

Important Laplace and Surface Pressure Formulas PDF



Formulas Examples with Units

List of 9 Important Laplace and Surface Pressure Formulas

1) Contact Angle Hysteresis Formula ↻

Formula

$$H = \theta_a - \theta_r$$

Example with Units

$$7^\circ = 28^\circ - 21^\circ$$

Evaluate Formula ↻

2) Correction Factor given Surface Tension Formula ↻

Formula

$$f = \frac{m \cdot [g]}{2 \cdot \pi \cdot r_{cap} \cdot \gamma}$$

Example with Units

$$0.1355 = \frac{25 \text{ kg} \cdot 9.8066 \text{ m/s}^2}{2 \cdot 3.1416 \cdot 4 \text{ m} \cdot 72 \text{ N/m}}$$

Evaluate Formula ↻

3) Interfacial Tension by Laplace Equation Formula ↻

Formula

$$\sigma_i = \Delta P \cdot \left(\frac{R_1 \cdot R_2}{R_1 + R_2} \right)$$

Example with Units

$$3618.4074 \text{ mN} \cdot \text{m} = 5 \text{ Pa} \cdot \left(\frac{1.67 \text{ m} \cdot 8 \text{ m}}{1.67 \text{ m} + 8 \text{ m}} \right)$$

Evaluate Formula ↻

4) Laplace Pressure Formula ↻

Formula

$$\Delta P = P_{\text{inside}} - P_{\text{outside}}$$

Example with Units

$$0.9 \text{ Pa} = 7 \text{ Pa} - 6.1 \text{ Pa}$$

Evaluate Formula ↻

5) Laplace Pressure of Bubbles or Droplets using Young Laplace Equation Formula ↻

Formula

$$\Delta P_b = \frac{\sigma \cdot 2}{R_c}$$

Example with Units

$$9.7 \text{ Pa} = \frac{72.75 \text{ N/m} \cdot 2}{15 \text{ m}}$$

Evaluate Formula ↻

6) Laplace Pressure of Curved Surface using Young-Laplace Equation Formula ↻

Formula

$$\Delta P_y = \sigma \cdot \left(\left(\frac{1}{R_1} \right) + \left(\frac{1}{R_2} \right) \right)$$

Example with Units

$$52.6566 \text{ Pa} = 72.75 \text{ N/m} \cdot \left(\left(\frac{1}{1.67 \text{ m}} \right) + \left(\frac{1}{8 \text{ m}} \right) \right)$$

Evaluate Formula ↻



7) Maximum Force at Equilibrium Formula

Formula

$$F_{\max} = (\rho_1 - \rho_2) \cdot [g] \cdot V_T$$

Evaluate Formula 

Example with Units

$$12.9742 \text{ N} = (10.2 \text{ kg/m}^3 - 8.1 \text{ kg/m}^3) \cdot 9.8066 \text{ m/s}^2 \cdot 0.63 \text{ m}^3$$

8) Parachor Given Molar Volume Formula

Formula

$$P_s = (\gamma)^{\frac{1}{4}} \cdot V_m$$

Example with Units

$$93.2144 \text{ m}^3/\text{mol} \cdot (\text{J/m}^2)^{(1/4)} = (72 \text{ N/m})^{\frac{1}{4}} \cdot 32 \text{ m}^3/\text{mol}$$

Evaluate Formula 

9) Shape Factor using Pendant Drop Formula

Formula

$$S_s = \frac{d_s}{d_e}$$

Example with Units

$$0.85 = \frac{17 \text{ m}}{20 \text{ m}}$$

Evaluate Formula 



Variables used in list of Laplace and Surface Pressure Formulas above

- d_e Equatorial Diameter (Meter)
- d_s Diameter of Tip of Drop (Meter)
- f Correction Factor
- $F_{\max}$ Maximum Force (Newton)
- H Contact Angle Hysteresis (Degree)
- m Drop Weight (Kilogram)
- P_{inside} Pressure inside of Curved Surface (Pascal)
- P_{outside} Pressure Outside of Curved Surface (Pascal)
- P_s Parachor given Molar Volume (Cubic Meter per Mole (Joule per Square Meter)^(0.25))
- R_1 Radius of Curvature at Section 1 (Meter)
- R_2 Radius of Curvature at Section 2 (Meter)
- R_c Radius of Curvature (Meter)
- r_{cap} Capillary Radius (Meter)
- S_s Shape Factor of Drop
- V_m Molar Volume (Cubic Meter per Mole)
- V_T Volume (Cubic Meter)
- γ Surface Tension of Fluid (Newton per Meter)
- ΔP Laplace Pressure (Pascal)
- ΔP_b Laplace Pressure of Bubble (Pascal)
- ΔP_y Laplace Pressure given Young Laplace (Pascal)
- θ_a Advancing Contact Angle (Degree)
- θ_r Receding Contact Angle (Degree)
- ρ_1 Density of Liquid Phase (Kilogram per Cubic Meter)
- ρ_2 Density of Liquid or Gas Phase (Kilogram per Cubic Meter)
- σ Surface Tension (Newton per Meter)
- σ_i Interfacial Tension (Millinewton Meter)

Constants, Functions, Measurements used in list of Laplace and Surface Pressure Formulas above

- **constant(s):** π , 3.14159265358979323846264338327950288
Archimedes' constant
- **constant(s):** $[g]$, 9.80665
Gravitational acceleration on Earth
- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Weight** in Kilogram (kg)
Weight Unit Conversion 
- **Measurement: Volume** in Cubic Meter (m³)
Volume Unit Conversion 
- **Measurement: Pressure** in Pascal (Pa)
Pressure Unit Conversion 
- **Measurement: Force** in Newton (N)
Force Unit Conversion 
- **Measurement: Angle** in Degree (°)
Angle Unit Conversion 
- **Measurement: Surface Tension** in Newton per Meter (N/m)
Surface Tension Unit Conversion 
- **Measurement: Density** in Kilogram per Cubic Meter (kg/m³)
Density Unit Conversion 
- **Measurement: Moment of Force** in Millinewton Meter (mN*m)
Moment of Force Unit Conversion 
- **Measurement: Molar Magnetic Susceptibility** in Cubic Meter per Mole (m³/mol)
Molar Magnetic Susceptibility Unit Conversion 
- **Measurement: Parachor** in Cubic Meter per Mole (Joule per Square Meter)^(0.25) (m³/mol* (J/m²)^(1/4))
Parachor Unit Conversion 



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