Density: $\rho = \dfrac{Mass}{Volume}$

Example: density of water $\mathbf{1000\frac{kg}{m^3} = 1\frac{kg}{l} = 1\frac{g}{cm^3} = 1\frac{g}{ml}}$

Pressure = $\dfrac{\text{Force}}{\text{Area}}$

Units of Pressure:

$1Pa = 1\frac{N}{m^3}$ (standard SI unit called Pascal)

$1\ bar\ = 100\ kPa = 10^5 Pa$

Atmospheric Pressure $1\ atm = 101\ kPa,$ it is very close to 1 bar.

Pressure in fluids

- **Pascal's Principle:**

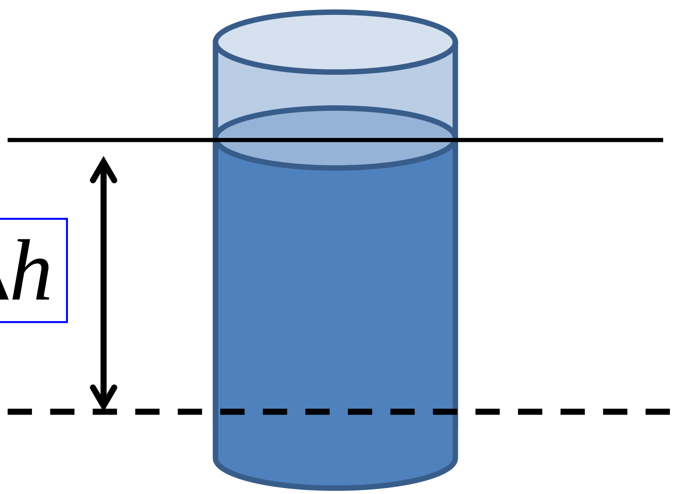
"Pressure in static fluid is transmitted uniformly in all directions"

P = *const*

(static fluid, no gravity)

- **Hydrostatic Pressure.** Due to gravity, the pressure increases as you go deeper in fluid:

$$\Delta P = \rho g \Delta h$$



$$\Delta h$$

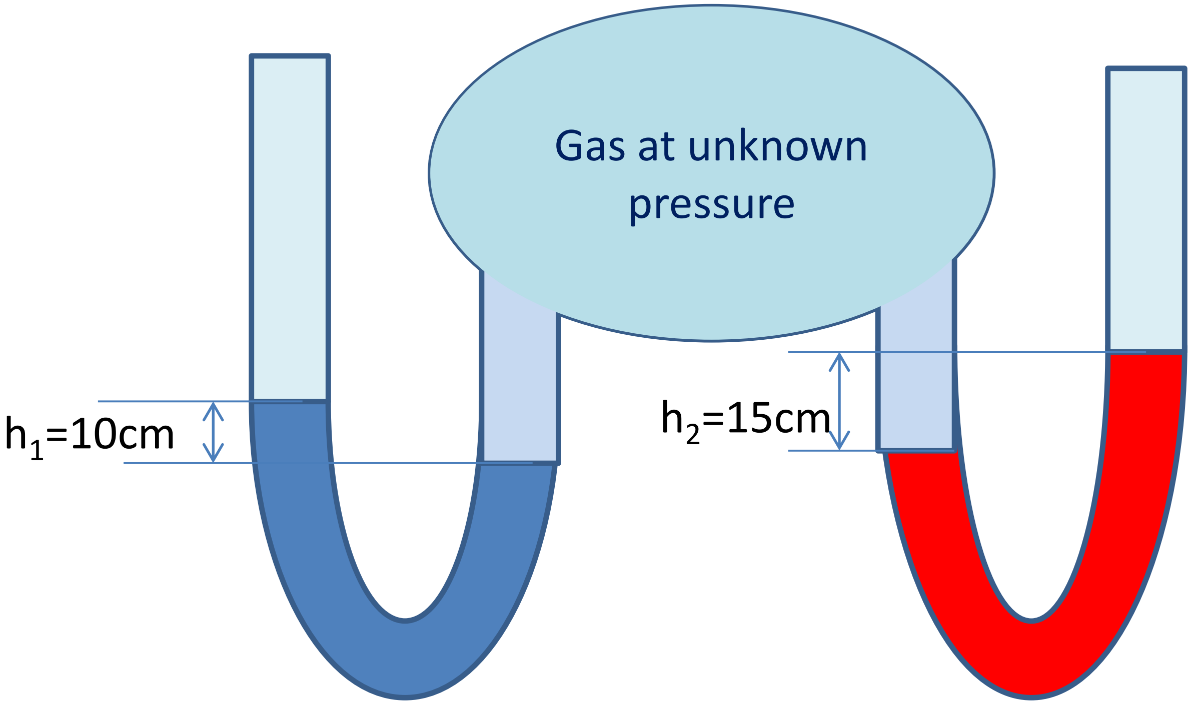
$$P = P_{atm}$$

$$P = P_{atm} + \rho g \Delta h$$

Homework

Problem 1.

Two U-shaped pipes are used to measure pressure in a sealed tank containing some gas. The first pipe contains water, and it shows a level difference h_1=10cm. What is the density of the liquid in the other pipe, if the level difference in that pipe is h_2=15cm? The open ends of both pipes are exposed to the atmosphere.



Problem 2

Solids at high pressure may float as fluids. This property is called plasticity. For instance, granite will float under pressure about 200 MPa (200 Mega Pascal).

a) Use this information to estimate the height of the tallest mountain possible on Earth. You may consider a mountain to have cylindrical rather than conic shape. This is not a terrible approximation for large mountainous regions like Himalayan.

b) What would be your prediction for the height of the tallest mountain on Moon (gravitational acceleration $g= 1.6\ m/c^2$) and Mars ($g= 3.67\ m/c^2$)?