



Basic Formulas of Mechanical Operations

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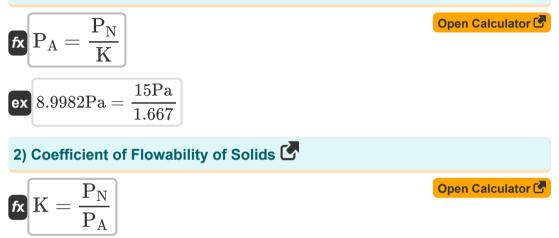




List of 21 Basic Formulas of Mechanical Operations

Basic Formulas of Mechanical Operations 🕑





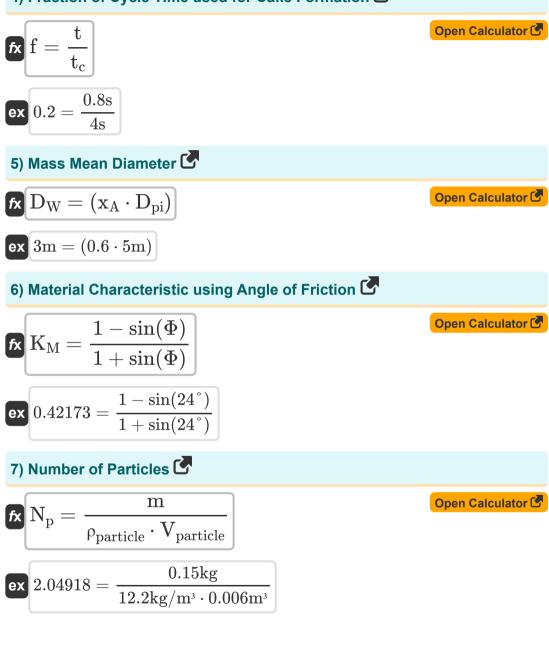
$$\begin{array}{c} \textbf{ex} \end{array} \textbf{1.6666667} = \frac{15 \text{Pa}}{9 \text{Pa}} \end{array}$$

3) Energy Required to Crush Coarse Materials according to Bond's Law



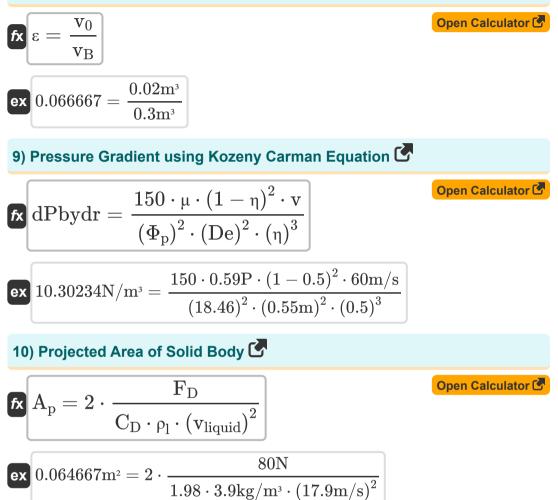


4) Fraction of Cycle Time used for Cake Formation 🕑



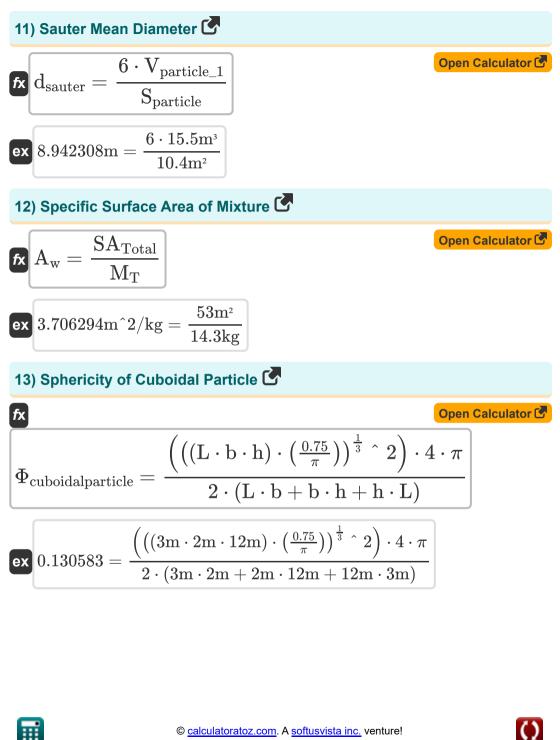












14) Sphericity of Cylindrical Particle fx Open Calculator $\frac{\left(\left(\left((\mathrm{R})^{2}\cdot\mathrm{H}\cdot\frac{3}{4}\right)^{\frac{1}{3}}\right)^{2}\right)\cdot4\cdot\pi}{2\cdot\pi\cdot\mathrm{R}\cdot(\mathrm{R}+\mathrm{H})}$ $\Phi_{ m cvlindrical particle} =$ $= \frac{\left(\left(\left((0.025 \mathrm{m})^2 \cdot 0.11 \mathrm{m} \cdot \frac{3}{4}\right)^{\frac{1}{3}}\right)^2\right) \cdot 4 \cdot \pi}{2 \cdot \pi \cdot 0.025 \mathrm{m} \cdot (0.025 \mathrm{m} + 0.11 \mathrm{m})}$ **ex** 0.820941 15) Sphericity of Particle $\Phi_{ m p} = rac{6 \cdot { m V_s}}{{ m S}_{ m particle} \cdot { m De}}$ Open Calculator ex $18.46154 = \frac{6 \cdot 17.6 \mathrm{m}^3}{10.4 \mathrm{m}^2 \cdot 0.55 \mathrm{m}}$ 16) Surface Shape Factor

fx
$$\Phi_{
m s}=rac{1}{\Phi_{
m p}}$$
 Open Calculator $ar{ar{C}}$ ex $0.054171=rac{1}{18.46}$





17) Terminal Settling Velocity of Single Particle

$$\begin{split} & \bigvee_{t} = \frac{V}{(\in)^{n}} & \text{Open Calculator } \\ & & \bigvee_{t} = \frac{V}{(\in)^{n}} \\ & & \underbrace{\text{Open Calculator } \\ & & \underbrace{$$

Open Calculator 🕑

Open Calculator 🕑

21) Total Surface Area of Particles 🕑

fx
$$\mathrm{SA} = \mathrm{S} \cdot \mathrm{N_p}$$

ex $22.032m^2 = 10.8m^2 \cdot 2.04$





Variables Used

- ∈ Void fraction
- Ap Projected Area of Solid Particle Body (Square Meter)
- Asa Total Surface Area of Particles (Square Meter)
- Aw Specific Surface Area of Mixture (Square Meter per Kilogram)
- **b** Breadth (Meter)
- C_D Drag Coefficient
- **d₁** Feed Diameter (*Meter*)
- d₂ Product Diameter (Meter)
- d_p Arithmetic Mean Diameter (Meter)
- D_{pi} Size Of Particles Present In Fraction (Meter)
- d_{sauter} Sauter Mean Diameter (Meter)
- D_W Mass Mean Diameter (Meter)
- **De** Equivalent Diameter (*Meter*)
- dPbydr Pressure Gradient (Newton per Cubic Meter)
- E Energy per Unit Mass of Feed (Joule per Kilogram)
- f Fraction of Cycle Time Used For Cake Formation
- **F**_D Drag Force (Newton)
- **h** Height (Meter)
- **H** Cylinder Height (Meter)
- K Coefficient of Flowability
- K_M Material Characteristic
- L Length (Meter)



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- **M** Mixture Mass (Kilogram)
- M Mass (Kilogram)
- M_T Total Mass of Mixture (Kilogram)
- **n** Richardsonb Zaki Index
- N_p Number of Particles
- N_T Total Number of Particles in Mixture
- **P**_A Applied Pressure (Pascal)
- **P**_N Normal Pressure (Pascal)
- R Cylinder Radius (Meter)
- **S** Surface Area of One Particle (Square Meter)
- Sparticle Surface Area of Particle (Square Meter)
- SA Surface Area (Square Meter)
- SA_{Total} Total Surface Area (Square Meter)
- t Time Required For Cake Formation (Second)
- t_c Total Cycle Time (Second)
- V Velocity (Meter per Second)
- V Settling Velocity of Group of Particles (Meter per Second)
- **V**₀ Volume of Voids in Bed (*Cubic Meter*)
- **V**B Total Volume of Bed (Cubic Meter)
- Vliquid Velocity of Liquid (Meter per Second)
- V_p Volume Of One Particle (Cubic Meter)
- Vparticle Volume of Spherical Particle (Cubic Meter)
- Vparticle_1 Volume of Particle (Cubic Meter)
- **V**_s Volume of One Spherical Particle (*Cubic Meter*)



- Vt Terminal Velocity of Single Particle (Meter per Second)
- W_i Work Index (Joule per Kilogram)
- XA Mass Fraction
- ε Porosity or Void Fraction
- η Porosity
- µ Dynamic Viscosity (Poise)
- ρ_I Density of Liquid (Kilogram per Cubic Meter)
- ρ_p Density Of Particle (Kilogram per Cubic Meter)
- **P**particle Density of One Particle (Kilogram per Cubic Meter)
- **Φ** Angle of Friction (Degree)
- Φ_{cuboidalparticle} Sphericity of Cuboidal Particle
- **Φ**cylindricalparticle Sphericity of Cylindrical Particle
- Φ_p Sphericity of Particle
- Φ_s Surface Shape Factor



Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- Function: **sin**, sin(Angle) *Trigonometric sine function*
- Measurement: Length in Meter (m) Length Unit Conversion
- Measurement: Weight in Kilogram (kg) Weight Unit Conversion
- Measurement: Time in Second (s) Time Unit Conversion
- Measurement: Volume in Cubic Meter (m³) Volume Unit Conversion
- Measurement: Area in Square Meter (m²) Area Unit Conversion
- Measurement: Pressure in Pascal (Pa) Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s) Speed Unit Conversion
- Measurement: Force in Newton (N) Force Unit Conversion
- Measurement: Angle in Degree (°) Angle Unit Conversion
- Measurement: Dynamic Viscosity in Poise (P)
 Dynamic Viscosity Unit Conversion
- Measurement: Density in Kilogram per Cubic Meter (kg/m³)
 Density Unit Conversion





- Measurement: Specific Energy in Joule per Kilogram (J/kg) Specific Energy Unit Conversion
- Measurement: Pressure Gradient in Newton per Cubic Meter (N/m³) Pressure Gradient Unit Conversion
- Measurement: **Specific Area** in Square Meter per Kilogram (m²/kg) Specific Area Unit Conversion

Check other formula lists

• Basic Formulas 🗹

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 Operations

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