

Important Settling Velocity Formulas PDF



**Formulas
Examples
with Units**

List of 17 Important Settling Velocity Formulas

1) Settling Velocity Formula ↻

Formula

$$v_s = \sqrt{\frac{4 \cdot [g] \cdot (\rho_m - \rho_f) \cdot d}{3 \cdot C_D \cdot \rho_f}}$$

Evaluate Formula ↻

Example with Units

$$0.0049 \text{ m/s} = \sqrt{\frac{4 \cdot 9.8066 \text{ m/s}^2 \cdot (2700 \text{ kg/m}^3 - 1000 \text{ kg/m}^3) \cdot 0.0013 \text{ m}}{3 \cdot 1200 \cdot 1000 \text{ kg/m}^3}}$$

2) Settling Velocity at 10 degree Celsius Formula ↻

Formula

$$v_s = 418 \cdot (G_s - G_w) \cdot d^2$$

Example with Units

$$0.0012 \text{ m/s} = 418 \cdot (2.7 - 1.001) \cdot 0.0013 \text{ m}^2$$

Evaluate Formula ↻

3) Settling Velocity given Celsius for Diameter greater than 0.1mm Formula ↻

Formula

$$v_s = \left(418 \cdot (G_s - G_w) \cdot d \right) \cdot \frac{3 \cdot t + 70}{100}$$

Evaluate Formula ↻

Example with Units

$$9.2088 \text{ m/s} = \left(418 \cdot (2.7 - 1.001) \cdot 0.0013 \text{ m} \right) \cdot \frac{3 \cdot 36^\circ\text{C} + 70}{100}$$

4) Settling Velocity given Degree Celsius Formula ↻

Formula

$$v_s = 418 \cdot (G_s - G_w) \cdot d^2 \cdot \left(\frac{3 \cdot t + 70}{100} \right)$$

Evaluate Formula ↻

Example with Units

$$0.012 \text{ m/s} = 418 \cdot (2.7 - 1.001) \cdot 0.0013 \text{ m}^2 \cdot \left(\frac{3 \cdot 36^\circ\text{C} + 70}{100} \right)$$



5) Settling Velocity given Displacement Velocity for Fine Particles Formula

Formula

$$v_s = \frac{v_d}{\sqrt{\frac{8}{f}}}$$

Example with Units

$$0.0072 \text{ m/s} = \frac{0.0288 \text{ m/s}}{\sqrt{\frac{8}{0.5}}}$$

Evaluate Formula 

6) Settling Velocity given Displacement Velocity with Settling Velocity Formula

Formula

$$v_s = \frac{v_d}{18}$$

Example with Units

$$0.0016 \text{ m/s} = \frac{0.0288 \text{ m/s}}{18}$$

Evaluate Formula 

7) Settling Velocity given Drag Force as per Stokes Law Formula

Formula

$$v_s = \frac{F_D}{3 \cdot \pi \cdot \mu_{\text{viscosity}} \cdot d}$$

Example with Units

$$0.3201 \text{ m/s} = \frac{0.004 \text{ N}}{3 \cdot 3.1416 \cdot 10.2 \text{ P} \cdot 0.0013 \text{ m}}$$

Evaluate Formula 

8) Settling Velocity given Frictional Drag Formula

Formula

$$v_s = \sqrt{\frac{2 \cdot F_D}{a \cdot C_D \cdot \rho_f}}$$

Example with Units

$$0.0711 \text{ m/s} = \sqrt{\frac{2 \cdot 0.004 \text{ N}}{1.32 \text{ mm}^2 \cdot 1200 \cdot 1000 \text{ kg/m}^3}}$$

Evaluate Formula 

9) Settling Velocity given Height at Outlet Zone with respect to Settling Velocity Formula

Formula

$$v_s = v' \cdot \frac{h}{H}$$

Example with Units

$$0.03 \text{ m/s} = 0.1 \text{ m/s} \cdot \frac{12000 \text{ mm}}{40 \text{ m}}$$

Evaluate Formula 

10) Settling Velocity given Particle Reynold's Number Formula

Formula

$$v_s = \frac{\mu_{\text{viscosity}} \cdot Re}{\rho_f \cdot d}$$

Example with Units

$$0.0157 \text{ m/s} = \frac{10.2 \text{ P} \cdot 0.02}{1000 \text{ kg/m}^3 \cdot 0.0013 \text{ m}}$$

Evaluate Formula 

11) Settling Velocity given Ratio of Removal with respect to Settling Velocity Formula

Formula

$$v_s = \frac{v'}{R_r}$$

Example with Units

$$1.25 \text{ m/s} = \frac{0.1 \text{ m/s}}{0.08}$$

Evaluate Formula 



12) Settling Velocity given Specific Gravity of Particle and Viscosity Formula

Formula

$$v_s = \frac{[g] \cdot (G_s - 1) \cdot d^2}{18 \cdot \nu}$$

Example with Units

$$0.0022 \text{ m/s} = \frac{9.8066 \text{ m/s}^2 \cdot (2.7 - 1) \cdot 0.0013 \text{ m}^2}{18 \cdot 7.25 \text{ St}}$$

Evaluate Formula 

13) Settling Velocity using Temperature in Fahrenheit Formula

Formula

$$v_s = 418 \cdot (G_s - G_w) \cdot d^2 \cdot \left(\frac{T_F + 10}{60} \right)$$

Example with Units

$$0.0021 \text{ m/s} = 418 \cdot (2.7 - 1.001) \cdot 0.0013 \text{ m}^2 \cdot \left(\frac{96.8^\circ\text{F} + 10}{60} \right)$$

Evaluate Formula 

14) Settling Velocity with respect to Dynamic Viscosity Formula

Formula

$$v_s = \frac{[g] \cdot (\rho_m - \rho_f) \cdot d^2}{18 \cdot \mu_{\text{viscosity}}}$$

Example with Units

$$0.0015 \text{ m/s} = \frac{9.8066 \text{ m/s}^2 \cdot (2700 \text{ kg/m}^3 - 1000 \text{ kg/m}^3) \cdot 0.0013 \text{ m}^2}{18 \cdot 10.2 \text{ P}}$$

Evaluate Formula 

15) Settling Velocity with respect to Kinematic Viscosity Formula

Formula

$$v_s = \frac{[g] \cdot (G_s - G_w) \cdot d^2}{18 \cdot \nu}$$

Example with Units

$$0.0022 \text{ m/s} = \frac{9.8066 \text{ m/s}^2 \cdot (2.7 - 1.001) \cdot 0.0013 \text{ m}^2}{18 \cdot 7.25 \text{ St}}$$

Evaluate Formula 

16) Settling Velocity with respect to Specific Gravity of Particle Formula

Formula

$$v_s = \sqrt{\frac{4 \cdot [g] \cdot (G_s - 1) \cdot d}{3 \cdot C_D}}$$

Example with Units

$$0.0049 \text{ m/s} = \sqrt{\frac{4 \cdot 9.8066 \text{ m/s}^2 \cdot (2.7 - 1) \cdot 0.0013 \text{ m}}{3 \cdot 1200}}$$

Evaluate Formula 

17) Surface Loading with respect to Settling Velocity Formula

Formula

$$R = 864000 \cdot v_s$$

Example with Units

$$1382.4 = 864000 \cdot 0.0016 \text{ m/s}$$

Evaluate Formula 



Variables used in list of Settling Velocity Formulas above

- **a** Projected Area of A Particle (Square Millimeter)
- **C_D** Drag Coefficient
- **d** Diameter of a Spherical Particle (Meter)
- **f** Darcy Friction Factor
- **F_D** Drag Force (Newton)
- **G_s** Specific Gravity of Spherical Particle
- **G_w** Specific Gravity of Fluid
- **h** Height of Crack (Millimeter)
- **H** Outer Height (Meter)
- **R** Surface Loading Rate
- **R_r** Removal Ratio
- **Re** Reynold Number
- **t** Temperature in Centigrade (Celsius)
- **T_F** Temperature in Fahrenheit (Fahrenheit)
- **v_d** Displacement Velocity (Meter per Second)
- **v_s** Settling Velocity of Particles (Meter per Second)
- **v'** Falling Speed (Meter per Second)
- **μ_{viscosity}** Dynamic Viscosity (Poise)
- **ν** Kinematic Viscosity (Stokes)
- **ρ_f** Mass Density of Fluid (Kilogram per Cubic Meter)
- **ρ_m** Mass Density of Particles (Kilogram per Cubic Meter)

Constants, Functions, Measurements used in list of Settling Velocity Formulas above

- **constant(s):** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **constant(s):** **[g]**, 9.80665
Gravitational acceleration on Earth
- **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), Millimeter (mm)
Length Unit Conversion 
- **Measurement:** **Temperature** in Celsius (°C), Fahrenheit (°F)
Temperature Unit Conversion 
- **Measurement:** **Area** in Square Millimeter (mm²)
Area Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement:** **Force** in Newton (N)
Force Unit Conversion 
- **Measurement:** **Dynamic Viscosity** in Poise (P)
Dynamic Viscosity Unit Conversion 
- **Measurement:** **Mass Concentration** in Kilogram per Cubic Meter (kg/m³)
Mass Concentration Unit Conversion 
- **Measurement:** **Kinematic Viscosity** in Stokes (St)
Kinematic Viscosity Unit Conversion 
- **Measurement:** **Density** in Kilogram per Cubic Meter (kg/m³)
Density Unit Conversion 



Download other Important Treatment of Water 1 Sedimentation PDFs

- **Important Diameter of Sediment Particle Formulas** 
- **Important Displacement and Drag Formulas** 
- **Important Sedimentation Tank Formulas** 
- **Important Settling Velocity Formulas** 
- **Important Settling Zone Formulas** 
- **Important Specific Gravity and Density Formulas** 

Try our Unique Visual Calculators

-  **Percentage increase** 
-  **HCF calculator** 
-  **Mixed fraction** 

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

10/15/2024 | 9:58:50 AM UTC

