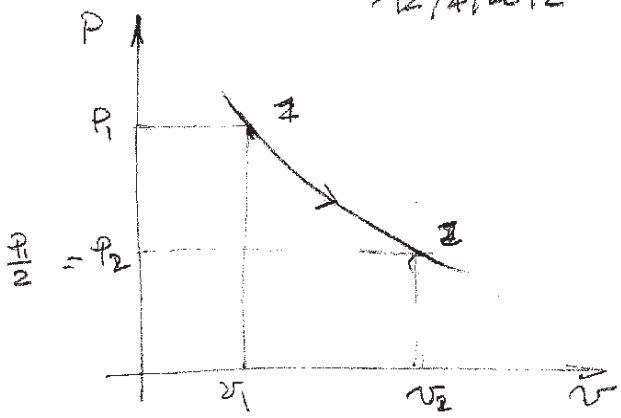
12/4/2012

$T_1 = 1,5 \cdot T_c$ (circa 133 K)

$P_1 = 10$ MPa $\quad P_2 = 5$ MPa



1) Gas ideale

$pv = RT$

$R = \frac{8,314}{0,79 \cdot 28 + 0,21 \cdot 32} = 0,288 \ \frac{kJ}{kg\,K}$

$v_1 = \frac{RT}{P_1} = \frac{0,288 \ \frac{kJ}{kg\,K} \cdot 1,5 \cdot 133 \ K}{10000 \ kPa} = 5,75 \times 10^{-3} \ m^3$

$v_2 = \frac{RT}{P_2} = \frac{RT}{P_1/2} = 2 v_1 = 11,5 \times 10^{-3} \ m^3$ $\quad v_2 = 2 v_1$

$\delta l = p \, dv \Rightarrow l = \int_1^2 \frac{RT}{v} dv = RT \ln \left(\frac{v_2}{v_1} \right)$

$= 39,86 \ \frac{kJ}{kg}$ (sull'aria ideale)

$\delta l = \delta q$

2) Gas reale

$P_{r1} = \frac{P_1}{P_c} = \frac{10 \ MPa}{3,77} = 2,65$

$T_{r1} = 1,5$

$\Rightarrow Z_1 = \frac{v_2^1}{v_{id}} \simeq 0,82$

$P_{r2} = \frac{P_2}{P_c} = \frac{P_1}{2} \cdot \frac{1}{P_c} = 1,33$ $\quad Z_2 = \frac{v_{id}^2}{v_{id}^2} = 0,88$

$l_{12} = RT \cdot \ln \frac{v_1^2}{v_1^1} = RT \cdot \ln \frac{Z_2 v_{id}^2}{Z_1 v_{id}^1} = RT \left[\ln \frac{v_{1id}^2}{v_{1id}^1} + \ln \frac{Z_2}{Z_1} \right]$

$= \bar{l}_{12} + RT \ln \frac{Z_2}{Z_1}$

$39,86 + 4,06$ $\quad +10\%$

$= 43,74 \ \frac{kJ}{kg}$