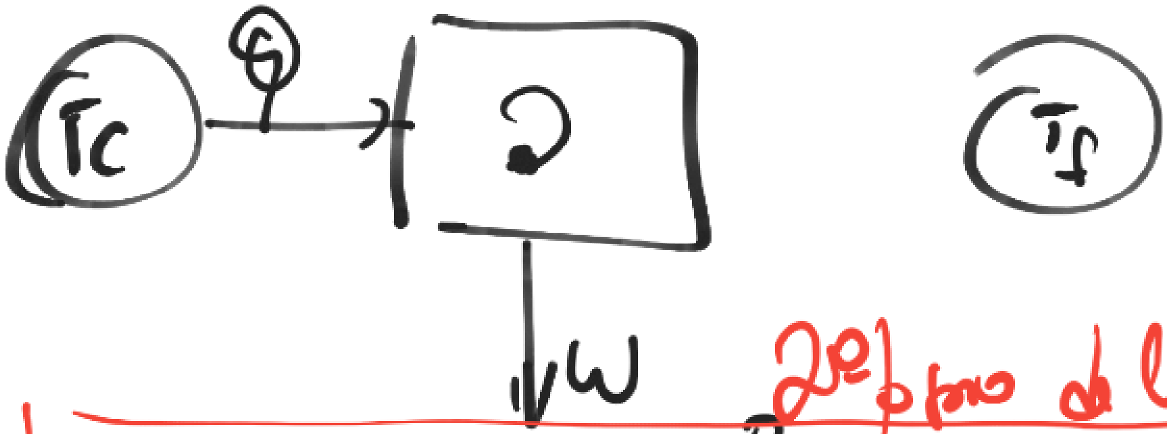
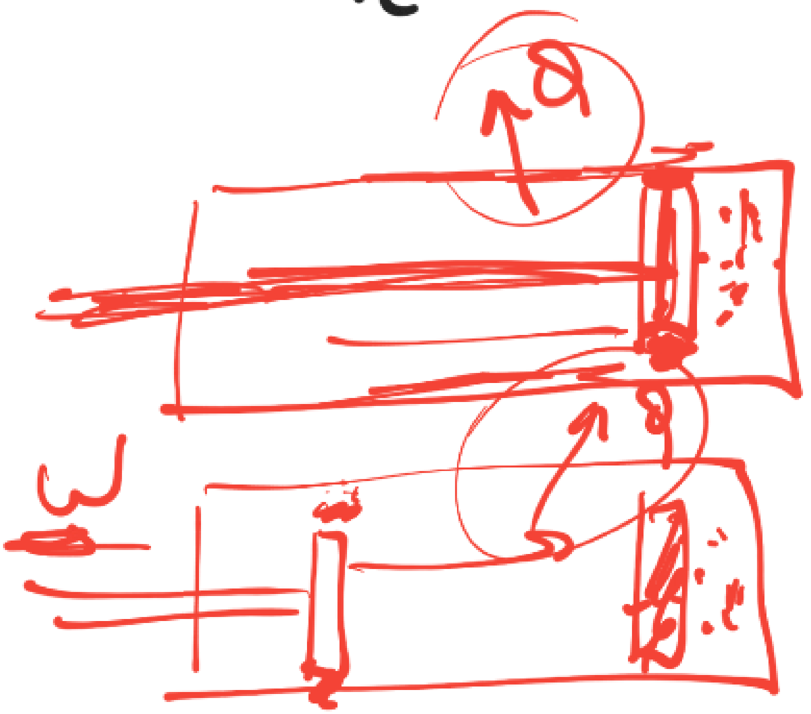
F3B2019: f3b-20190521-U03C07-Entropia-e...

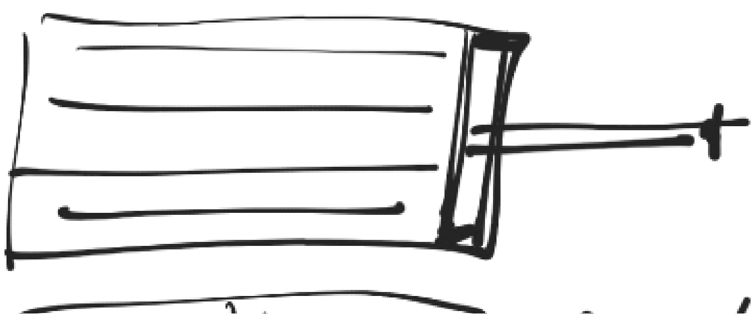


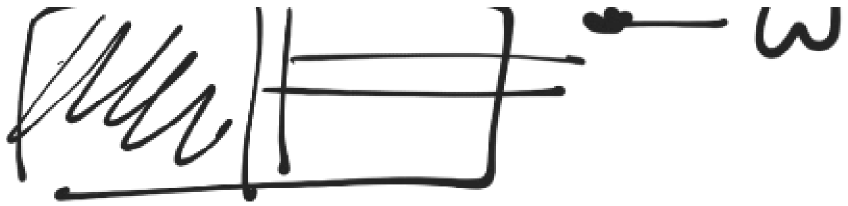
2º ppio de la termodinámica

$$\boxed{\Delta S_U = \cancel{\Delta S_{sis}}^{\,0} + \Delta S_{med} \geq 0}$$

$$\Delta S = \frac{-Q}{T_c} < 0 \Rightarrow \underbrace{\Delta S_U < 0}_{\text{proc. imposible}}$$







$$\Delta S_U = \Delta S_{sis} + \cancel{\Delta S_{med}}^{\,0}$$

$$\Delta S_U = n C_p \ln\left(\frac{V_2}{V_1}\right) + n C_v \ln\left(\frac{P_2}{P_1}\right)$$

$T = cte$

$$\Delta S_U = \underbrace{n C_p \ln 10}_{>0} + \underbrace{n C_v \ln 0{,}1}_{<0}$$

$\Delta S_U > 0$ $\quad C_p > C_v.$

$$\boxed{\Delta S_U > 0}$$

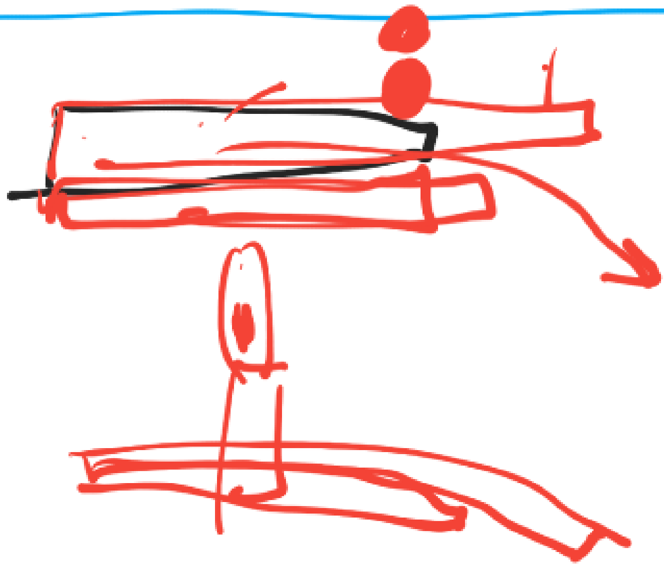
$n = 30$ gas ideal biatómico

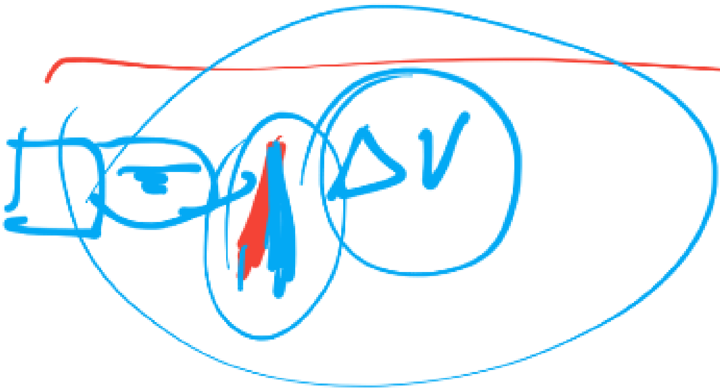
$$\Delta S_U = 3\,mol \left(\frac{7}{2} R \ln 10 + \frac{5}{2} R \cdot \ln 0{,}1\right)$$

$$\Delta S_V = 30 R \ln 10 \left(\frac{7}{2} - \frac{5}{2} \right)$$

$$\Delta S_V = 30 . R \ln 10$$

$$\boxed{\Delta S_V = 574 \ J/K}$$

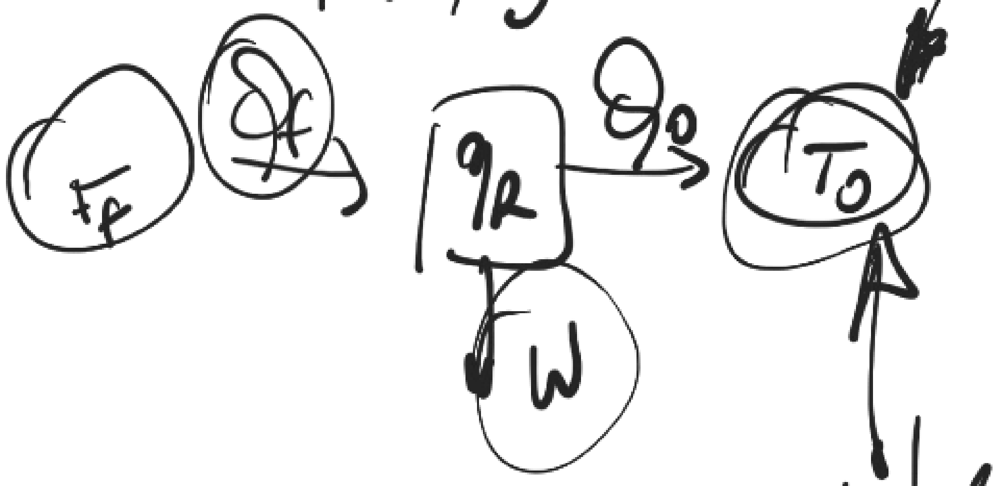




$$\eta_C = \left(1 - \frac{T_f}{T_c} \right)$$

T_f $|Q_f|$

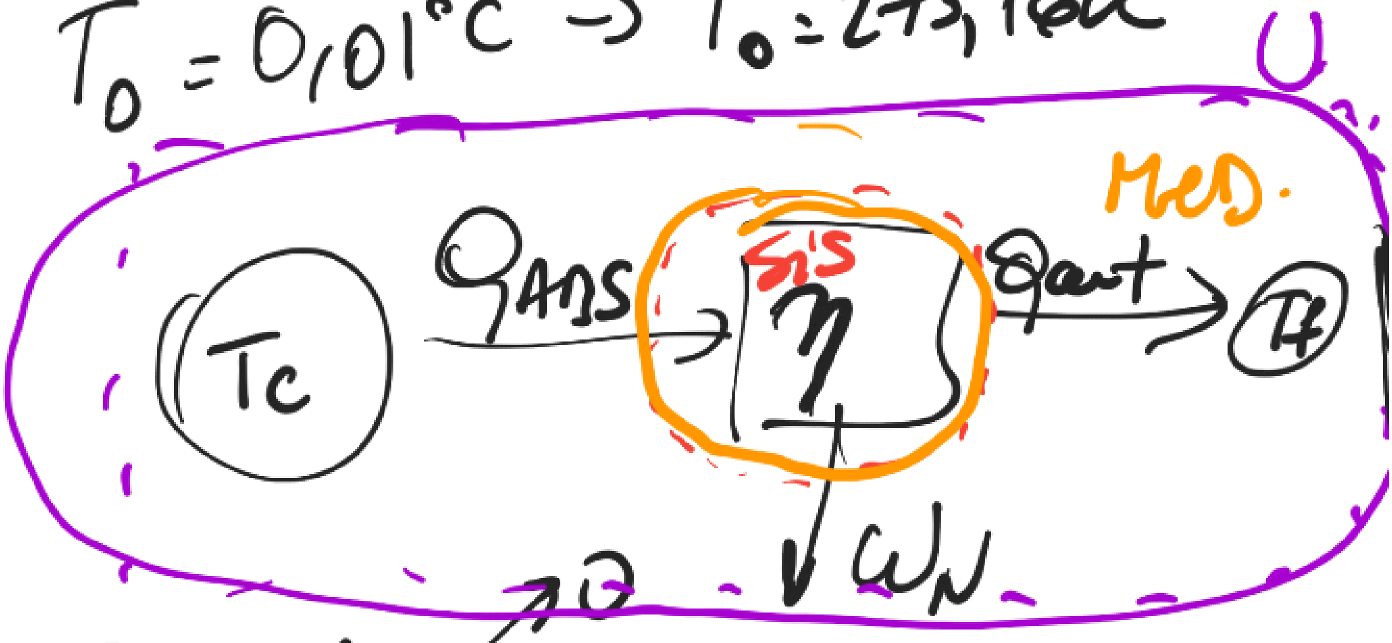
$$\eta_C = \left(1 - \frac{|Q_F|}{|Q_C|}\right) \quad \frac{T_F}{T_C} \quad \frac{|Q_F|}{|Q_C|}$$



Punto triple del Agua

$$0K = -273{,}15\,°C$$

$$T_0 = 0{,}01\,°C \rightarrow T_0 = 273{,}16\,K$$



$$\Delta S_U = \Delta S_{sis} + \Delta S_{med.}$$

$$\Delta S_{med} = -\frac{Q_{ABS}}{T_C} + \frac{Q_{ent}}{T_f} = \Delta S_U$$

$$Q_{ent} = \left(\Delta S_U + \frac{Q_{ABS}}{T_C}\right) T_f$$

$$\boxed{Q_{ent} = \underbrace{\frac{T_f}{T_C} Q_{ABS}}_{Q_{rev}} + \underbrace{T_f \Delta S_U}_{Q_{irreversibilidad}}}$$

$$Q_{ent} = Q_{rev} + \underline{Q_{irreversible}}$$

$$Q_{ABS} = W + Q_{ent}$$

$$\Rightarrow W = Q_{ABS} - Q_{ent}$$

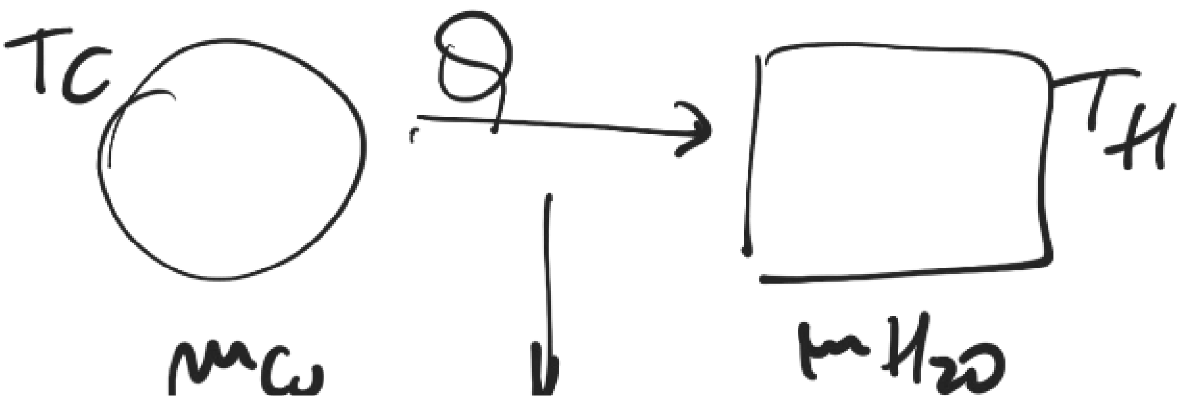
$$W = \underbrace{Q_{ABS} - \frac{T_f}{T_C} Q_{ABS}}_{\text{Maq reversible}} - \underbrace{T_f \Delta S_U}_{<0}$$

$$\frac{W}{Q_{ABS}} = \eta = \frac{Q_{ABS} - \frac{T_f}{T_C} Q_{ABS} - T_f \Delta S_U}{Q_{ABS}}$$

$$\eta = \underbrace{\left(1 - \frac{T_f}{T_C}\right)}_{\eta_C} - T_f \frac{\Delta S_U}{Q_{ABS}}$$

$$\Rightarrow \boxed{\eta = \eta_C - \frac{T_f \Delta S_U}{Q_{ABS}}}$$

$$\boxed{\Delta S_U = \frac{|Q_{ABS}|}{T_f} \left(\eta_C - \eta\right)}$$



C_{Cu} $\quad T \quad$ C_{H_2O}.

T_0 $\quad\quad$ T_H

$$Q_C = m_C \cdot C_C (T - T_C)$$

$$Q_H = m_H \cdot C_H (T - T_H)$$

$$Q_C + Q_H = 0 \Rightarrow Q_H = -Q_C$$

$$m_C C_C (T_C - T) = m_H C_H (T - T_H)$$

$$T = \frac{m_C C_C T_C + m_H C_H T_H}{m_C C_C + m_H C_H}$$

$\underline{\underline{T = 300K}}$ $\quad T_C = 353K$

$T_H = 298K$

$C_H = 4{,}184 \frac{kJ}{kg\,K}$ / $C_C = 0{,}385 \frac{kJ}{kg\,K}$

$$\Delta S_U = \Delta S_C + \Delta S_H$$

$$\Delta S_C = \int \frac{dQ_{C,rev}}{T}$$

$$= \int_{T_C}^{T} \frac{m_C c_C \, dT}{T} = m_C c_C \int_{T_C}^{T} \frac{dT}{T}$$

$$\Delta S_C = m_C c_C \ln T/T_C$$

$$= -6{,}26 \text{ kJ/K}$$

$$\Delta S_H = m_H c_H \ln T/T_H$$

$$\Delta S_H = +6{,}72 \text{ kJ/K}$$

$$\Delta S_U = \Delta S_C + \Delta S_H$$

$$= -6{,}26\ \frac{kJ}{K} + 6{,}72\ \frac{kJ}{K}.$$

$$\boxed{\Delta S_U = +0{,}46\ \frac{kJ}{K}}$$

Proc. irreversible

→ 2 dados 6^2 combinaciones posibles.

$n = x_1 + x_2$

n		
2	(1,1)	1/36
3	(1,2) (2,1)	2/36
4	(1,3) (2,2) (3,1)	3/36
5	(1,4) (2,3) (3,2) (4,1)	4/36
6	(1,5) (2,4) (3,3) (4,2) (5,1)	5/36
7	(1,6) (2,5) (3,4) (4,3) (5,2) (6,1)	6/36
8		
9		
10		
11		

11

12 $(6,6)$

Última modificación: 22:59