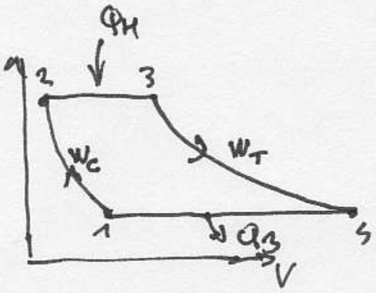
CC3

1 -



$\oint dU = \phi = W_C + Q_H + W_T + Q_B$

donc $W = W_C + W_T = -(Q_H + Q_B) = -(Q_{23} + Q_{41})$

or isobares $\rightsquigarrow Q = \Delta H \Rightarrow W = -mc_p(T_3 - T_2 + T_1 - T_4)$

donc $\dfrac{W}{m} = -(h_3 - h_2 + h_1 - h_4)$ et

soit $\eta = \dfrac{-W}{Q_H} = \dfrac{mc_p(T_3 - T_2 + T_1 - T_4)}{mc_p(T_3 - T_2)} = 1 + \dfrac{T_1 - T_4}{T_3 - T_2} = 1 + \dfrac{(20 - 400)}{(900 - 237)} = 42{,}7\%$

et $\dfrac{W_C}{W_T} = \dfrac{mc_v(T_2 - T_1)}{mc_v(T_4 - T_3)} = \dfrac{T_2 - T_1}{T_4 - T_3} = \dfrac{(237 - 20)}{(400 - 900)} = -43{,}4\%.$

car W_T perdu !

2. a- $\vec{\phi}$ $[W m^{-2}]$

c $[J.kg^{-1}K^{-1}]$

λ $[W.m^{-1}K^{-1}]$

$\overrightarrow{grad}\, T$ $[K.m^{-1}]$.

b- $\vec{\phi} = -\lambda \overrightarrow{grad}\, T$

loi de Fourier

c- $\nabla(\lambda \vec{\nabla} T) + p - \rho c \dfrac{\partial T}{\partial t} = \phi$

$\hookrightarrow \Delta T + \dfrac{p}{\lambda} - \dfrac{\rho c}{\lambda}\dfrac{\partial T}{\partial t} = 0$ avec $a = \dfrac{\lambda}{\rho c}$.

$\hookrightarrow \Delta T + \dfrac{p}{\lambda} = \phi$

3. a) $R_{conv} = \dfrac{1}{hS}$

h $[W m^{-2} K^{-1}]$

S $[m^2]$

R $[K.W^{-1}]$

b) $Nu = \dfrac{hD}{\lambda}$

$Re = \dfrac{\rho U_\infty D}{\mu}$

$Pr = \dfrac{\mu C}{\lambda}$

nombres adimensionnés

Donc

SANS DIMENSION !