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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

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

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

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

2) Coefficient of Permeability at Temperature of Permeameter Experiment

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

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

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

5) Coefficient of Permeability when Transmissibility is Considered

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

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



9) Dynamic Viscosity when Specific or Intrinsic Permeability is Considered

[Open Calculator !\[\]\(bd1a142de767a21e5362c595f844a4ff_img.jpg\)](#)

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

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

10) Equation for Specific or Intrinsic Permeability

[Open Calculator !\[\]\(830769b31eeeaca920791081939ff8ba_img.jpg\)](#)

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

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

11) Equivalent Permeability when Transmissivity of Aquifer is Considered

[Open Calculator !\[\]\(47734e4656765d20df4fdbd5b7aff048_img.jpg\)](#)

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

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



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

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

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

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

13) Kinematic Viscosity and Dynamic Viscosity Relation

$$fx \quad v = \frac{\mu}{\rho_{fluid}}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

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



15) Kinematic Viscosity for Standard Value of Coefficient of Permeability



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

[Open Calculator](#)

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

16) Kinematic Viscosity when Specific or Intrinsic Permeability is Considered



$$fx \quad v = \frac{K_o \cdot g}{k}$$

[Open Calculator](#)

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

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



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

[Open Calculator](#)

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



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

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

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107_img.jpg\)](#)

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

19) Specific or Intrinsic Permeability when Dynamic Viscosity is Considered

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

[Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6_img.jpg\)](#)

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

20) Standard Value of Coefficient of Permeability

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

[Open Calculator !\[\]\(4688aadfd656ded00cd6bdfae55089a9_img.jpg\)](#)

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



21) Unit weight of fluid

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

[Open Calculator !\[\]\(c3d993ca47bfe2a953c700506ce31fa0_img.jpg\)](#)

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



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-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)



- **ρ_{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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