Porosity

$$n = \frac{V_{void}}{V_{total}} \times 100 = \%$$

Ex. $$\frac{20\,cm^3}{100\,cm^3} = 20\%$$

Effective Porosity

- Pore throats

Measuring Porosity

$$n = 100\left[1 - \frac{\rho_{bulk}}{\rho_{particle}}\right]$$

$$\rho_{bulk} = \frac{Mass}{Volume}$$

$$\rho_{particle} = 2.65\ gm/cm^3\ \text{Qtz}$$

Factors affecting Porosity

Grain Size → No effect

Sorting → Poorly sorted sediments have less porosity

Grain Shape → irregular shapes = higher porosity

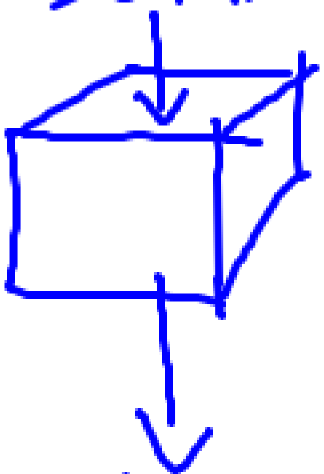
Primary vs. Secondary

- unconsolidated sand + Gravel
- cemented + crystallin

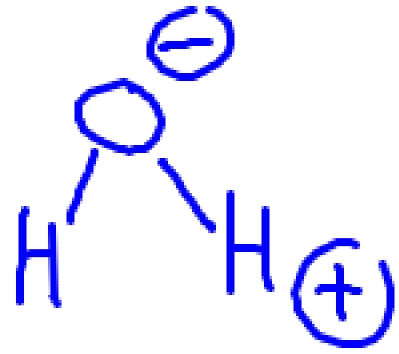
Specific Yield

Porosity = Specific yield + Specific retention

50ml



→ 10ml



40ml specific yield 90%

Surface to volume ratio

→ low large particles

→ High Small particles

Gravels → High sp. yield

Clays → Very low sp. yield

Permeability

- Connectedness of pore spaces
- Grain size (pipe diameter)
- Hydraulic Conductivity
  - ease of flow of a particular fluid through a specific material

Darcy's Law

Hydraulic conductivity

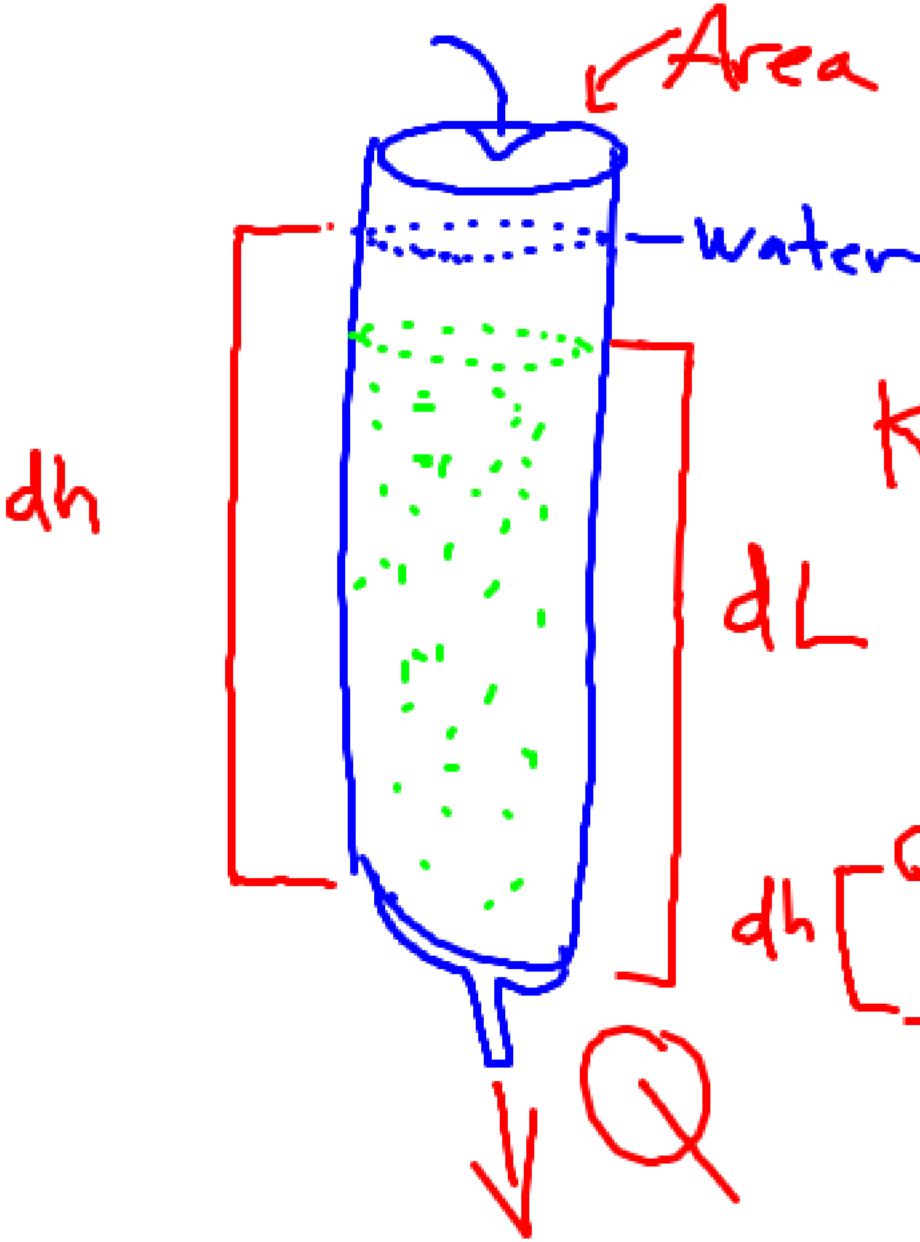
$$Q = A \cdot \left(\frac{h_a - h_b}{L} \right) \cdot -K$$

Flow

$$\frac{cm^3}{sec} = cm^2 \cdot \text{Hydraulic gradient} \cdot \frac{cm}{sec}$$

unitless

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



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