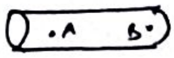
M.P.F

① $P = \frac{F_\perp}{A}$

② 

$$\boxed{P = P_0 + \rho g h}$$

③ 

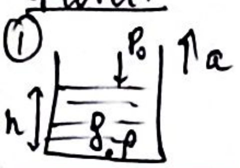
Horizontally pressure remains same

$P_A = P_B$

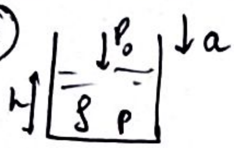
④ 

$$\boxed{\rho_{mix} = \frac{m_1 + m_2}{(m_1/\rho_1) + (m_2/\rho_2)}}$$

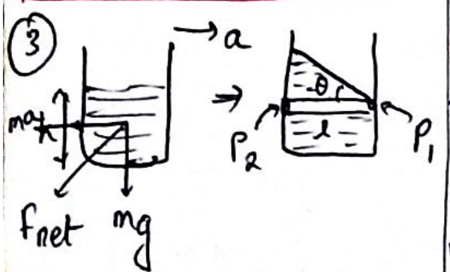
Variation in P in a fluid.

① 

$$\boxed{P = P_0 + \rho(g+a)h}$$

⑤ 

$$\boxed{P = P_0 + \rho(g-a)h}$$

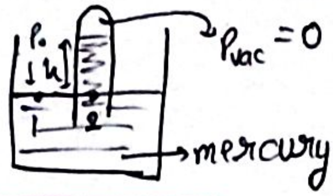
③ 

$$\boxed{P_2 - P_1 = \rho l a}$$

$$\boxed{\tan\theta = \frac{h}{l} = \frac{a}{g}}$$

Barometer

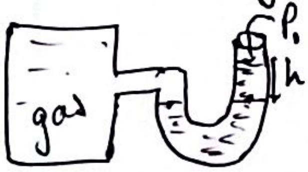
↳ measure atm. P



$$\boxed{P_0 = \rho g h}$$

Manometer

↳ measure P of an enclosed gas



$$\boxed{P_{gas} = P_0 + \rho g h}$$

$\underbrace{P_{gas} - P_0}_{\text{gauge pressure}} = \rho g h$

Upthrust / Buoyancy

$$\boxed{U = V\rho g}$$

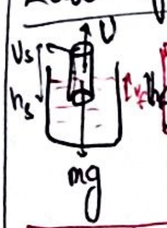
$V \to$ Volume of solid immersed

$\rho \to$ density of fluid

$g \to$

$$\boxed{\text{Apparent weight} = \text{Weight in air} - \text{Upthrust}}$$

Law of floation



$$\boxed{f_{net} = 0}$$

$$\boxed{\text{wt of body} = \text{Upthrust}}$$

$$\boxed{\rho_s V_s = \rho_f V_f} \quad \boxed{h_s \rho_s = h_f \rho_f}$$

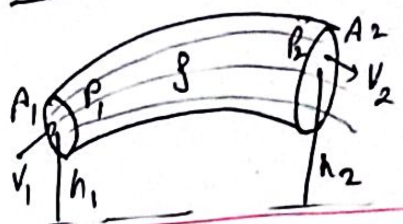
Eqⁿ of continuity

$AV = \text{constant}$

$\boxed{A \propto \frac{1}{V}}$ or $A_1 V_1 = A_2 V_2$

↳ Conservation of mass

Bernoulli's Theroem



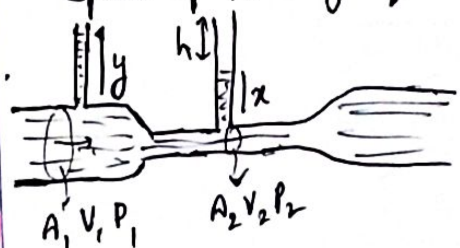
→ $$\boxed{P + \rho g h + \frac{1}{2}\rho v^2 = \text{constant}}$$

→ Conservation of energy

$$\boxed{P_1 + \rho g h_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho g h_2 + \frac{1}{2}\rho v_2^2}$$

$$\boxed{P_1 - P_2 = \frac{1}{2}\rho(v_2^2 - v_1^2) + \rho g(h_2 - h_1)}$$

Venturimeter: 2 measure speed of flowing liquid



$$\boxed{v_2^2 - v_1^2 = 2gh}$$

$$\boxed{v_1 = A_2\sqrt{\frac{2gh}{A_1^2 - A_2^2}}}$$

$$\boxed{v_2 = A_1\sqrt{\frac{2gh}{A_1^2 - A_2^2}}}$$

$$\boxed{\text{Rate of flow} = A_1 A_2\sqrt{\frac{2gh}{A_1^2 - A_2^2}}}$$

Critical Velocity

$$\boxed{V_c = \frac{N_R \eta}{\rho D}}$$

$N_R \rightarrow$ Reynold's No.

$\eta \rightarrow$ coefficient of viscosity.

$\rho \Rightarrow$ density of liquid.

$D \Rightarrow$ diameter of tube.

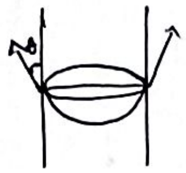
Value of N_R	Type of flow
0 to 2,000	Streamline & Stable
2000 to 3000	Streamline $\rightarrow$ Turbulent
Above 3000	Turbulent

Work done in soap BUBBLE

$$\boxed{W = 8\pi R^2 T}$$

On mixing highly soluble impurity in water

$\Rightarrow T\uparrow$ & $\theta\uparrow$



Upward force = (surface. T) x (length in contact)

$$\boxed{f_v = T\, 2\pi r}$$

Applications of Pascal law:-

1. Hydraulic lift
2. Hydraulic brakes:
3. Hydraulic jack.

Pascal law:

$$\boxed{\frac{F_1}{F_2} = \frac{A_1}{A_2}}$$

$1N = 10^5$ dyne

when drops coelease (combine)

$\Rightarrow$ Volume conservation

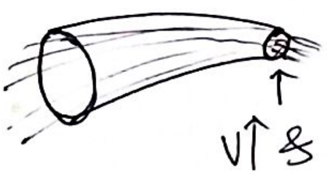
when BUBBLE combine

$\Rightarrow$ Area conservation

Shortcut: where E = Energy

$$\boxed{\frac{E_{drop}}{E_{droplets}} = \frac{1}{n^{1/3}}}$$

θ is ~~con~~ constant for particular solid - liquid pair

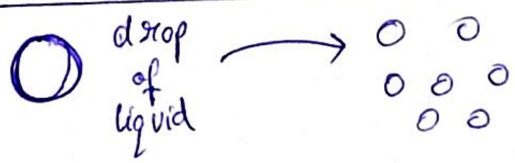


$V\uparrow$ & $P\downarrow$

Soap solution is used for cleaning dirty clothes because surface tension of solution is decreased

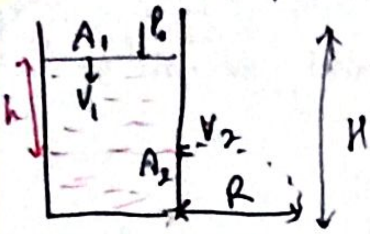
Shortcut: If ~~to~~ there is a wire or ring lying on the surface of liquid, always replace l by $2l$ & replace $2\pi R$ by $4\pi R$ respectively

As temperature of a liquid increases, then Surface tension (T) $\downarrow$ (decreases) & $\cos\theta\uparrow$ & $\theta\downarrow$



then surface area increases.

Speed of efflux:



$$\boxed{v_2 = \sqrt{2gh}} \rightarrow \text{open tank}$$

$$\boxed{v_2 = \sqrt{2gh + \frac{(P-P_0)}{\rho}}} \rightarrow \text{closed tank}$$

$$\boxed{R = 2\sqrt{h(H-h)}}$$

$$\boxed{R_{max} = H}$$

Velocity gradient

$$\boxed{V_g = \frac{dv}{dx}} = \frac{\text{change in velocity}}{\text{height}}$$

Viscous force

$$\boxed{f_v = -\eta A \frac{dv}{dx}}$$

$\eta \rightarrow$ cofficient of viscosity

$\eta \rightarrow N\text{-}s/m^2$

C.G.S $\rightarrow$ $\underbrace{dyne\text{-}s/cm^2}_{\text{poise}}$

$$\boxed{1 \text{ poise} = 10^{-1} N\text{-}s/m^2}$$

$\eta - [M^1 L^{-1} T^{-1}]$

Stoke's Theorem

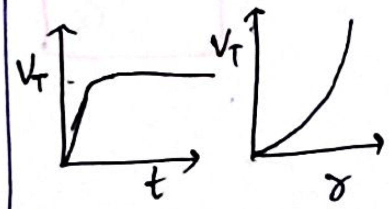
$$\boxed{F_v = 6\pi \eta r v}$$

- spherical ho
- fluid ka ander
- motion mai ho

Terminal velocity

$$\boxed{V_T = \frac{2}{9}\frac{r^2}{\eta}(\sigma_s - \rho_f)g}$$

- spherical ho
- fluid mai ho

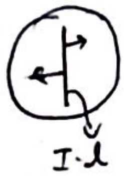


if $V_T \rightarrow -ve$

Rise upwards

Surface Tension

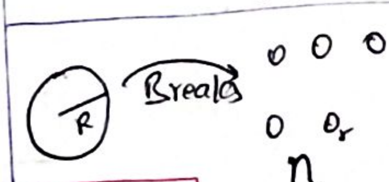
$$\boxed{T = \frac{F_\perp}{l}}$$



Surface Energy

$$\boxed{\Delta U = T\Delta A}$$

Note: Soap flim has two layers



$$\boxed{R = n^{1/3} r}$$

$$\boxed{W = 4\pi R^2 T(n^{1/3} - 1)}$$

Capillary action

$$\boxed{\cos\theta = \frac{r}{R}}$$

R → Radius of meniscus
θ → contact angle
r → Radius of tube

Excess P in liquid drop

$$\boxed{\Delta P = \frac{2T}{R}}$$

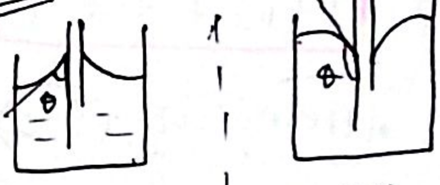
Excess P in soap Bubble

$$\boxed{\Delta P = \frac{4T}{R}}$$

Contact angle 'θ'

$\theta \rightarrow 0^c$ to π^c

Note: for kerosen $\rightarrow \boxed{\theta = 0^\circ}$



concave mensicus	convex mensicus
$\rightarrow \theta < 90^\circ$	$\rightarrow \theta > 90^\circ$
$\rightarrow$ Rises	$\rightarrow$ falls
$\rightarrow$ Liquid wets glass surface	$\rightarrow$ Liquid do NOT wet glass surface
$\rightarrow$ Adhesive > Cohesive	$\rightarrow$ Ad < Coh
eg methyl iodide, impure water $\rightarrow \theta = 29^\circ$	eg mercury $\rightarrow \theta = 135^\circ$

#

$\theta = 90^\circ$
eg water in silver capillary

→ Liquids wets the glass surface
→ Adhesive = Cohesive

$$\boxed{h = \frac{2T\cos\theta}{r\rho g}}$$