

$$2. \quad V = 465 \text{ l} = 465 \text{ dm}^3 = 465 \cdot 10^{-3} \text{ m}^3$$

$$T_1 = 20,6^\circ \text{C} = 293,75 \text{ K}$$

$$\rho = 131 \text{ kg/m}^3$$

$$t = 19 \text{ min} = 1140 \text{ s}$$

$$P = 175 \text{ W}$$

$$\Delta S = ?$$

$$\Delta S = m c_p \ln \frac{T_2}{T_1}$$

$$\Delta S = 481,64 \text{ J/K}$$

$$Q = m c_p \Delta T = P \cdot t$$

$$m = \frac{\rho V}{RT} = 0,723$$

$$\Delta T = \frac{P t}{\frac{\rho V}{RT} \cdot c_p} = \frac{P t R T_1}{\rho V c_p} = 270,69$$

$$T_2 = 564,44 \text{ K}$$

$$3. \quad v = 29 \text{ l/h} = 29 \frac{\text{dm}^3}{\text{h}} \cdot 10^{-3} \frac{\text{m}^3}{\text{dm}^3} \cdot \frac{1}{3600} \frac{\text{h}}{\text{s}} = 8,1 \cdot 10^{-6} \text{ m}^3/\text{s}$$

$$\rho = 734 \text{ kg/m}^3$$

$$H = 36,1 \text{ MJ/kg}, \quad P = 47 \text{ kW}$$

$$\dot{m} = v \cdot \rho = 0,0059454 \text{ kg/s}$$

$$\eta = ?$$

$$\eta = \frac{P}{\dot{m} \cdot H} = \frac{47 \text{ kW}}{0,0059454 \frac{\text{kg}}{\text{s}} \cdot 36,1 \cdot 10^6 \frac{\text{J}}{\text{kg}}} = 21,96\%$$

$$6. \quad 2,5 = \frac{|Q_{\text{dov}}|}{W} \Rightarrow W = \frac{|Q_{\text{dov}}|}{2,5}$$

$$W = P \cdot t, \quad Q_{\text{dov}} = m \cdot C_v \cdot \Delta T$$

$$P = \frac{m C_v \Delta T}{2,5 t} = 1,94 \text{ kW}$$

$$7. \quad T_2 = 788 \text{ K}$$

$$T_4 = 302 \text{ K}$$

$$p_1 = 0,7 \text{ MPa}$$

$$p_4 = 0,13 \text{ MPa}$$

$$\dot{m} = 10 \text{ kg/s}$$

$$Q = ?$$

$$Q = \dot{m} c_p \Delta T = 2,81 \text{ MW}$$

$$T_1 = T_4 \left( \frac{p_1}{p_4} \right)^{\frac{\gamma-1}{\gamma}} = 487,96 \text{ K}$$

$$c_p = \frac{\gamma R}{\gamma - 1} = \frac{1,4 \cdot 287}{0,4}$$

$$c_p = 1004,5$$

$$8. \quad u = 1 - \left( \frac{r_v}{r_n} \right)^{\frac{1-x}{2}} = 0,339$$

10.  $h_2 = 3387$

$h_3 = 2638$

$h_4 = 3023$

$h_5 = 2171$

$h_6 = 191,8$

$h_1 = 194,8$

$y = ?$

$$y = \frac{(h_2 - h_3) + (h_4 - h_5) - |h_6 - h_1|}{(h_2 - h_1) + (h_4 - h_3)} = 0,455$$

$$11. \quad \eta = 0,35$$

$$h_2 = 336,8$$

$$h_1 = 195,4$$

$$p_1 = 4,8 \text{ MPa}$$

$$p_4 = 0,008 \text{ MPa}$$

$$\dot{m} = 125 \text{ kg/s}$$

$$P = ?$$

$$\eta = \frac{w_{23} - |w_{41}|}{q}$$

$$q = h_2 - h_1$$

$$w_{41} = h_4 - h_1 = v(p_4 - p_1)$$

$$P = \dot{m} \cdot w_{23} = \dot{m} [\eta(h_2 - h_1) + |v(p_4 - p_1)|] = 138,8 \text{ MW}$$

$$12. \quad \eta_t = 0,350$$

$$P_K = 1796 \text{ MW}$$

$$P_A = 638 \text{ MW}$$

$$p_4 = 15,6 \text{ MPa}$$

$$p_3 = 0,009 \text{ MPa}$$

$$v = 0001 \text{ m}^3/\text{kg}$$

$$\dot{m} = ?$$

$$\eta = \frac{w_A - |w_P|}{Q} = \frac{P_A - \dot{m} \cdot |w_P|}{P_K}$$

$$w_P = v(p_3 - p_4)$$

$$\dot{m} = \frac{P_A - \eta P_K}{|v(p_3 - p_4)|}$$

$$\dot{m} = 602,91 \text{ kg/s}$$



$$13. \quad h_2 = 3361$$

$$h_3 = 2145$$

$$h_4 = 190,6$$

$$h_1 = 195,9$$

$$\frac{\eta_t = 0,84}{\eta = ?}$$

$$\eta = \frac{w_t - w_f}{Q} = \frac{(h_2 - h_3)\eta_t - |h_4 - h_1|}{h_2 - h_1} = 0,321$$

$$15. \quad w_{\text{KOMPRESOR}} = (h_{12} - h_{11}) \cdot \frac{1}{\eta} = 2792,85 \text{ kJ/kg}$$

$$16. \quad w_{\text{turbine}} = (h_{\text{u102}} - h_{\text{i202}}) \cdot \eta = 1228,59 \text{ kJ/kg}$$