4.5

$\rho_T < \rho_{20}$

$V = 100\ m^3$

$V_1 = V_2$ (a Arkimedes princip)

$$F = mg = \rho_{20} V g - \rho_T V g = (\rho_{20} - \rho_T) V g$$

$$mg = (\rho_{20} - \rho_T) V g \Leftrightarrow \rho_T = \rho_{20} - \frac{m}{V}$$

$$\rho_T = \frac{p M}{R T_T} \Leftrightarrow T_T = \frac{p M}{R \rho_T} = \frac{p M}{R\left(\rho_{20} - \frac{m}{V}\right)}$$

$$\rho_{20} = \frac{p M}{R T_{20}} \qquad T_T = \frac{p M}{R\left(\frac{p M}{R T_{20}} - \frac{m}{V}\right)}$$

$$T_T = \frac{1{,}013 \cdot 10^5\ Pa \cdot 29 \cdot 10^{-3}\ kg/mol}{8{,}314\ J/(mol\,K) \cdot \left(\frac{1{,}013 \cdot 10^5\ Pa \cdot 29 \cdot 10^{-3}\ kg/mol}{8{,}314\ J/(mol\,K) \cdot 293\ K}\right) - \frac{25\ kg}{100\ m^3}} =$$

$= 369\ K - 273\ K = 96{,}6\ K \approx$ **97 °C**