I GAS

→ teoria cinetica dei gas
(microscopico)

→ p V p t (temperatura in °C)
(Macroscopica)

gas perfetti

→ le molecole non interagiscono
(o interagiscono con urti elastici)

→ le molecole sono puntiformi
(non hanno volume proprio)

Legge di Boyle

t cost $\Rightarrow$ pV cost

Legge di Gay-Lussac

I $\quad p$ cost $\rightarrow \quad V(t) = V_0(1+\alpha t)$ (V_0: V a $0^\circ C$)

II $\quad V$ cost $\rightarrow \quad p(t) = p_0(1+\beta t)$ (p_0: p a $0^\circ C$)

$$\alpha = \beta = \frac{1}{273{,}15\ ^\circ C}$$

Equazione di stato dei gas perfetti

$$pV = p_0 V_0 (1+\alpha t)$$

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$p_0 V_0$ $\xrightarrow{t=0^\circ}$ $p' V$ $\xrightarrow{t=0^\circ}$ pV $\xleftarrow{}$ t

izoterma $t = 0^\circ$

$$p_0 V_0 = p' V$$ (Boyle)

$$p' = p_0 V_0 / V$$

izocora $V = \text{cost}$

$$p(t) = p' (1 + \alpha t)$$

$$p = p' (1 + \alpha t)$$

$$p = \frac{p_0 V_0}{V} (1 + \alpha t)$$

$$\boxed{pV = p_0 V_0 (1 + \alpha t)}$$

$N_A = 6{,}022 \cdot 10^{23}\ mol^{-1}$

$p_0 = 1\ atm \quad t = 0\ ^\circ C \quad n = 1 \Rightarrow V = 22{,}41\ \ell$

$pV = p_0 V_0 (1 + \alpha t) \qquad \alpha = \frac{1}{273{,}15}\ ^\circ C^{-1}$

$n = 1 \Downarrow$

$pV = 1\ atm\ 22{,}41\ \ell$

$\left(\frac{273{,}15\ ^\circ C + t}{273{,}15\ ^\circ C} \right)^{T\ (K)}$

$pV = 0{,}082\ \frac{\ell\ atm}{K}\ T \qquad K$

$R = 8{,}314\ \frac{J}{K}$

$pV = RT \qquad (n = 1\ mol)$

$\boxed{pV = nRT}$

$$R = 0{,}082 \ \frac{\ell \cdot atm}{K}$$

$$= 0{,}082 \ \cancel{10^{-3} m^3} \cdot 101{,}300 \ \cancel{\frac{N}{m^2}} \ \frac{1}{K}$$

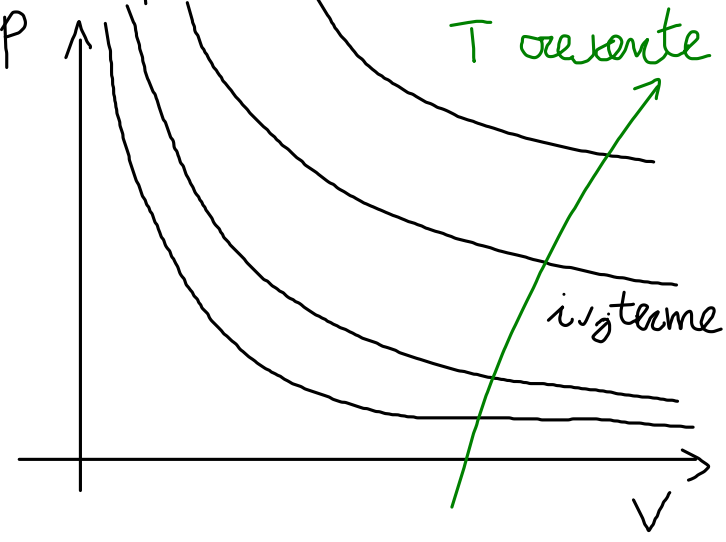
$$= 0{,}082 \cdot 101{,}3 \ \frac{N \cdot m}{K}$$

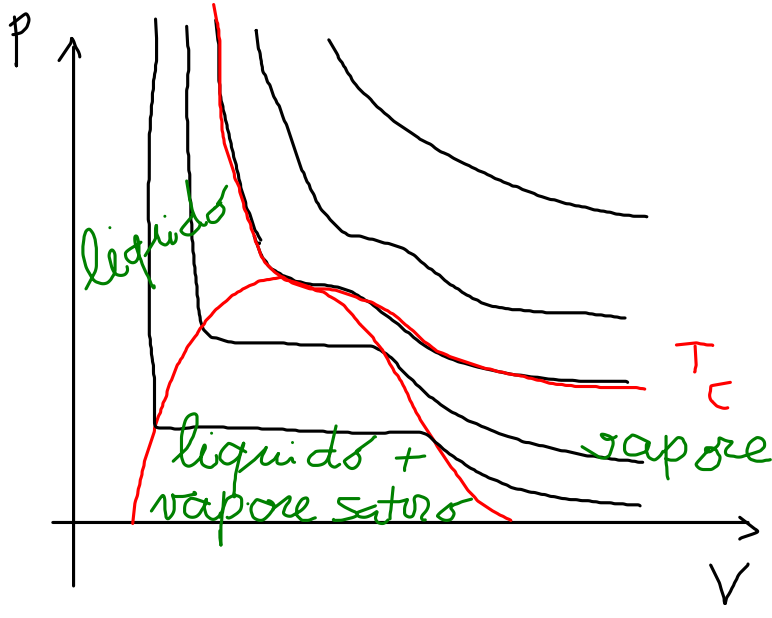
$$R = 8{,}314 \ \frac{J}{K}$$

GAS REALI

(equazione di Van der Waals)

$pV = nRT$





$$\left(p + \frac{n^2 a}{V^2}\right)\left(V - nb\right) = nRT$$

$$\left(p + \frac{a}{v^2}\right)\left(v - b\right) = RT$$

$v = \frac{V}{n}$

vol. spec. molare