



# 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

$$egin{equation} \mathbf{K}_{\mathrm{t}} = rac{\mathrm{K_{s} \cdot v_{s}}}{\mathrm{v_{t}}} \label{eq:Kt} \end{aligned}$$

Open Calculator

$$oxed{4.17 ext{cm/s}} = rac{8.34 \cdot 12 ext{m}^2/ ext{s}}{24 ext{m}^2/ ext{s}}$$

2) Coefficient of Permeability at Temperature of Permeameter Experiment

$$\mathbf{K} = \left(rac{\mathrm{Q}}{\mathrm{A}}
ight) \cdot \left(rac{\mathrm{1}}{rac{\Delta \mathrm{H}}{\mathrm{L}}}
ight)$$

Open Calculator

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



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

 $\left| \mathrm{K}_{ ext{H-P}} = \mathrm{C} \cdot \left( \mathrm{d}_{\mathrm{m}}^2 
ight) \cdot rac{rac{\gamma}{1000}}{\mu} 
ight|$ 

Open Calculator

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

4) Coefficient of Permeability when Specific or Intrinsia Perme

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

 $\mathbf{K} = \mathrm{K_o} \cdot \left( rac{rac{\gamma}{1000}}{\mu} 
ight)$ 

Open Calculator 🖸

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

### 5) Coefficient of Permeability when Transmissibility is Considered



Open Calculator 🗗

$$m = 23.33333cm/s = rac{3.5m^2/s}{15m}$$



- 6) Cross-Sectional Area when Coefficient of Permeability at Permeameter Experiment is Considered
- $\mathbf{K} \mathbf{A} = rac{\mathbf{Q}}{\mathbf{K} \cdot \left(rac{\Delta H}{\mathbf{L}}
  ight)}$

Open Calculator 🗗

- $oxed{ex} 97.5 \mathrm{m}^2 = rac{3.0 \mathrm{m}^3/\mathrm{s}}{6 \mathrm{cm/s} \cdot \left(rac{2}{3.9 \mathrm{m}}
  ight)}$ 
  - 7) Discharge when Coefficient of Permeability at Permeameter Experiment is Considered
- $\mathbf{Q} = \mathbf{K} \cdot \mathbf{A} \cdot \left( rac{\Delta \mathbf{H}}{\mathbf{L}} 
  ight)$

Open Calculator

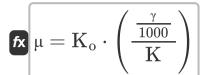
- $extstyle = 3.076923 ext{m}^3/ ext{s} = 6 ext{cm/s} \cdot 100 ext{m}^2 \cdot \left(rac{2}{3.9 ext{m}}
  ight)$
- 8) Dynamic Viscosity of Fluid of Laminar Flow through Conduit or Hagen Poiseuille Flow
- $\mu = \left(C \cdot d_m^2 
  ight) \cdot \left(rac{rac{\gamma}{1000}}{K_{\text{H-P}}}
  ight)$

Open Calculator 🚰

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



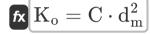
### 9) Dynamic Viscosity when Specific or Intrinsic Permeability is Considered



Open Calculator

$$ext{ex} \left[ 1.613252 ext{Pa*s} = 0.00987 ext{m}^2 \cdot \left( rac{rac{9.807 ext{kN/m}^3}{1000}}{6 ext{cm/s}} 
ight) 
ight]$$

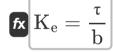
#### 10) Equation for Specific or Intrinsic Permeability



Open Calculator

$$ext{ex} \left[ 0.00072 ext{m}^2 = 1.8 \cdot \left( 0.02 ext{m} 
ight)^2 
ight]$$

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



Open Calculator 🗗

$$oxed{ex} 9.333333 ext{cm/s} = rac{1.4 ext{m}^2/ ext{s}}{15 ext{m}}$$



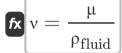
### 12) Hagen Poiseuille Flow or Mean Particle Size of Porous Medium Laminar Flow through Conduit

 $\left| \mathbf{d}_{\mathrm{m}} \right| = \sqrt{\left| rac{\mathrm{K}_{\mathrm{H-P}} \cdot \mathbf{\mu}}{\mathrm{C} \cdot \left( rac{\gamma}{1000} 
ight)} 
ight|}$ 

Open Calculator

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

#### 13) Kinematic Viscosity and Dynamic Viscosity Relation



Open Calculator 🗗

$$0.001605 \mathrm{m}^2/\mathrm{s} = rac{1.6 \mathrm{Pa}^* \mathrm{s}}{997 \mathrm{kg/m}^3}$$

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

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

Open Calculator 🗗

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



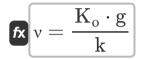
#### 15) Kinematic Viscosity for Standard Value of Coefficient of Permeability

fx 
$$egin{equation} \mathbf{v}_{\mathrm{t}} = rac{\mathbf{K}_{\mathrm{s}} \cdot \mathbf{v}_{\mathrm{s}}}{\mathbf{K}_{\mathrm{t}}} \end{bmatrix}$$

Open Calculator

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

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



Open Calculator

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

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



Open Calculator 🚰

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



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

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

Open Calculator

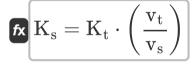
 $\boxed{0.009789 m^2 = \frac{6 cm/s \cdot 1.6 Pa^*s}{\frac{9.807 kN/m^3}{1000}}}$ 

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

 $\mathbf{K} \mathbf{K}_{\mathrm{o}} = \frac{\mathbf{K} \cdot \mathbf{\mu}}{\frac{\gamma}{1000}}$ 

Open Calculator 🗗

#### 20) Standard Value of Coefficient of Permeability



Open Calculator

 $oxed{ex} 8.34 = 4.17 \mathrm{cm/s} \cdot \left(rac{24 \mathrm{m^2/s}}{12 \mathrm{m^2/s}}
ight)$ 



#### 21) Unit weight of fluid



Open Calculator

 $m ex [9.7706kN/m^3 = 997kg/m^3 \cdot 9.8m/s^2]$ 



#### Variables Used

- A Cross-Sectional Area (Square Meter)
- **b** Aquifer Thickness (*Meter*)
- C Shape Factor
- d<sub>m</sub> 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<sub>e</sub> Equivalent Permeability (Centimeter per Second)
- K<sub>H-P</sub> Coefficient of Permeability (Hagen-Poiseuille) (Centimeter per Second)
- Ko Intrinsic Permeability (Square Meter)
- K<sub>S</sub> Standard Coefficient of Permeability at 20°C
- K<sub>t</sub> 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<sub>S</sub> Kinematic Viscosity at 20° C (Square Meter per Second)
- Vt Kinematic Viscosity at t° C (Square Meter per Second)
- V Unit Weight of Fluid (Kilonewton per Cubic Meter)
- AH Constant Head Difference
- µ Dynamic Viscosity of the Fluid (Pascal Second)
- V Kinematic Viscosity (Square Meter per Second)





- **P**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 Distance-Drawdown Analysis Formulas
- Coefficient of Permeability Formulas [7]
- Formulas
- Steady Flow into a Well Formulas C

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