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Properties of Fluid Formulas

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List of 33 Properties of Fluid Formulas

Properties of Fluid

1) Absolute Pressure using Equation of State given Specific Weight

Open Calculator

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

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

2) Absolute Pressure using Gas Density

Open Calculator

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

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

3) Absolute Temperature of Gas

Open Calculator

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

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

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4) Bulk Modulus of Elasticity

Open Calculator

fx $$K = \left(\frac{\Delta P}{\frac{dV}{V_f}} \right)$$

ex $$2000 N/m^2 = \left(\frac{100 Pa}{\frac{5 m^3}{100 m^3}} \right)$$

5) Capillary Rise or Depression of Fluid

Open Calculator

fx $$h_c = \frac{2 \cdot \sigma \cdot \cos(\theta)}{G_f \cdot r_t \cdot W \cdot 1000}$$

ex $$0.000205 m = \frac{2 \cdot 72.75 N/m \cdot \cos(10^\circ)}{14 \cdot 5.1 m \cdot 9.81 kN/m^3 \cdot 1000}$$

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

Open Calculator

fx $$h_c = \frac{2 \cdot \sigma \cdot \cos(\theta)}{r_t \cdot W \cdot (S_1 - S_2) \cdot 1000}$$

ex $$0.002864 m = \frac{2 \cdot 72.75 N/m \cdot \cos(10^\circ)}{5.1 m \cdot 9.81 kN/m^3 \cdot (5 - 4) \cdot 1000}$$

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

Open Calculator

fx $$h_c = \frac{2 \cdot \sigma \cdot (\cos(\theta))}{W \cdot G_f \cdot t}$$

ex $$0.000209\text{m} = \frac{2 \cdot 72.75\text{N/m} \cdot (\cos(10^\circ))}{9.81\text{kN/m}^3 \cdot 14 \cdot 5\text{m}}$$

8) Capillary Rise when Contact is between Water and Glass

Open Calculator

fx $$h_c = \frac{2 \cdot \sigma}{r_t \cdot W \cdot 1000}$$

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

9) Compressibility of Fluid

Open Calculator

fx $$C = \left(\frac{\frac{dV}{V_f}}{\Delta P} \right)$$

ex $$0.0005\text{m}^2/\text{N} = \left(\frac{\frac{5\text{m}^3}{100\text{m}^3}}{100\text{Pa}} \right)$$

10) Compressibility of Fluid given Bulk Modulus of Elasticity

Open Calculator

fx $$C = \frac{1}{K}$$

ex $$0.0005\text{m}^2/\text{N} = \frac{1}{2000\text{N}/\text{m}^2}$$

11) Dynamic Viscosity given Shear Stress

Open Calculator

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

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

12) Dynamic Viscosity using Kinematic Viscosity

Open Calculator

fx $$\mu = \rho_f \cdot \nu$$

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

13) Gas Constant using Equation of State

Open Calculator

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

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

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14) Mass Density given Specific Weight

Open Calculator

fx $$\rho_f = \frac{S}{g}$$

ex $$76.53061\text{kg/m}^3 = \frac{0.75\text{kN/m}^3}{9.8\text{m/s}^2}$$

15) Mass Density given Viscosity

Open Calculator

fx $$\rho_f = \frac{\mu}{\nu}$$

ex $$76.92308\text{kg/m}^3 = \frac{80\text{N*s/m}^2}{1.04\text{m}^2/\text{s}}$$

16) Pressure Intensity inside Droplet

Open Calculator

fx $$p_i = \frac{2 \cdot \sigma}{r_t}$$

ex $$28.52941\text{N/m}^2 = \frac{2 \cdot 72.75\text{N/m}}{5.1\text{m}}$$

17) Pressure Intensity inside Liquid Jet

Open Calculator

fx $$p_i = \frac{\sigma}{r_t}$$

ex $$14.26471\text{N/m}^2 = \frac{72.75\text{N/m}}{5.1\text{m}}$$

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18) Pressure Intensity inside Soap Bubble

Open Calculator

fx $$p_i = \frac{4 \cdot \sigma}{r_t}$$

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

19) Shear Stress between any two thin sheets of Fluid

Open Calculator

fx $$\tau = \text{dvdy} \cdot \mu$$

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

20) Specific Gravity of Fluid

Open Calculator

fx $$G_f = \frac{S}{\Upsilon_s}$$

ex $$10.71429 = \frac{0.75\text{kN/m}^3}{70\text{N/m}^3}$$

21) Specific Volume of Fluid

Open Calculator

fx $$v = \frac{1}{\rho_f}$$

ex $$0.012987\text{m}^3\text{/kg} = \frac{1}{77\text{kg/m}^3}$$

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22) Velocity Gradient

Open Calculator

$$\text{dvdy} = \frac{\text{dv}}{\text{dy}}$$

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

23) Velocity Gradient given Shear Stress

Open Calculator

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

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

24) Velocity of Fluid given Shear Stress

Open Calculator

$$V = \frac{Y \cdot \tau}{\mu}$$

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

25) Volume of Fluid given Specific Weight

Open Calculator

$$V_T = \frac{w_l}{S}$$

$$0.647147\text{m}^3 = \frac{485.36\text{N}}{0.75\text{kN/m}^3}$$

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Specific Weight

26) Specific Weight given Mass Density

Open Calculator

fx $S = \rho_f \cdot g$

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

27) Specific Weight of Fluid

Open Calculator

fx $S = \frac{w_l}{V_T}$

ex $0.770413\text{kN/m}^3 = \frac{485.36\text{N}}{0.63\text{m}^3}$

28) Specific Weight of Fluid given Specific Gravity

Open Calculator

fx $S = G_f \cdot \Upsilon_s$

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

29) Specific Weight using Equation of State given Absolute Pressure

Open Calculator

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

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

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Surface Tension

30) Surface Tension given Capillary Rise or Depression

Open Calculator

fx $$\sigma = \frac{h_c \cdot W \cdot G_f \cdot r_t \cdot 1000}{2 \cdot (\cos(\theta))}$$

ex $$106.6859\text{N/m} = \frac{0.0003\text{m} \cdot 9.81\text{kN/m}^3 \cdot 14 \cdot 5.1\text{m} \cdot 1000}{2 \cdot (\cos(10^\circ))}$$

31) Surface Tension given Pressure Intensity inside Droplet

Open Calculator

fx $$\sigma = p_i \cdot \frac{r_t}{2}$$

ex $$77.01\text{N/m} = 30.2\text{N/m}^2 \cdot \frac{5.1\text{m}}{2}$$

32) Surface Tension given Pressure Intensity inside Liquid Jet

Open Calculator

fx $$\sigma = p_i \cdot r_t$$

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

33) Surface Tension given Pressure Intensity inside Soap Bubble

Open Calculator

fx $$\sigma = p_i \cdot \frac{r_t}{4}$$

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

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)*
- G_f 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)*
- $P_{ab'}$ Absolute Pressure by Specific Weight *(Pascal)*
- p_i Internal Pressure Intensity *(Newton per Square Meter)*
- **R** Gas Constant *(Joule per Kilogram per K)*
- r_t Radius of Tube *(Meter)*
- **S** Specific Weight of Liquid in Piezometer *(Kilonewton per Cubic Meter)*
- S_1 Specific Gravity of Liquid 1
- S_2 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)*

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- V_T Volume *(Cubic Meter)*
- **W** Specific Weight of Water in KN per cubic meter *(Kilonewton per Cubic Meter)*
- w_l Weight of Liquid *(Newton)*
- **Y** Distance between Fluid Layers *(Meter)*
- **ΔP** Change in Pressure *(Pascal)*
- **θ** Contact Angle *(Degree)*
- **μ** Dynamic Viscosity *(Newton Second per Square Meter)*
- **ν** Kinematic Viscosity *(Square Meter per Second)*
- ρ_f Mass Density of Fluid *(Kilogram per Cubic Meter)*
- ρ_{gas} Density of Gas *(Gram per Liter)*
- **σ** Surface Tension *(Newton per Meter)*
- **τ** Shear Stress *(Newton per Square Meter)*
- Y_s 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 (m^3)
  Volume Unit Conversion
- Measurement: **Pressure** in Pascal (Pa), Newton per Square Meter (N/m^2)
  Pressure Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Acceleration** in Meter per Square Second (m/s^2)
  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

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- 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
- Properties of Fluid Formulas
- Thermal Expansion of Pipe and Pipe Stresses Formulas
- Uniform Flow in Channels Formulas
- Water Power Engineering Formulas

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