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Laplace and Surface Pressure Formulas

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List of 9 Laplace and Surface Pressure Formulas

Laplace and Surface Pressure

1) Contact Angle Hysteresis

Open Calculator

fx $$H = \theta_a - \theta_r$$

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

2) Correction Factor given Surface Tension

Open Calculator

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

ex $$0.135484 = \frac{25kg \cdot [g]}{2 \cdot \pi \cdot 4m \cdot 72N/m}$$

3) Interfacial Tension by Laplace Equation

Open Calculator

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

ex $$3618.407mN*m = 5Pa - \left(\frac{1.67m \cdot 8m}{1.67m + 8m}\right)$$

4) Laplace Pressure

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

ex $$52.65662\text{Pa} = 72.75\text{N/m} \cdot \left(\left(\frac{1}{1.67\text{m}}\right) + \left(\frac{1}{8\text{m}}\right)\right)$$

7) Maximum Force at Equilibrium

Open Calculator

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

ex $$12.9742\text{N} = (10.2\text{kg/m}^3 - 8.1\text{kg/m}^3) \cdot [g] \cdot 0.63\text{m}^3$$

8) Parachor Given Molar Volume

Open Calculator

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

ex $93.21442\text{m}^3/\text{mol}*(\text{J}/\text{m}^2)\hat{}(1/4) = (72\text{N}/\text{m})^{\frac{1}{4}} \cdot 32\text{m}^3/\text{mol}$

9) Shape Factor using Pendant Drop

Open Calculator

fx $S_S = \frac{d_s}{d_e}$

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

Variables Used

- 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

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665 Meter/Second²
  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

Check other formula lists

- **Laplace and Surface Pressure Formulas**
- **Parachor Formulas**
- **Surface Tension Formulas**
- **Wilhelmy-Plate Method Formulas**

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