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# Coefficient of Permeability Formulas

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# List of 21 Coefficient of Permeability Formulas

## Coefficient of Permeability

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

Open Calculator

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

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

### 2) Coefficient of Permeability at Temperature of Permeameter Experiment

Open Calculator

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

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

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

Open Calculator

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

ex $$0.441315\text{cm/s} = 1.8 \cdot \left((0.02\text{m})^2\right) \cdot \frac{\frac{9.807\text{kN/m}^3}{1000}}{1.6\text{Pa*s}}$$

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

Open Calculator

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

ex $$6.049693\text{cm/s} = 0.00987\text{m}^2 \cdot \left(\frac{\frac{9.807\text{kN/m}^3}{1000}}{1.6\text{Pa*s}}\right)$$

## 5) Coefficient of Permeability when Transmissibility is Considered

Open Calculator

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

ex $$23.33333\text{cm/s} = \frac{3.5\text{m}^2/\text{s}}{15\text{m}}$$

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

Open Calculator

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

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

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

Open Calculator

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

ex $$3.076923\text{m}^3/\text{s} = 6\text{cm/s} \cdot 100\text{m}^2 \cdot \left(\frac{2}{3.9\text{m}}\right)$$

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

Open Calculator

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

ex $$1.601143\text{Pa*s} = \left(1.8 \cdot (0.02\text{m})^2\right) \cdot \left(\frac{\frac{9.807\text{kN/m}^3}{1000}}{0.441\text{cm/s}}\right)$$

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

Open Calculator

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

ex $$1.613252\text{Pa*s} = 0.00987\text{m}^2 \cdot \left( \frac{\frac{9.807\text{kN/m}^3}{1000}}{6\text{cm/s}} \right)$$

## 10) Equation for Specific or Intrinsic Permeability

Open Calculator

fx $$K_o = C \cdot d_m^2$$

ex $$0.00072\text{m}^2 = 1.8 \cdot (0.02\text{m})^2$$

## 11) Equivalent Permeability when Transmissivity of Aquifer is Considered

Open Calculator

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

ex $$9.333333\text{cm/s} = \frac{1.4\text{m}^2/\text{s}}{15\text{m}}$$

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

Open Calculator

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

ex $$0.019993\text{m} = \sqrt{\frac{0.441\text{cm/s} \cdot 1.6\text{Pa*s}}{1.8 \cdot \left(\frac{9.807\text{kN/m}^3}{1000}\right)}}$$

## 13) Kinematic Viscosity and Dynamic Viscosity Relation

Open Calculator

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

ex $$0.001605\text{m}^2/\text{s} = \frac{1.6\text{Pa*s}}{997\text{kg/m}^3}$$

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

$$0.96726\text{m}^2/\text{s} = \frac{0.00987\text{m}^2 \cdot 9.8\text{m/s}^2}{10\text{cm/s}}$$

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

Open Calculator

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

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

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

Open Calculator

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

ex $$0.009789\text{m}^2 = \frac{6\text{cm/s} \cdot 1.6\text{Pa*s}}{\frac{9.807\text{kN/m}^3}{1000}}$$

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

Open Calculator

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

ex $$0.009789\text{m}^2 = \frac{6\text{cm/s} \cdot 1.6\text{Pa*s}}{\frac{9.807\text{kN/m}^3}{1000}}$$

## 20) Standard Value of Coefficient of Permeability

Open Calculator

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

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

## 21) Unit weight of fluid

Open Calculator

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

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

# Variables Used

- **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)*
- $K_{H\text{-}P}$ 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)*
- **v** Kinematic Viscosity *(Square Meter per Second)*

- $\rho_{fluid}$ Density of Fluid *(Kilogram per Cubic Meter)*
- $T$ Transmissivity *(Square Meter per Second)*

# Constants, Functions, Measurements used

- Function: **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*

## Check other formula lists

- **Aquifer Analysis and Properties Formulas**
- **Coefficient of Permeability Formulas**
- **Distance-Drawdown Analysis Formulas**
- **Steady Flow into a Well Formulas**

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