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Displacement and Drag Formulas

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List of 10 Displacement and Drag Formulas

Displacement and Drag

Displacement Efficiency

1) Displacement Efficiency of Sedimentation Tank

Open Calculator

fx $$D^e = \frac{F_t}{T_d}$$

ex $$0.011111 = \frac{2s}{3min}$$

2) Flow through Period given Displacement Efficiency of Sedimentation Tank

Open Calculator

fx $$F_t = T_d \cdot D^e$$

ex $$1.8s = 3min \cdot 0.01$$

Displacement Velocity

3) Displacement Velocity for Fine Particles

Open Calculator

fx $$v_d = V_s \cdot \sqrt{\frac{8}{f}}$$

ex $$6\text{m/s} = 1.5\text{m/s} \cdot \sqrt{\frac{8}{0.5}}$$

4) Displacement Velocity given Settling Velocity

Open Calculator

fx $$v_d = 18 \cdot V_s$$

ex $$27\text{m/s} = 18 \cdot 1.5\text{m/s}$$

5) Displacement Velocity when friction factor is 0.025

Open Calculator

fx $$v_d = V_s \cdot \sqrt{\frac{8}{0.025}}$$

ex $$26.83282\text{m/s} = 1.5\text{m/s} \cdot \sqrt{\frac{8}{0.025}}$$

Drag Coefficient

6) Drag Coefficient given Settling Velocity with respect to Specific Gravity

Open Calculator

fx $$C_D = 4 \cdot [g] \cdot (a - 1) \cdot \frac{D}{3 \cdot V_s^2}$$

ex $$32.54355 = 4 \cdot [g] \cdot (2.4 - 1) \cdot \frac{4m}{3 \cdot (1.5m/s)^2}$$

7) Drag Coefficient with respect to Reynold's Number

Open Calculator

fx $$C_D = \left(\frac{24}{Re}\right) + \left(\frac{3}{\sqrt{Re}}\right) + 0.34$$

ex $$1221.553 = \left(\frac{24}{0.02}\right) + \left(\frac{3}{\sqrt{0.02}}\right) + 0.34$$

8) General form of Drag Coefficient

Open Calculator

fx $$C_D = \frac{24}{Re}$$

ex $$1200 = \frac{24}{0.02}$$

Drag Force

9) Diameter given Drag Force as per Stokes Law

Open Calculator

fx $$D_S = \frac{F_D}{3} \cdot \pi \cdot V_s \cdot \mu_{viscosity}$$

ex $$128.177\text{m} = \frac{80\text{N}}{3} \cdot \pi \cdot 1.5\text{m/s} \cdot 10.2\text{P}$$

10) Drag Force as per Stokes Law

Open Calculator

fx $$F_D = 3 \cdot \frac{D_S}{\pi \cdot \mu_{viscosity} \cdot V_s}$$

ex $$79.88954\text{N} = 3 \cdot \frac{128\text{m}}{\pi \cdot 10.2\text{P} \cdot 1.5\text{m/s}}$$

Variables Used

- **a** Constant a
- C_D Drag Coefficient
- **D** Diameter *(Meter)*
- D_S Diameter of Spherical particle *(Meter)*
- D^e Displacement Efficiency
- **f** Darcy Friction Factor
- F_D Drag Force *(Newton)*
- F_t Flowing through Period *(Second)*
- **Re** Reynold Number
- T_d Detention Time *(Minute)*
- v_d Displacement Velocity *(Meter per Second)*
- V_s Settling Velocity *(Meter per Second)*
- $\mu_{viscosity}$ Dynamic Viscosity *(Poise)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- 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: **Time** in Second (s), Minute (min)
  Time 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

Check other formula lists

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

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