9/5/23

Porosity

$$\phi = \frac{V_p}{V_b} = \frac{V_b - V_g}{V_b}$$

* Volume of Rock

- Displacement of non-pent. fluid
  → Mercury

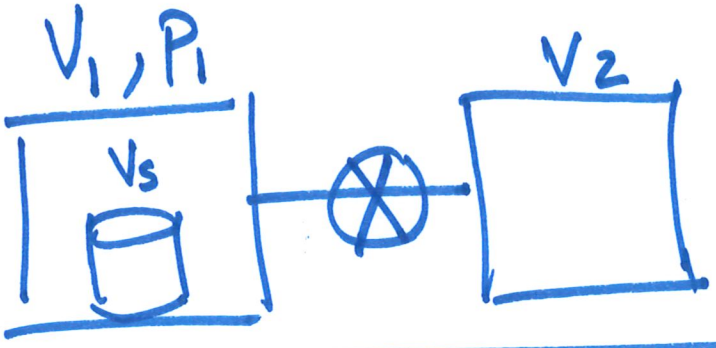
- Archimedes Priciple

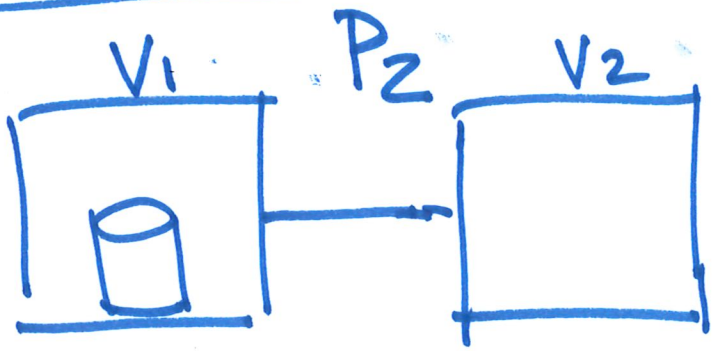
1. sat sample → W_{sat}
2. immerse sample in the same liquid → W_i
3. $$V_b = \frac{W_{sat} - W_i}{\rho_L}$$

* Volume of Grains

- Fluid displacement

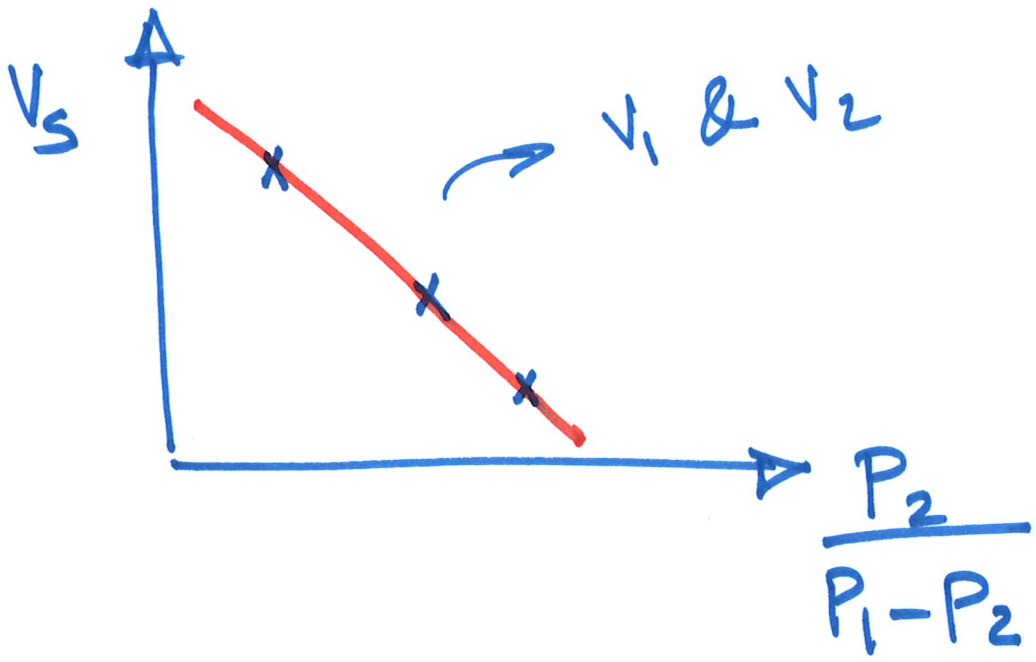
- Gas Expansion
  → Boyle's Law

① 

② 

$$(V_1 - V_s)P_1 = (V_1 + V_2 - V_s)P_2$$

$$\rightsquigarrow V_s = V_1 - V_2\left(\frac{P_2}{P_1 - P_2}\right)$$



Example:

Dry sample in air = 42.4 g

Sat " " " = 45.49 g

" " immerse in oil = 28.8 g

$\rho_{oil} = 0.85\ g/cm^3$

(a) $\phi = ?$

(b) Dominat lith?

$$V_b = \frac{(W_{sat} - W_{sat,i})}{\rho_{oil}}$$

$$V_b = \frac{45.49 - 28.8}{0.85} = 19.64 \text{ cm}^3$$

$$V_p = \frac{(W_{sat} - W_{Dry})_{air}}{\rho_{oil}}$$

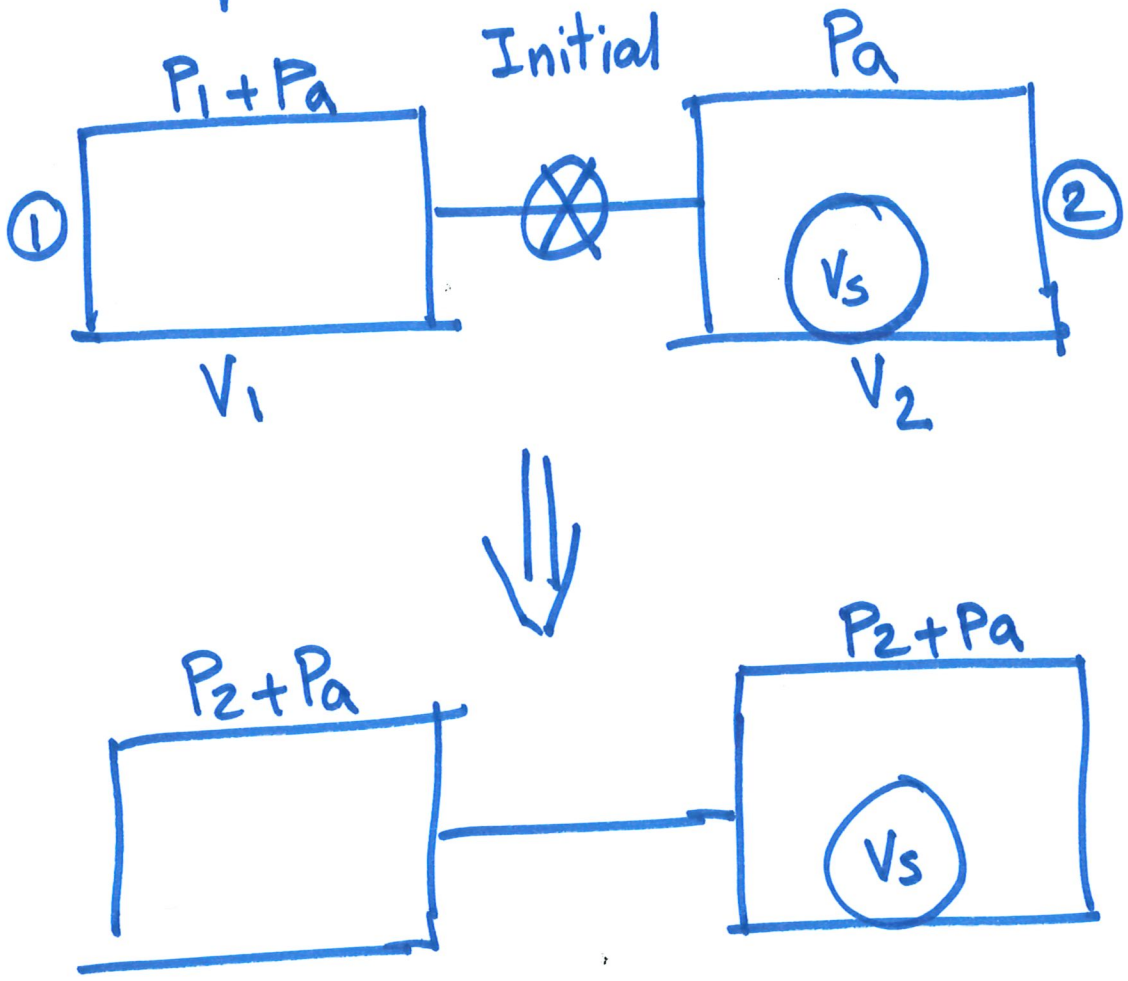
$$V_p = \frac{45.49 - 42.4}{0.85} = 3.64 \text{ cm}^3$$

$$\phi = \frac{3.64}{19.64} = 18.5\%$$

(b) $V_g = V_b - V_p = 16 \text{ cm}^3$

$$\rho_g = \frac{42.4}{16} = 2.65 \text{ g/cm}^3$$

Example:



ⓐ $V_s = f(P_1, P_2)$

ⓑ Calibration Process ?

(c)

D_s (cm)	P_1 (psig)	P_2 (psig)
1	100	33.6
2	100	35.7
4	100	60.2