K = hydraulic Conductivity

$$Q = K \times A \times \frac{dh}{dl}$$

$$\frac{L}{T} \times L^2$$

Combines Sediment + Fluid Properties

Hubbert (1956)

A. Flow $\propto$ sp. wt of Fluid

$$\frac{F}{Vol}$$

$$\rho = \frac{M}{Vol} \qquad \text{Sp.wt} = \frac{M \cdot g}{Vol}$$

$$\underset{\text{sp.wt}}{\gamma} = \rho \cdot g$$

B. Flow $\propto \frac{1}{\mu}$ dynamic viscosity

μ = Internal resistance to flow

$$\mu = \frac{F \cdot T}{L^2} \quad \frac{N \cdot s}{m^2} \text{ or } \frac{lb \cdot s}{ft^2}$$

$\mu \rightarrow$ strongly related to temp.

C. Flow $\propto$ C (Shape of the Sed. Particles)

D. Flow $\propto$ d^2 (diameter of Sed. particles)

$$Q = K \cdot A \cdot \frac{dh}{dL}$$

$$K = \frac{C \cdot d^2 \cdot \rho \cdot g}{\mu}$$

Sed. Fluid

$$K = C \cdot d^2 \cdot \frac{\rho \cdot g}{\mu}$$

$C \cdot d^2 \rightarrow k$ "Little k"

Intrinsic Permeability

$$K = k \cdot \frac{\rho \cdot g}{\mu} \qquad k = L^2$$

$1 \text{ Darcy} = 9.87 \times 10^{-9} \text{ cm}^2$

Specific Discharge

$$= \frac{K}{n} \approx \text{velocity}$$

$$K = \frac{L}{T}$$

$$Q = K \cdot A \frac{dh}{dl}$$