scatter plots; figure 5 could be a box and whisker plot (one graph with three box and whisker plots).

Guidelines
The paper must have a cover page, a thesis statement regarding hydraulic conductivity, subheadings (related to the questions above), and reference list.

All figures must be referred to in the text as Figure 1 (or Figure 2…). All figures must have a two-part figure caption, for example: Figure 1. The effect of H on Q.
If the figure is taken from published literature, then the caption must be a three-part figure caption, for example: Figure 1. The effect of H on Q (author, year).

Write clearly, write well, focus the paper on the thesis statement.