

Definition

Density

- ρ Mass per unit volume
- $\rho = \frac{m}{V}$
- $\frac{kg}{m^3} = \frac{10^3 g}{10^6 cm^3} = 10^{-3} \frac{g}{cm^3}$

Pressure

- P Force per unit area
- $P = \frac{F}{A}$
- Pressure is a scalar because of **Pascal Law**: Pressure is the same in all direction, therefore pressure is a vector acting everywhere, which is no direction (this caused the up thrust)
- Solid: Weight or Force exerted on the surface of solid $P = \frac{F}{A}$
- Liquid: weight of the liquid $P = \frac{F}{A}$ or $P = \rho gh$
- Gasses: gas molecule *move* and *collide* with the surface and the *change in momentum* exerted force on the surface to create pressure $P = \frac{F}{A}$

Concept

Pressure transmission

- Pressure is the same in everywhere of the container
- Force does NOT transmitted
- $\frac{F_1}{A_1} = \frac{F_2}{A_2}$
- This is applicable for all substance
- - For Liquid it is Hydraulic
 - For Gas it is Pneumatics
 - It is also possible with solid

Derivation

Obtain pressure formula in Liquid

- $P = \rho gh$ from $P = \frac{F}{A}$
- $P = \frac{F}{A} = \frac{mg}{A} = \rho \frac{V}{A} g = \rho \frac{Ah}{A} g = \rho gh$
- Area does NOT affect the pressure
- For U shape Tube: $Pressure_{Left} = Pressure_{Right}$, therefore it is atmospheric pressure + ρgh in open tube case, and lower(because of one side does not have atmospheric pressure) if one end is closed.
- The U shape tube connected with a funnel is how the **manometer** made

Work done by Gases

- $W = p\Delta V$
- Derivation Comes from unit: $[pV] = Nm = J$