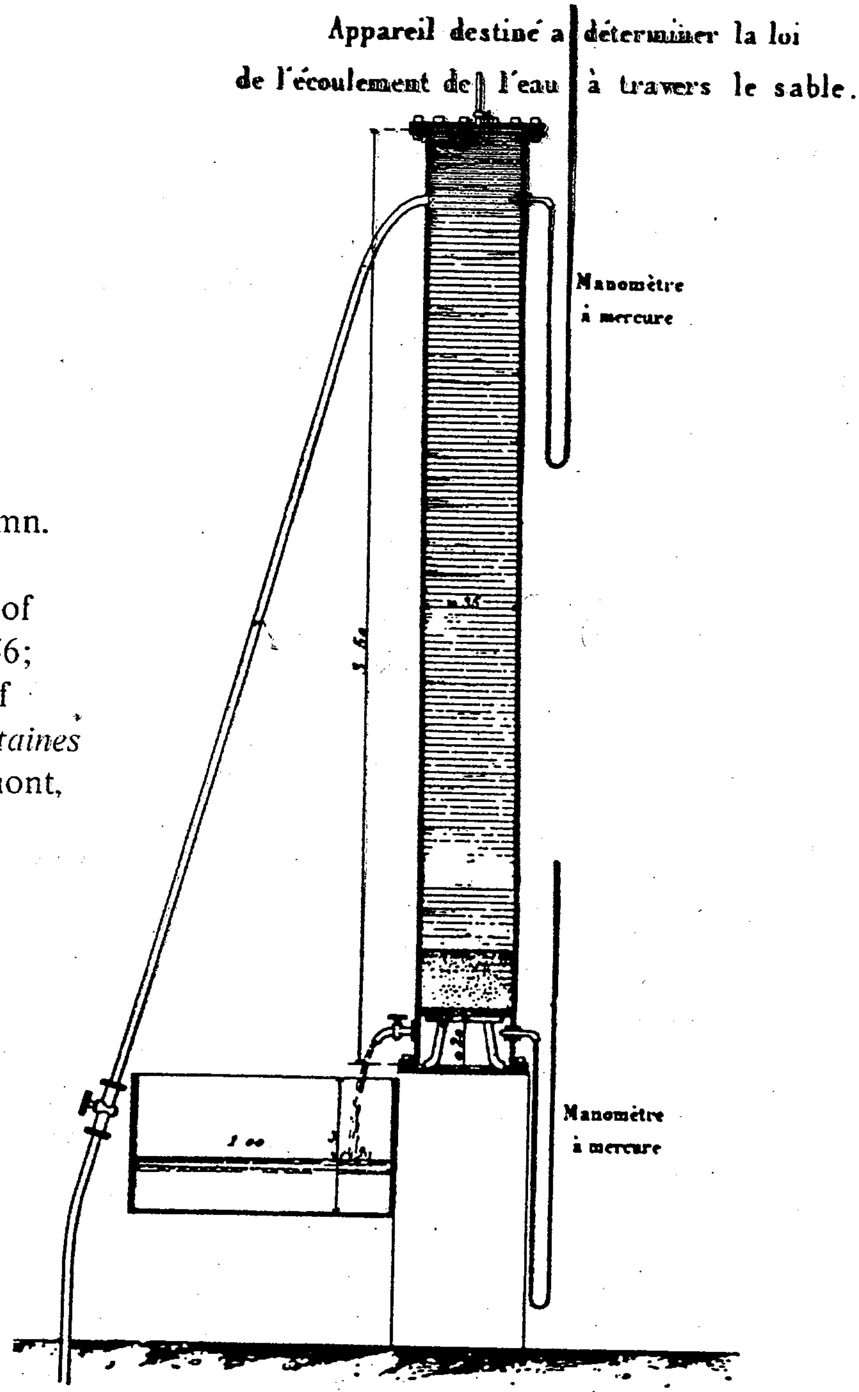

Figure 1.2
Darcy's experimental sand column. (From Hubbert, 1969. © 1956, Society of Petroleum Engineers of AIME, published *JPT*, Oct. 1956; *Trans.* AIME, 1956. Facsimile of Fig. 3 in Darcy, Henry, *Les Fontaines de la Ville de Dijon*, Victor Dalmont, Paris, 1856.)

SOURCE: H. F. Wang & M. P. Anderson
Introduction to Groundwater Modeling
W. H. Freeman & Company, 1982

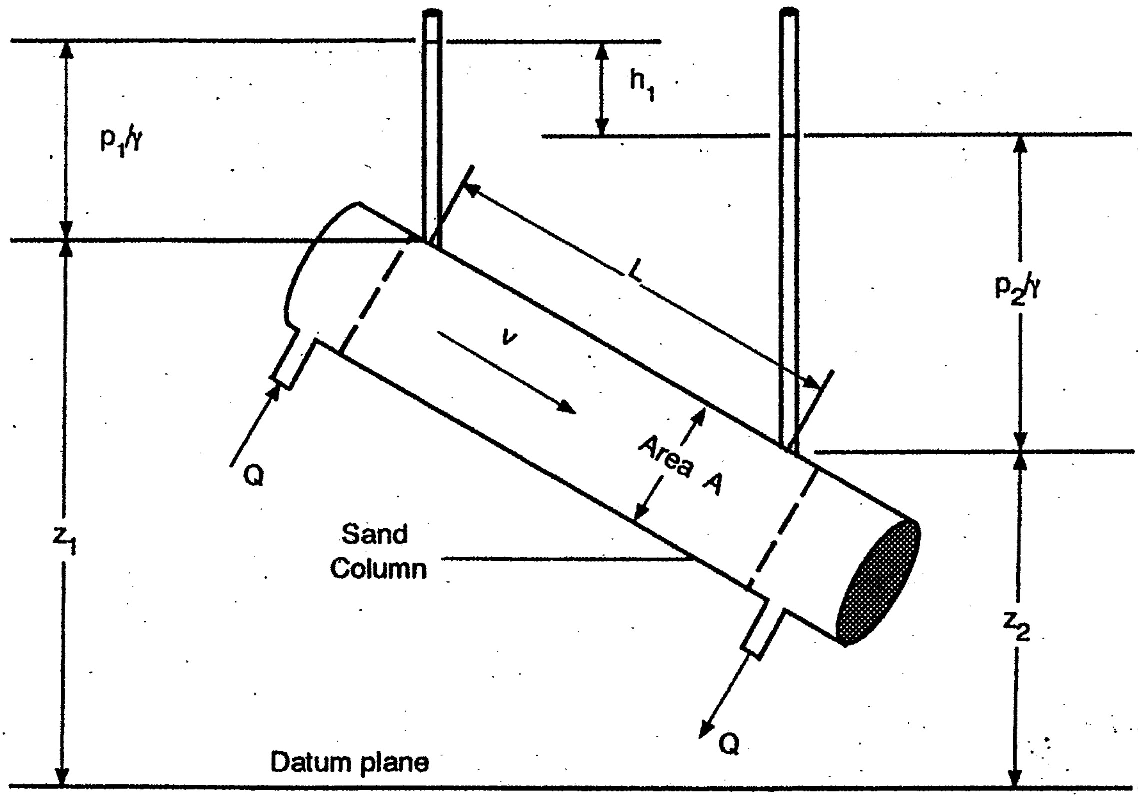

Figure 2.8 Head loss through a sand column. Source: Bedient and Huber, 1992.

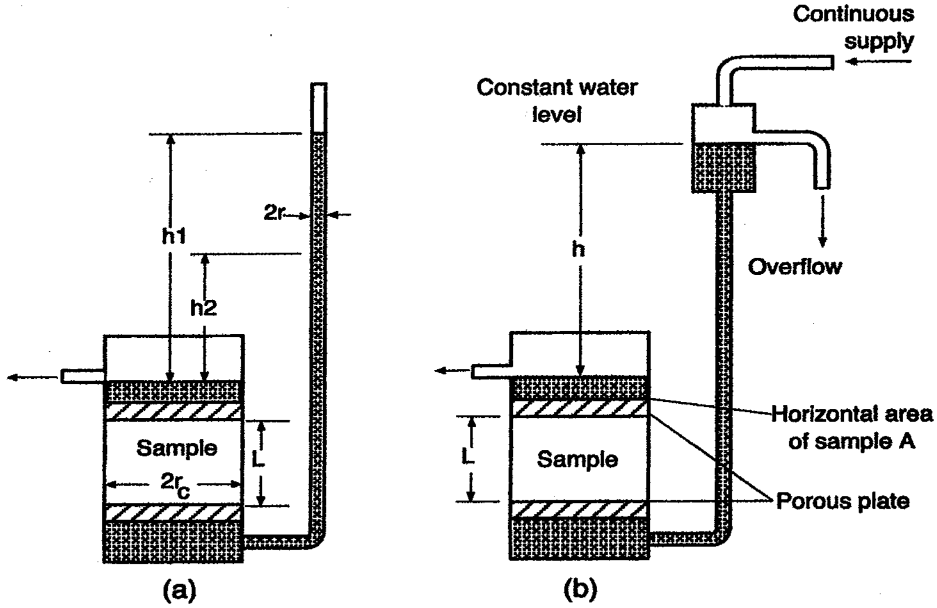

Figure 2.9 Permeameters for measuring hydraulic conductivity of geologic samples. (a) falling head. (b) constant head.

Source: Bedient et al.,
Ground Water Contamination
Prentice Hall PTR
1999

At station A the water-table elevation is 650 ft above sea level, and at B, which is 1000 ft apart from A, the elevation is 632 ft. The average velocity of flow is observed to be 0.1 ft/day. Determine the coefficient of permeability in meinzers.

SOLUTION

From eq. (3.4),

$$K = \frac{v}{\Delta h/L}$$

where

$$v = \text{specific discharge} = \text{velocity} = 0.1\,\text{ft/day}$$

$$\Delta h/L = \text{hydraulic gradient} = (650 - 632)/1000 = 0.018$$

$$\text{thus, } K = 0.1/0.018 = 5.56\ \text{ft/day}$$

Conversion to meinzers:

$$K = \left(5.56\frac{\text{ft}}{\text{day}}\right)\left[\frac{1\ \text{meinzer}}{0.134\ \text{ft/day}}\right]$$

$$= 41.49\ \text{meinzers}$$

Ex. 3.5, Gupta 2nd ed.

Determine the hydraulic conductivity of a medium with intrinsic permeability of 1 darcy and through which water flows at 60 °F.

SOLUTION

At 60 °F or 15.6 °C, $\rho = 0.999$ g/cm³ and $\mu = 1.12$ cP or 1.12×10^{-2} P or g/cm sec.

From eq. (3.6), $K = k\frac{\gamma}{\mu} = k\frac{\rho g}{\mu}$

$$K = (1\text{darcy})\left(0.999\frac{\text{g}}{\text{cm}^3}\right)\left(980\frac{\text{cm}}{\text{sec}^2}\right)\left(\frac{1}{1.12 \times 10^{-2}}\frac{\text{cm} \cdot \text{sec}}{g}\right)$$

$$\times \left[\frac{0.987 \times 10^{-8}}{1}\frac{\text{cm}^2}{\text{darcy}}\right]$$

↑

from Table 3.2

$$= 862.8 \times 10^{-6}\text{cm/sec}$$

Conversion to meinzers:

$$K = \left(862.8 \times 10^{-6}\frac{\text{cm}}{\text{sec}}\right)\left[\frac{1\text{ m}}{100\text{ cm}}\right]\left[\frac{24 \times 60 \times 60\text{ sec}}{1\text{ day}}\right]\left[\frac{1\text{ meinzer}}{0.041\text{ m/day}}\right]$$

k 1 darcy = 0.987×10^{-8} cm² = 1.062×10^{-11} ft²

K 1 meinzer

or $\frac{gpd}{ft^2}$ = 0.134 ft/d = 0.041 m/d.

T 1 gpd/ft = 0.134 ft²/d = 0.0124 m²/d.

Ex. 3.4, Gupta 2nd ed.