



Properties of Fluid Formulas

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Examples!

Conversions!

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List of 33 Properties of Fluid Formulas

Properties of Fluid &

1) Absolute Pressure using Equation of State given Specific Weight

fx
$$P_{ab'} = R \cdot S \cdot T$$

Open Calculator

ex $310575 \mathrm{Pa} = 4.1 \mathrm{J/(kg*K)} \cdot 0.75 \mathrm{kN/m^3} \cdot 101 \mathrm{K}$

2) Absolute Pressure using Gas Density

fx
$$P_{ab} = T \cdot
ho_{gas} \cdot R$$

Open Calculator

$$0.530048 ext{Pa} = 101 ext{K} \cdot 0.00128 ext{g/L} \cdot 4.1 ext{J/(kg*K)}$$

3) Absolute Temperature of Gas

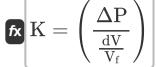
$$ag{T} = rac{ ext{P}_{ab}}{ ext{R} \cdot
ho_{ ext{gas}}}$$

Open Calculator

$$ext{ex} 97.56098 ext{K} = rac{0.512 ext{Pa}}{4.1 ext{J/(kg*K)} \cdot 0.00128 ext{g/L}}$$



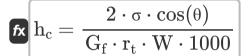
4) Bulk Modulus of Elasticity



Open Calculator 🗗

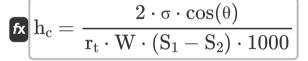
$$oxed{ex} 2000 {
m N/m^2} = \left(rac{100 {
m Pa}}{rac{5 {
m m^3}}{100 {
m m^3}}}
ight)$$

5) Capillary Rise or Depression of Fluid



Open Calculator 🗗

6) Capillary Rise or Depression when Tube is inserted in two Liquids



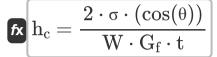
Open Calculator 🗗

$$= \frac{2 \cdot 72.75 \text{N/m} \cdot \cos(10^\circ)}{5.1 \text{m} \cdot 9.81 \text{kN/m}^3 \cdot (5-4) \cdot 1000}$$





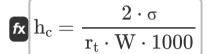
7) Capillary Rise or Depression when two Vertical Parallel Plates are Partially Immersed in Liquid



Open Calculator

$$ext{ex} 0.000209 ext{m} = rac{2 \cdot 72.75 ext{N/m} \cdot (\cos(10\degree))}{9.81 ext{kN/m}^3 \cdot 14 \cdot 5 ext{m}}$$

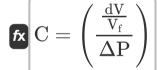
8) Capillary Rise when Contact is between Water and Glass



Open Calculator

ex
$$0.002908 \mathrm{m} = \frac{2 \cdot 72.75 \mathrm{N/m}}{5.1 \mathrm{m} \cdot 9.81 \mathrm{kN/m^3 \cdot 1000}}$$

9) Compressibility of Fluid



$$ext{ex} \left[0.0005 ext{m}^2/ ext{N} = \left(rac{5 ext{m}^3}{100 ext{m}^3}
ight)
ight]$$



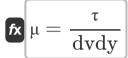
10) Compressibility of Fluid given Bulk Modulus of Elasticity



Open Calculator

$$ext{ex} 0.0005 ext{m}^2/ ext{N} = rac{1}{2000 ext{N}/ ext{m}^2}$$

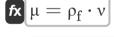
11) Dynamic Viscosity given Shear Stress



Open Calculator 🖸

$$80N*s/m^2 = {800N/m^2 \over 10 {
m cycle/s}}$$

12) Dynamic Viscosity using Kinematic Viscosity



Open Calculator

$= 80.08 \text{N*s/m}^2 = 77 \text{kg/m}^3 \cdot 1.04 \text{m}^2/\text{s}$

13) Gas Constant using Equation of State

$$m R = rac{P_{ab}}{
ho_{gas} \cdot T}$$

Open Calculator

$$=$$
 $3.960396 \mathrm{J/(kg*K)} = rac{0.512 \mathrm{Pa}}{0.00128 \mathrm{g/L} \cdot 101 \mathrm{K}}$





Open Calculator

Open Calculator

Open Calculator 2

Open Calculator 2

14) Mass Density given Specific Weight

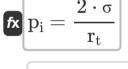
$$ext{ex} \left[76.53061 ext{kg/m}^3 = rac{0.75 ext{kN/m}^3}{9.8 ext{m/s}^2}
ight]$$

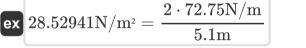
15) Mass Density given Viscosity

 $ho_{
m f}=rac{1}{2}$

$$ext{ex} egin{array}{l} 76.92308 ext{kg/m}^3 = rac{80 ext{N*s/m}^2}{1.04 ext{m}^2/ ext{s}} \end{array}$$

16) Pressure Intensity inside Droplet $2 \cdot \sigma$





17) Pressure Intensity inside Liquid Jet

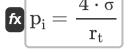


$$ho_{
m i} - rac{
m r_{
m t}}{
m r_{
m t}}$$

$$ext{ex} 14.26471 ext{N/m} = rac{72.75 ext{N/m}}{5.1 ext{m}}$$



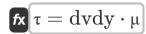
18) Pressure Intensity inside Soap Bubble 🗗



Open Calculator

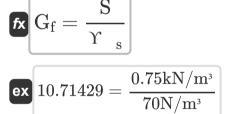
$$ext{ex} \ 57.05882 ext{N/m}^2 = rac{4 \cdot 72.75 ext{N/m}}{5.1 ext{m}}$$

19) Shear Stress between any two thin sheets of Fluid 🗹



Open Calculator

20) Specific Gravity of Fluid



Open Calculator G

21) Specific Volume of Fluid

$$\mathbf{fx} = \frac{1}{\rho_1}$$

Open Calculator

$$0.012987 \mathrm{m}^3/\mathrm{kg} = rac{1}{77 \mathrm{kg/m}^3}$$





Open Calculator 2

Open Calculator

Open Calculator

Open Calculator

22) Velocity Gradient

 $\frac{d\mathbf{v}}{d\mathbf{y}} = \frac{d\mathbf{v}}{d\mathbf{y}}$

ex $10.1 \text{cycle/s} = \frac{10.1 \text{m/s}}{1000 \text{mm}}$

23) Velocity Gradient given Shear Stress 🗗

 $\operatorname{dvdy} = \frac{\tau}{\mu}$

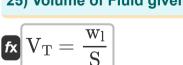
 $ext{ex} 10 ext{cycle/s} = rac{800 ext{N/m}^2}{80 ext{N*s/m}^2}$

24) Velocity of Fluid given Shear Stress

 $V = rac{Y \cdot au}{\mu}$

 $810 ext{m/s} = rac{81 ext{m} \cdot 800 ext{N/m}^2}{80 ext{N*s/m}^2}$

25) Volume of Fluid given Specific Weight G



$$m S$$
 $m ex = rac{485.36N}{0.75kN/m^3}$







Specific Weight @

26) Specific Weight given Mass Density

fx $S =
ho_f \cdot g$

Open Calculator

 $0.7546 \text{kN/m}^3 = 77 \text{kg/m}^3 \cdot 9.8 \text{m/s}^2$

27) Specific Weight of Fluid

 $extbf{K} = rac{w_l}{V_T}$

Open Calculator

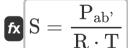
 $= \frac{0.770413 \text{kN/m}^3}{0.63 \text{m}^3}$

fx $S = G_f \cdot \gamma$ $_s$

 $0.98 \mathrm{kN/m^3} = 14 \cdot 70 \mathrm{N/m^3}$

Open Calculator

29) Specific Weight using Equation of State given Absolute Pressure 🗹



Open Calculator

 $ext{ex} 0.724463 ext{kN/m}^3 = rac{300000 ext{Pa}}{4.1 ext{J/(kg*K)} \cdot 101 ext{K}}$

28) Specific Weight of Fluid given Specific Gravity

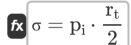
Surface Tension &

30) Surface Tension given Capillary Rise or Depression

$$\sigma = rac{ ext{h}_{ ext{c}} \cdot ext{W} \cdot ext{G}_{ ext{f}} \cdot ext{r}_{ ext{t}} \cdot 1000}{2 \cdot (ext{cos}(heta))}$$

Open Calculator

31) Surface Tension given Pressure Intensity inside Droplet



Open Calculator

 $ext{ex} 77.01 ext{N/m} = 30.2 ext{N/m}^2 \cdot rac{5.1 ext{m}}{2}$

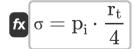
32) Surface Tension given Pressure Intensity inside Liquid Jet

fx $\sigma = p_i \cdot r_t$

Open Calculator

ex $154.02 \mathrm{N/m} = 30.2 \mathrm{N/m^2 \cdot 5.1m}$

33) Surface Tension given Pressure Intensity inside Soap Bubble 🖸



Open Calculator

 $ext{ex} 38.505 ext{N/m} = 30.2 ext{N/m}^2 \cdot rac{5.1 ext{m}}{4}$





Variables Used

- C Compressibility of Fluid (Square Meter per Newton)
- dv Change in Velocity (Meter per Second)
- **dV** Change in Volume (Cubic Meter)
- **dvdy** Velocity Gradient (Cycle per Second)
- **dy** Change in Distance (Millimeter)
- g Acceleration due to Gravity (Meter per Square Second)
- Gf Specific Gravity of Fluid
- **h**_c Capillary Rise (or Depression) (Meter)
- **K** Bulk Modulus of Elasticity (Newton per Square Meter)
- P_{ab} Absolute Pressure by Gas Density (Pascal)
- Pah Absolute Pressure by Specific Weight (Pascal)
- pi Internal Pressure Intensity (Newton per Square Meter)
- R Gas Constant (Joule per Kilogram per K)
- rt Radius of Tube (Meter)
- S Specific Weight of Liquid in Piezometer (Kilonewton per Cubic Meter)
- S₁ Specific Gravity of Liquid 1
- S₂ Specific Gravity of Liquid 2
- t Distance between Vertical Plates (Meter)
- T Absolute Temperature of Gas (Kelvin)
- V Specific Volume (Cubic Meter per Kilogram)
- V Fluid Velocity (Meter per Second)
- **V**_f Fluid Volume (Cubic Meter)





- **V**_T Volume (Cubic Meter)
- W Specific Weight of Water in KN per cubic meter (Kilonewton per Cubic Meter)
- W_I Weight of Liquid (Newton)
- Y Distance between Fluid Layers (Meter)
- ΔP Change in Pressure (Pascal)
- **0** Contact Angle (Degree)
- µ Dynamic Viscosity (Newton Second per Square Meter)
- V Kinematic Viscosity (Square Meter per Second)
- ρ_f Mass Density of Fluid (Kilogram per Cubic Meter)
- ρ_{qas} Density of Gas (Gram per Liter)
- σ Surface Tension (Newton per Meter)
- T Shear Stress (Newton per Square Meter)
- Y Specific Weight of Standard Fluid (Newton per Cubic Meter)





Constants, Functions, Measurements used

- Function: cos, cos(Angle)
 Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Measurement: Length in Meter (m), Millimeter (mm)

 Length Unit Conversion
- Measurement: Temperature in Kelvin (K)

 Temperature Unit Conversion
- Measurement: Volume in Cubic Meter (m³)
 Volume Unit Conversion
- Measurement: Pressure in Pascal (Pa), Newton per Square Meter (N/m²)

 Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Acceleration in Meter per Square Second (m/s²)
 Acceleration Unit Conversion
- Measurement: Force in Newton (N)
 Force Unit Conversion
- Measurement: Angle in Degree (°)
 Angle Unit Conversion
- Measurement: Frequency in Cycle per Second (cycle/s)
 Frequency Unit Conversion
- Measurement: Specific Heat Capacity in Joule per Kilogram per K
 (J/(kg*K))
 Specific Heat Capacity Unit Conversion
- Measurement: Surface Tension in Newton per Meter (N/m)
 Surface Tension Unit Conversion





- Measurement: Dynamic Viscosity in Newton Second per Square Meter (N*s/m²)
 - Dynamic Viscosity Unit Conversion
- Measurement: Kinematic Viscosity in Square Meter per Second (m²/s)

 Kinematic Viscosity Unit Conversion
- Measurement: Density in Gram per Liter (g/L), Kilogram per Cubic Meter (kg/m³)
 - Density Unit Conversion
- Measurement: Specific Volume in Cubic Meter per Kilogram (m³/kg)
 Specific Volume Unit Conversion
- Measurement: Specific Weight in Kilonewton per Cubic Meter (kN/m³), Newton per Cubic Meter (N/m³)
 Specific Weight Unit Conversion
- Measurement: Compressibility in Square Meter per Newton (m²/N)

 Compressibility Unit Conversion





Check other formula lists

- Buoyancy And Floatation
 Formulas
- Culverts Formulas
- Equations of Motion and Energy Equation Formulas
- Flow of Compressible Fluids
 Formulas
- Flow Over Notches and Weirs Formulas
- Fluid Pressure and Its
 Measurement Formulas
- Fundamentals of Fluid Flow Formulas
- Hydroelectric Power Generation
 Formulas
- Hydrostatic Forces on Surfaces
 Formulas

- Impact of Free Jets Formulas
- Impulse Momentum Equation and its Applications Formulas
- Liquids in Relative Equilibrium Formulas
- Most Efficient Section of Channel Formulas
- Non-uniform Flow in Channels Formulas
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- Thermal Expansion of Pipe and Pipe Stresses Formulas
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