Important Coefficient of Permeability Formulas PDF

Formulas
Examples
with Units

List of 21
Important Coefficient of Permeability Formulas

1) Coefficient of Permeability at any Temperature t for Standard Value of Coefficient of Permeability Formula

Evaluate Formula

Formula

$$K_t = \frac{K_s \cdot v_s}{v_t}$$

Example with Units

$$4.17\,\text{cm/s} = \frac{8.34 \cdot 12\,\text{m}^2/\text{s}}{24\,\text{m}^2/\text{s}}$$

2) Coefficient of Permeability at Temperature of Permeameter Experiment Formula

Evaluate Formula

Formula

$$K = \left(\frac{Q}{A}\right) \cdot \left(\frac{1}{\frac{\Delta H}{L}}\right)$$

Example with Units

$$5.85\,\text{cm/s} = \left(\frac{3.0\,\text{m}^3/\text{s}}{100\,\text{m}^2}\right) \cdot \left(\frac{1}{\frac{2}{3.9\,\text{m}}}\right)$$

3) Coefficient of Permeability from Analogy of Laminar Flow (Hagen Poiseuille flow) Formula

Evaluate Formula

Formula

$$K_{H\text{-}P} = C \cdot \left(d_m{}^2\right) \cdot \frac{\frac{\gamma}{1000}}{\mu}$$

Example with Units

$$0.4413\,\text{cm/s} = 1.8 \cdot \left(0.02\,\text{m}^2\right) \cdot \frac{\frac{9.807\,\text{kN/m}^3}{1000}}{1.6\,\text{Pa*s}}$$

4) Coefficient of Permeability when Specific or Intrinsic Permeability is Considered Formula

Evaluate Formula

Formula

$$K = K_o \cdot \left(\frac{\frac{\gamma}{1000}}{\mu}\right)$$

Example with Units

$$6.0497\,\text{cm/s} = 0.00987\,\text{m}^2 \cdot \left(\frac{\frac{9.807\,\text{kN/m}^3}{1000}}{1.6\,\text{Pa*s}}\right)$$

5) Coefficient of Permeability when Transmissibility is Considered Formula

Evaluate Formula

Formula

$$k = \frac{T}{b}$$

Example with Units

$$23.3333\,\text{cm/s} = \frac{3.5\,\text{m}^2/\text{s}}{15\,\text{m}}$$

6) Cross-Sectional Area when Coefficient of Permeability at Permeameter Experiment is Considered Formula

Evaluate Formula

Formula

$$A = \frac{Q}{K \cdot \left(\frac{\Delta H}{L}\right)}$$

Example with Units

$$97.5\,\text{m}^2 = \frac{3.0\,\text{m}^3/\text{s}}{6\,\text{cm/s} \cdot \left(\frac{2}{3.9\,\text{m}}\right)}$$

7) Discharge when Coefficient of Permeability at Permeameter Experiment is Considered Formula

Evaluate Formula

Formula

$$Q = K \cdot A \cdot \left(\frac{\Delta H}{L}\right)$$

Example with Units

$$3.0769\,\text{m}^3/\text{s} = 6\,\text{cm/s} \cdot 100\,\text{m}^2 \cdot \left(\frac{2}{3.9\,\text{m}}\right)$$

8) Dynamic Viscosity of Fluid of Laminar Flow through Conduit or Hagen Poiseuille Flow Formula

Evaluate Formula

Formula

$$\mu = \left(C \cdot d_m^{\,2}\right) \cdot \left(\frac{\frac{\gamma}{1000}}{K_{H\text{-}P}}\right)$$

Example with Units

$$1.6011\,\text{Pa*s} = \left(1.8 \cdot 0.02\,\text{m}^{\,2}\right) \cdot \left(\frac{\frac{9.807\,\text{kN/m}^3}{1000}}{0.441\,\text{cm/s}}\right)$$

9) Dynamic Viscosity when Specific or Intrinsic Permeability is Considered Formula

Evaluate Formula

Formula

$$\mu = K_o \cdot \left(\frac{\frac{\gamma}{1000}}{K}\right)$$

Example with Units

$$1.6133\,\text{Pa*s} = 0.00987\,\text{m}^2 \cdot \left(\frac{\frac{9.807\,\text{kN/m}^3}{1000}}{6\,\text{cm/s}}\right)$$

10) Equation for Specific or Intrinsic Permeability Formula

Evaluate Formula

Formula

$$K_o = C \cdot d_m^{\,2}$$

Example with Units

$$0.0007\,\text{m}^2 = 1.8 \cdot 0.02\,\text{m}^{\,2}$$

11) Equivalent Permeability when Transmissivity of Aquifer is Considered Formula

Evaluate Formula

Formula

$$K_e = \frac{\tau}{b}$$

Example with Units

$$9.3333\,\text{cm/s} = \frac{1.4\,\text{m}^2/\text{s}}{15\,\text{m}}$$

12) Hagen Poiseuille Flow or Mean Particle Size of Porous Medium Laminar Flow through Conduit Formula

Evaluate Formula

Formula

$$d_m = \sqrt{\frac{K_{H\text{-}P} \cdot \mu}{C \cdot \left(\frac{\gamma}{1000}\right)}}$$

Example with Units

$$0.02\,\text{m} = \sqrt{\frac{0.441\,\text{cm/s} \cdot 1.6\,\text{Pa*s}}{1.8 \cdot \left(\frac{9.807\,\text{kN/m}^3}{1000}\right)}}$$

13) Kinematic Viscosity and Dynamic Viscosity Relation Formula

Evaluate Formula

Formula

$$\nu = \frac{\mu}{\rho_{fluid}}$$

Example with Units

$$0.0016\,\text{m}^2/\text{s} = \frac{1.6\,\text{Pa*s}}{997\,\text{kg/m}^3}$$

14) Kinematic Viscosity at 20 degree Celsius for Standard Value of Coefficient of Permeability Formula

Evaluate Formula

Formula

$$v_s = \frac{K_t \cdot v_t}{K_s}$$

Example with Units

$$0.12\,\text{m}^2/\text{s} = \frac{4.17\,\text{cm/s} \cdot 24\,\text{m}^2/\text{s}}{8.34}$$

15) Kinematic Viscosity for Standard Value of Coefficient of Permeability Formula

Evaluate Formula

Formula

$$v_t = \frac{K_s \cdot v_s}{K_t}$$

Example with Units

$$24\,\text{m}^2/\text{s} = \frac{8.34 \cdot 12\,\text{m}^2/\text{s}}{4.17\,\text{cm/s}}$$

16) Kinematic Viscosity when Specific or Intrinsic Permeability is Considered Formula

Evaluate Formula

Formula

$$\nu = \frac{K_o \cdot g}{k}$$

Example with Units

$$0.9673\,\text{m}^2/\text{s} = \frac{0.00987\,\text{m}^2 \cdot 9.8\,\text{m/s}^2}{10\,\text{cm/s}}$$

17) Length when Coefficient of Permeability at Permeameter Experiment is Considered Formula

Evaluate Formula

Formula

$$L = \frac{\Delta H \cdot A \cdot K}{Q}$$

Example with Units

$$4\,\text{m} = \frac{2 \cdot 100\,\text{m}^2 \cdot 6\,\text{cm/s}}{3.0\,\text{m}^3/\text{s}}$$

18) Specific or Intrinsic Permeability when Coefficient of Permeability is Considered Formula

Evaluate Formula

Formula

$$K_o = \frac{K \cdot \mu}{\frac{\gamma}{1000}}$$

Example with Units

$$0.0098\,\text{m}^2 = \frac{6\,\text{cm/s} \cdot 1.6\,\text{Pa*s}}{\frac{9.807\,\text{kN/m}^3}{1000}}$$

19) Specific or Intrinsic Permeability when Dynamic Viscosity is Considered Formula

Evaluate Formula

Formula

$$K_o = \frac{K \cdot \mu}{\frac{\gamma}{1000}}$$

Example with Units

$$0.0098\,\text{m}^2 = \frac{6\,\text{cm/s} \cdot 1.6\,\text{Pa*s}}{\frac{9.807\,\text{kN/m}^3}{1000}}$$

20) Standard Value of Coefficient of Permeability Formula

Evaluate Formula

Formula

$$K_s = K_t \cdot \left(\frac{v_t}{v_s}\right)$$

Example with Units

$$8.34 = 4.17\,\text{cm/s} \cdot \left(\frac{24\,\text{m}^2/\text{s}}{12\,\text{m}^2/\text{s}}\right)$$

21) Unit weight of fluid Formula

Evaluate Formula

Formula

$$\gamma = \rho_{fluid} \cdot g$$

Example with Units

$$9.7706\,\text{kN/m}^3 = 997\,\text{kg/m}^3 \cdot 9.8\,\text{m/s}^2$$

Variables used in list of Coefficient of Permeability Formulas above

- **A** Cross-Sectional Area *(Square Meter)*
- **b** Aquifer Thickness *(Meter)*
- **C** Shape Factor
- d_m Mean Particle Size of the Porous Medium *(Meter)*
- **g** Acceleration due to Gravity *(Meter per Square Second)*
- **k** Coefficient of Permeability *(Centimeter per Second)*
- **K** Coefficient of Permeability at 20° C *(Centimeter per Second)*
- K_e Equivalent Permeability *(Centimeter per Second)*
- K_{H-P} Coefficient of Permeability (Hagen-Poiseuille) *(Centimeter per Second)*
- K_o Intrinsic Permeability *(Square Meter)*
- K_s Standard Coefficient of Permeability at 20°C
- K_t Coefficient of Permeability at any Temperature t *(Centimeter per Second)*
- **L** Length *(Meter)*
- **Q** Discharge *(Cubic Meter per Second)*
- **T** Transmissibility *(Square Meter per Second)*
- v_s Kinematic Viscosity at 20° C *(Square Meter per Second)*
- v_t Kinematic Viscosity at t° C *(Square Meter per Second)*
- **γ** Unit Weight of Fluid *(Kilonewton per Cubic Meter)*
- **ΔH** Constant Head Difference
- **μ** Dynamic Viscosity of the Fluid *(Pascal Second)*
- **ν** Kinematic Viscosity *(Square Meter per Second)*
- ρ_{fluid} Density of Fluid *(Kilogram per Cubic Meter)*
- **τ** Transmissivity *(Square Meter per Second)*

Constants, Functions, Measurements used in list of Coefficient of Permeability Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Speed** in Centimeter per Second (cm/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s²)
  Acceleration Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Dynamic Viscosity** in Pascal Second (Pa*s)
  Dynamic Viscosity Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m²/s)
  Kinematic Viscosity Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m³)
  Density Unit Conversion
- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
  Specific Weight Unit Conversion

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