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Specific Gravity and Density Formulas

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List of 16 Specific Gravity and Density Formulas

Specific Gravity and Density

Density of Fluid

1) Mass Density of Fluid given Frictional Drag

Open Calculator

fx $$\rho_{liquid} = \frac{2 \cdot F_D}{C_d \cdot A_{cs} \cdot V_s^2}$$

ex $$49.72805 kg/m^3 = \frac{2 \cdot 80 N}{0.11 \cdot 13 m^2 \cdot (1.5 m/s)^2}$$

Density of Particle

2) Mass Density of Particle given Impelling Force

Open Calculator

fx $$\rho_p = \left(\frac{F}{[g] \cdot V_p} \right) + \rho_{liquid}$$

ex $$7E\hat{}\text{-}5 g/mm^3 = \left(\frac{2E\hat{}\text{-}6 kgf}{[g] \cdot 90 mm^3} \right) + 48 kg/m^3$$

3) Mass Density of Particle given Settling Velocity with respect to Dynamic Viscosity

Open Calculator

fx $$\rho_m = \left(18 \cdot V_s \cdot \frac{\mu_{viscosity}}{D^2} \cdot [g]\right) + \rho_{liquid}$$

ex $$51.24355\text{kg/m}^3 = \left(18 \cdot 1.5\text{m/s} \cdot \frac{49\text{P}}{(20\text{m})^2} \cdot [g]\right) + 48\text{kg/m}^3$$

Specific Gravity of Fluid

4) Specific Gravity of Fluid for Temperature given Fahrenheit and Diameter greater than 0.1mm

Open Calculator

fx $$G_f = G - \left(V_s \cdot \frac{60}{418} \cdot d \cdot (T_F + 10)\right)$$

ex $$12.4928 = 16 - \left(1.5\text{m/s} \cdot \frac{60}{418} \cdot 0.06\text{m} \cdot (11^\circ\text{F} + 10)\right)$$

5) Specific Gravity of Fluid given Settling Velocity at 10 Degree Celsius

Open Calculator

fx $$G_f = G - \left(\frac{V_s}{418} \cdot d^2\right)$$

ex $$15.99999 = 16 - \left(\frac{1.5\text{m/s}}{418} \cdot (0.06\text{m})^2\right)$$

6) Specific Gravity of Fluid given Settling Velocity calculated in Fahrenheit

Open Calculator

fx $$G_f = G - \left(\frac{V_s}{418} \cdot d^2 \cdot \left(\frac{t_o + 10}{60}\right)\right)$$

ex $$15.99994 = 16 - \left(\frac{1.5\text{m/s}}{418} \cdot (0.06\text{m})^2 \cdot \left(\frac{273\text{K} + 10}{60}\right)\right)$$

7) Specific Gravity of Fluid given Settling Velocity given Celsius

Open Calculator

fx $$G_f = G - \left(V_s \cdot \frac{100}{418} \cdot d^2 \cdot (3 \cdot t + 70)\right)$$

ex $$15.52976 = 16 - \left(1.5\text{m/s} \cdot \frac{100}{418} \cdot (0.06\text{m})^2 \cdot (3 \cdot 98 + 70)\right)$$

8) Specific Gravity of Fluid given Settling Velocity with respect to Kinematic Viscosity

Open Calculator

fx $$G_f = G - \left(V_s \cdot 18 \cdot \frac{\nu}{[g]} \cdot d^2\right)$$

ex $$15.99999 = 16 - \left(1.5\text{m/s} \cdot 18 \cdot \frac{7.25\text{St}}{[g]} \cdot (0.06\text{m})^2\right)$$

Specific Gravity of Particle

9) Specific Gravity of Particle for Temperature given Celsius and diameter greater than 0.1mm

Open Calculator

$$G = G_f + \left(V_s \cdot \frac{100}{418} \cdot D_{particle} \cdot (3 \cdot T_F + 70)\right)$$

ex $$19.54426 = 14 + \left(1.5\text{m/s} \cdot \frac{100}{418} \cdot 0.15 \cdot (3 \cdot 11\,^\circ\text{F} + 70)\right)$$

10) Specific Gravity of Particle for temperature given Fahrenheit and diameter greater than 0.1mm

Open Calculator

$$G = G_f + \left(V_s \cdot \frac{60}{418} \cdot D_{particle} \cdot (T_F + 10)\right)$$

ex $$22.768 = 14 + \left(1.5\text{m/s} \cdot \frac{60}{418} \cdot 0.15 \cdot (11\,^\circ\text{F} + 10)\right)$$

11) Specific Gravity of Particle given Displacement Velocity by Camp

Open Calculator

$$\rho_p = \left(v_d^2 \cdot \frac{f}{8 \cdot [g] \cdot \beta \cdot d}\right) + 1$$

ex $$0.000318\text{g/mm}^3 = \left((0.0288\text{m/s})^2 \cdot \frac{0.5}{8 \cdot [g] \cdot 10 \cdot 0.06\text{m}}\right) + 1$$

12) Specific Gravity of Particle given Settling Velocity at 10 degree Celsius

Open Calculator

fx $$G = G_f + \left(\frac{V_s}{418} \cdot d^2\right)$$

ex $$14.00001 = 14 + \left(\frac{1.5\text{m/s}}{418} \cdot (0.06\text{m})^2\right)$$

13) Specific Gravity of Particle given Settling Velocity calculated in Fahrenheit

Open Calculator

fx $$G = G_f + \left(\frac{V_s}{418} \cdot d^2 \cdot \left(\frac{t_o + 10}{60}\right)\right)$$

ex $$14.00006 = 14 + \left(\frac{1.5\text{m/s}}{418} \cdot (0.06\text{m})^2 \cdot \left(\frac{273\text{K} + 10}{60}\right)\right)$$

14) Specific Gravity of Particle given Settling Velocity given Celsius

Open Calculator

fx $$G = G_f + \left(V_s \cdot \frac{100}{418} \cdot D_{\text{particle}}^2 \cdot (3 \cdot t + 70)\right)$$

ex $$16.939 = 14 + \left(1.5\text{m/s} \cdot \frac{100}{418} \cdot (0.15)^2 \cdot (3 \cdot 98 + 70)\right)$$

15) Specific Gravity of Particle given Settling Velocity with respect to Kinematic Viscosity

Open Calculator

fx $$G = \left(18 \cdot V_s \cdot \frac{\nu}{[g]} \cdot d^2\right) + G_f$$

ex $$14.00001 = \left(18 \cdot 1.5\text{m/s} \cdot \frac{7.25\text{St}}{[g]} \cdot (0.06\text{m})^2\right) + 14$$

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

Open Calculator

fx $$SG = \left(\frac{3 \cdot C_D \cdot V_s^2}{4 \cdot [g] \cdot d}\right) + 1$$

ex $$3442.542 = \left(\frac{3 \cdot 1200 \cdot (1.5\text{m/s})^2}{4 \cdot [g] \cdot 0.06\text{m}}\right) + 1$$

Variables Used

- A_{cs} Cross-Sectional Area *(Square Meter)*
- C_d Coefficient of Drag
- C_D Drag Coefficient
- **d** Diameter D *(Meter)*
- **D** Diameter *(Meter)*
- $D_{particle}$ Diameter of particle
- **f** Darcy Friction Factor
- **F** Impelling Force *(Kilogram-Force)*
- F_D Drag Force *(Newton)*
- **G** Specific Gravity of Particle
- G_f Specific Gravity of Fluid
- **SG** Specific Gravity of Material
- **t** Temperature
- T_F Temperature in Fahrenheit *(Fahrenheit)*
- t_o Outside Temperature *(Kelvin)*
- v_d Displacement Velocity *(Meter per Second)*
- V_p Volume of One Particle *(Cubic Millimeter)*
- V_s Settling Velocity *(Meter per Second)*
- **β** Beta Constant
- $\mu_{viscosity}$ Dynamic Viscosity *(Poise)*
- **v** Kinematic Viscosity *(Stokes)*
- ρ_{liquid} Liquid Density *(Kilogram per Cubic Meter)*

- ρ_m Mass Density of Particles *(Kilogram per Cubic Meter)*
- ρ_p Density of Particle *(Gram per Cubic Millimeter)*

Constants, Functions, Measurements used

- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Temperature** in Fahrenheit (°F), Kelvin (K)
  Temperature Unit Conversion
- Measurement: **Volume** in Cubic Millimeter (mm³)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Force** in Newton (N), Kilogram-Force (kgf)
  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), Gram per Cubic Millimeter (g/mm³)
  Density 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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