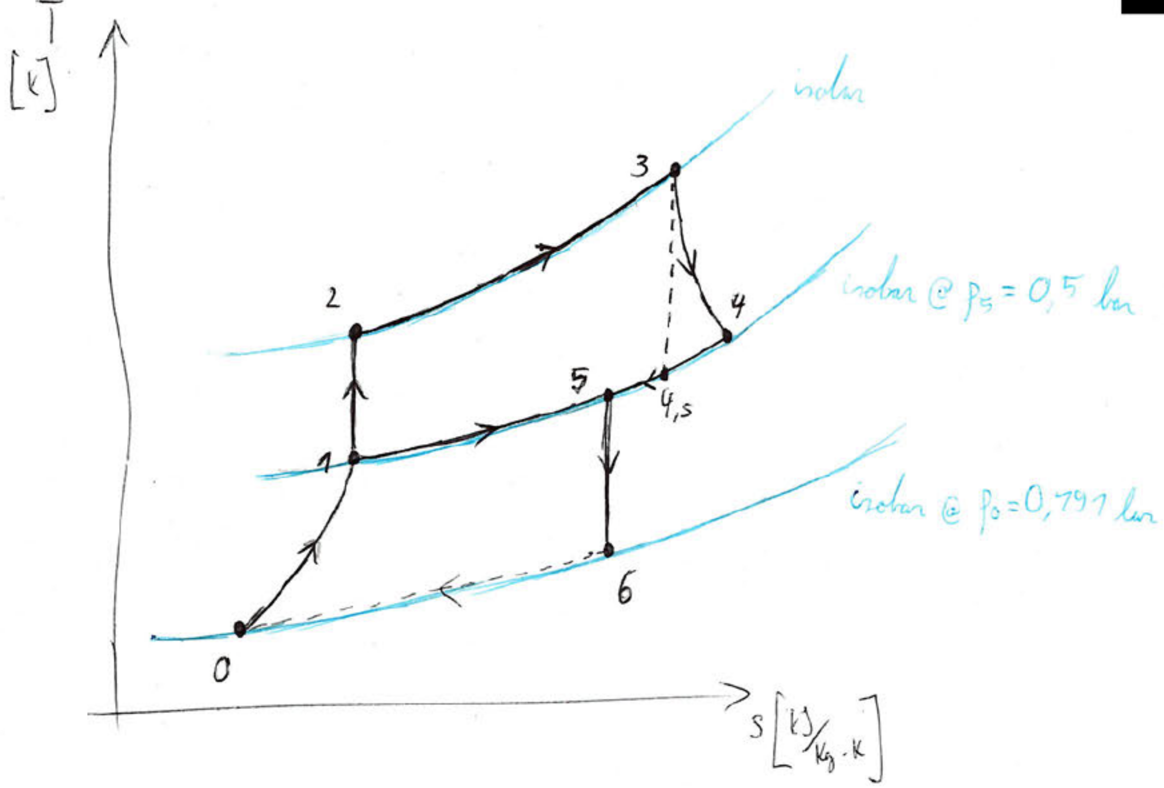
[redacted]

2.a)



b) $T_0 = -30°C = 243,15\ K$

~~Ich habe schon gemacht den Diagramm, aber~~

$$p_0 v_0 = RT_0 \Rightarrow v_0 = \frac{RT_0}{p_0}$$

$$R = c_p^{ig} - c_v^{ig} = c_p^{ig} - \frac{c_p^{ig}}{k} = 0,287429\ \frac{kJ}{kg \cdot K}$$

$v_0 = 3,65908\ m^3/kg$

$$\cancel{\frac{T_6}{T_0} = 1^{\frac{k-1}{k}} \Rightarrow T_6 = T_0 \cdot 1^{\frac{0,4}{1,4}}}$$

$$\cancel{\frac{T_0}{T_6} = \left(\frac{v_6}{v_0}\right)^{k-1}} \qquad \cancel{\frac{T_0}{T_6} = \left(\frac{\frac{RT_6}{p_6}}{v_0}\right)^{k-1}}$$

$$\cancel{p_6 v_6 = RT_6 \Rightarrow v_6 = \frac{RT_6}{p_6}} \qquad \cancel{T_0 = \left(\frac{R}{p_6 \cdot v_0}\right)^{k-1} \cdot T_6^{k-1} \cdot T_6 = \left(\frac{R}{p_6 \cdot v_0}\right)^{k-1} \cdot T_6^{k}}$$

2.b) $\cancel{T_6^{k} = T_0 \cdot \left(\frac{p_6 \cdot V_0}{R}\right)^{k-1}}$

$\cancel{T_6 = T_0^{1/k} \left(\frac{p_6 \cdot V_0}{R}\right)^{\frac{k-1}{k}}}$

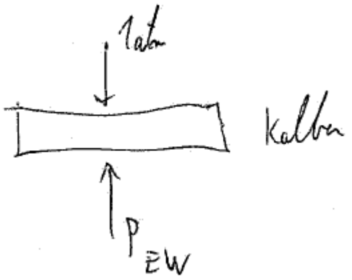
$$\frac{T_6}{T_5} = \left(\frac{p_6}{p_5}\right)^{\frac{k-1}{k}} \Rightarrow T_6 = T_5 \left(\frac{p_6}{p_5}\right)^{\frac{k-1}{k}} = 328{,}0747 \text{ K}$$

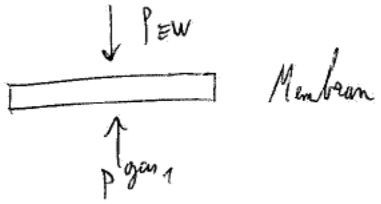
$$s_5 = s_6$$

$$0 = \dot m_{ges}\left[h_5 - h_6 + \frac{w_5^2 - w_6^2}{2}\right] - \dot W_{schubdüse}$$

[redacted]

3.a)





$1\,atm = p_{EW} = p_{gas,1} = 1{,}01325\ bar$

$$p_{g,1} V_{g,1} = m_{g,1} R T_{g,1}$$

$$R = \frac{\bar{R}}{M_g} = 0{,}16628 \ \frac{J}{g \cdot K} = 0{,}16628 \ \frac{kJ}{kg \cdot K}$$

$$m_{g,1} = \frac{p_{g,1} V_{g,1}}{R T_{g,1}} =$$

$$V_{g,1} = 3{,}14\,L = 3{,}14\,dm^3 = 3{,}14 \cdot 10^{-3}\,m^3$$

$$T_{g,1} = 500\,^\circ C = 773{,}15\,K$$

$$m_{g,1} = 2{,}4748 \left[\frac{(\cancel{N}/\cancel{m^2}) \cdot \cancel{m^3}}{\frac{\cancel{N}\cancel{m}}{g \cdot \cancel{K}} \cdot \cancel{K}} \right] g = 2{,}4748\ g$$

b) In Zweiphase gebiet (Fest-Flüssig) die T bleibt konstant wärend x_{Eis} geht von 1 zu 0. Gleich mit Druck.

$$3.c)\quad \Delta E = U_2 - U_1 = \overset{-W_{12}}{\overset{\vee}{Q_{12}}} = m_{g1}(u_2 - u_1) = m_{g1} \cdot c_v (T_{g2} - T_{g1}) = \cancel{2{,}4748\,g \cdot 0{,}633\,\frac{J}{g \cdot K}}$$

$$T_{g,2} = \cancel{0{,}0\ldots}$$
$$0{,}003\,°C = 273{,}153\ K$$

$$\Rightarrow Q_{12} = 2{,}4748\,g \cdot 0{,}633\,\frac{J}{gK}(273{,}153\,K - 773{,}15\,K) = -783{,}2695\ J$$

d)

[redacted]

1.a) $0 = \dot{m}_{ein} \left[h_{ein} - h_{aus} \right] + \dot{Q}_R - \dot{Q}_{aus}$

$$\dot{Q}_{aus} = \dot{m}_{ein} \left[h_{ein} - h_{aus} \right] + \dot{Q}_R$$

$$h_{ein} = h_{f} (@ 70°C \rightarrow A\text{-}2) = \cancel{} \overset{292,98}{} \ kJ/kg$$

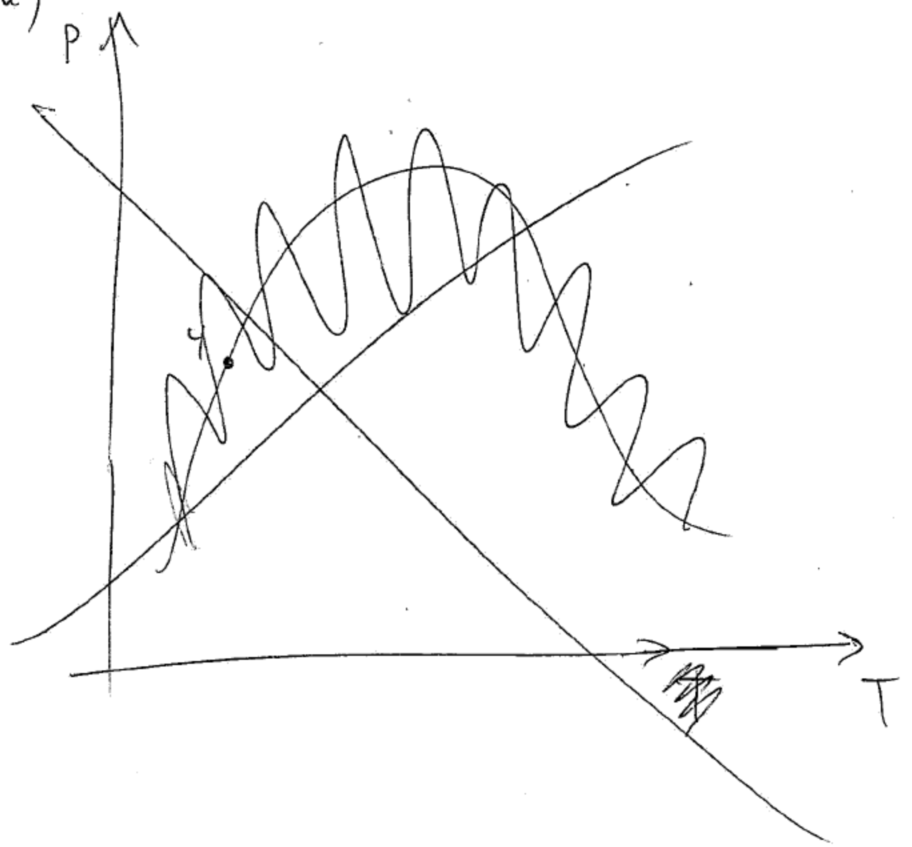
$$h_{aus} = h_{f} (@ 100°C \rightarrow A\text{-}2) = \cancel{} \overset{419,04}{} \ kJ/kg$$

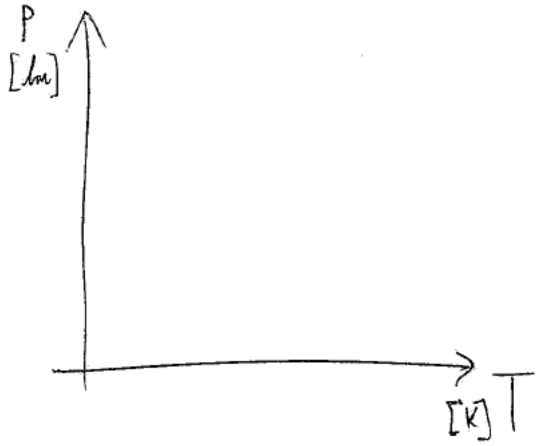
$$\Rightarrow \dot{Q}_{aus} = \cancel{} \ 62,182 \ kW$$

b) $$\bar{T} = \frac{\int_{ein}^{aus} T \, ds}{s_{aus} - s_{ein}} = \cancel{\ln\left(T_{aus}/T_{ein}\right)} = \frac{T_{aus} - T_{ein}}{\ln\left(T_{aus}/T_{ein}\right)} = 293,12157 \ K$$

[redacted]

4.a)





b) $T_1 < T_i$

$$0 = \dot{m}_{R134a}\left[h_2 - h_3\right] + \dot{W}_k$$

$$\dot{m}_{R134a} = \frac{-\dot{W}_k}{h_2 - h_3} = \frac{\dot{W}_k}{h_3 - h_2}$$

$S_3 = S_2$ (weil adiabat + reversibel)

d) $$\varepsilon_k = \frac{|\dot{Q}_{zu}|}{|\dot{W}_k|} = \frac{|\dot{Q}_k|}{|\dot{W}_k|}$$

$\cancel{\dot{Q}_k = \dot{m}}$

$$0 = \dot{m}_{R134a}\left(h_1 - h_2\right) + \dot{Q}_k \Rightarrow \dot{Q}_k = \dot{m}\left(h_2 - h_1\right)$$