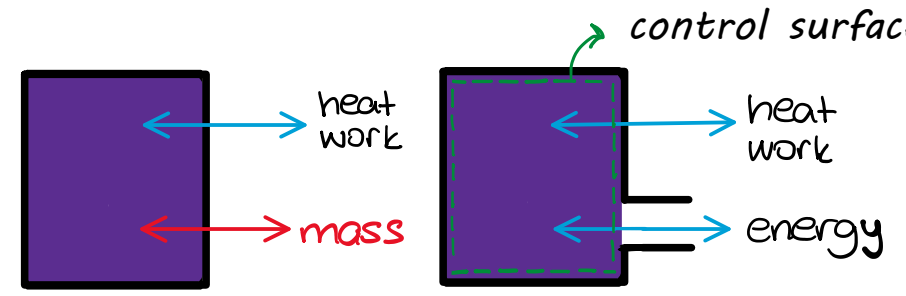
basic concepts

11 Şubat 2025 Salı 12:16



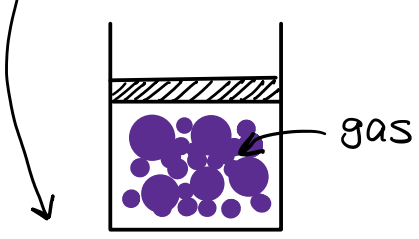
closed system (control mass)

open system (control volume)

there are two types of properties
- intensive: independent of mass (ρ, P, T)
- extensive: dependent of mass (E, V)

↳ $\frac{E}{m} = e$, $\frac{V}{m} = v$, $\frac{1}{\rho} = v$

two intensive properties → known state



piston cylinder device

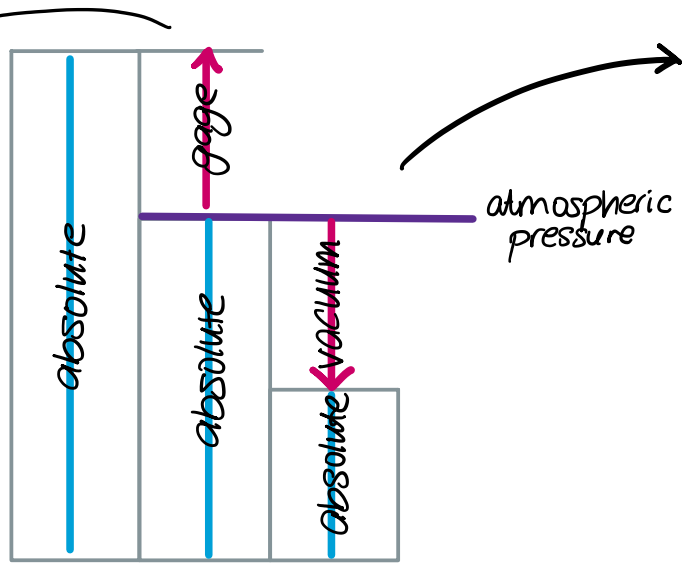
$P_{gage} = P_{abs} - P_{atm}$

$P_{vac} = P_{atm} - P_{abs}$

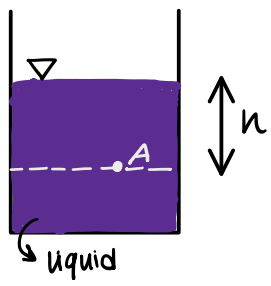
P_{atm} = outdoor air pressure
↳ barometric "

P_{gage} = effective pressure
↳ manometric "

$P_{abs} > P_{atm}$
positive pressure
$P_{abs} = P_{atm} + P_g$



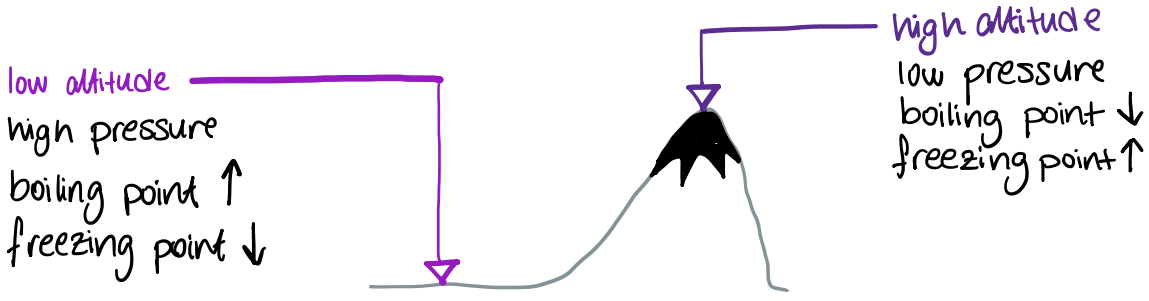
$P_{atm} < P_{abs}$
negative pressure
$P_{abs} = P_{atm} - P_{vac}$



$P_A = \rho_{liq} \cdot g \cdot h$

$P_{Abs} = P_{atm} + P_g$

$\left(P_{atm} = \begin{matrix} 101.3 & kPa \\ 760 & mmHg \end{matrix}\right)$



Unit Analysis:

$20\frac{kg}{m^3} = ? \frac{g}{cm^3}$ $2\not{0}\frac{10^3 g}{10\not{k}m^3} = 2\times10^{-2}\frac{g}{cm^3}$

$5bar = ? \frac{N}{m^2}$ (1bar = 100kPa)
$5bar = 5\times10^5 Pa = \frac{N}{m^2}$

$5cl = ?$ liters $\rightarrow 5\times10^{-2} L$

$100\ km/h = ?$ m/s
$\frac{100\times10^3 m}{3600 sec}$ $\frac{10^3}{36} \simeq 27.7 m/s$