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Porosity of Soil Sample Formulas

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List of 10 Porosity of Soil Sample Formulas

Porosity of Soil Sample ⤤

1) Air Content given Percentage Air Voids in Porosity ⤤

fx $a_c = \dfrac{n_a}{\eta}$

ex $1.2 = \dfrac{0.6}{0.5}$

2) Dry Unit Weight Given Porosity ⤤

fx $\gamma_{dry} = (1 - \eta) \cdot G_s \cdot \gamma_w$

ex $12.99825 \text{kN/m}^3 = (1 - 0.5) \cdot 2.65 \cdot 9810 \text{N/m}^3$

3) Porosity given Dry Unit Weight in Porosity ⤤

fx $\eta = 1 - \left(\dfrac{\gamma_{dry}}{G_s \cdot \gamma_w} \right)$

ex $0.500317 = 1 - \left(\dfrac{12.99 \text{kN/m}^3}{2.65 \cdot 9810 \text{N/m}^3} \right)$

4) Porosity given Percentage Air Voids in Porosity

$$fx \quad \eta = \frac{n_a}{a_c}$$

Open Calculator

$$ex \quad 0.5 = \frac{0.6}{1.20}$$

5) Porosity given Saturated Unit Weight in Porosity

$$fx \quad \eta_s = \frac{\gamma_{sat} - (G \cdot \gamma_w)}{\gamma_w} \cdot (1 - G)$$

Open Calculator

$$ex \quad 1.344833 = \frac{17854 N/m^3 - (2.64 \cdot 9810 N/m^3)}{9810 N/m^3} \cdot (1 - 2.64)$$

6) Porosity given Void Ratio

$$fx \quad \eta = \frac{e}{1 + e}$$

Open Calculator

$$ex \quad 0.545455 = \frac{1.2}{1 + 1.2}$$

7) Porosity of Soil Sample

$$fx \quad \eta = \frac{V_{void}}{V_t}$$

Open Calculator

$$ex \quad 0.12 = \frac{6 m^3}{50 m^3}$$

8) Saturated Unit Weight given Porosity ↗

fx $\gamma_{sat} = (G \cdot \gamma_w \cdot (1 - \eta)) + (\gamma_w \cdot \eta)$

Open Calculator ↗

ex $17854.2 N/m^3 = (2.64 \cdot 9810 N/m^3 \cdot (1 - 0.5)) + (9810 N/m^3 \cdot 0.5)$

9) Total Volume of Soil given Porosity of Soil Sample ↗

fx $V_t = \left(\dfrac{V_{void}}{\eta_v} \right) \cdot 100$

Open Calculator ↗

ex $24 m^3 = \left(\dfrac{6 m^3}{25} \right) \cdot 100$

10) Volume of Voids Porosity of Soil Sample ↗

fx $V_{void} = \dfrac{\eta_v \cdot V_t}{100}$

Open Calculator ↗

ex $12.5 m^3 = \dfrac{25 \cdot 50 m^3}{100}$

Variables Used

- a_c Air Content
- e Void Ratio
- G Specific Gravity of Soil Solids
- G_s Specific Gravity of Soil
- n_a Percentage of Air Voids
- V_t Volume of Soil Sample *(Cubic Meter)*
- V_{void} Volume of Voids in Soil Mechanics *(Cubic Meter)*
- γ_{dry} Dry Unit Weight *(Kilonewton per Cubic Meter)*
- γ_{sat} Saturated Unit Weight *(Newton per Cubic Meter)*
- γ_w Unit Weight of Water in Soil Mechanics *(Newton per Cubic Meter)*
- η Porosity in Soil Mechanics
- η_s Porosity of Soil
- η_v Porosity Volume Percent

Constants, Functions, Measurements used

- Measurement: **Volume** in Cubic Meter (m³)
  Volume Unit Conversion 📱

- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m³), Newton per Cubic Meter (N/m³)
  Specific Weight Unit Conversion 📱

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