Dichte / Molare Masse

① $\rho_{Hg} = 13'546\ kg/m^3$

$\rho = \frac{m}{V} \Rightarrow m = \rho \cdot V$

$m = \rho \cdot V = 13'546\ kg/m^3 \cdot 0.025\ m^3 \cong \underline{338.65\ kg}$

② $\rho_{Au} = 19'290\ kg/m^3$, $m = 1000\ kg$

$\rho = \frac{m}{V} \Rightarrow V = \frac{m}{\rho} = \frac{1000\ kg}{\frac{19290\ kg}{m^3}} \cong \underline{51.84\ Liter}$

③ $\rho_{Au} = 19'290\ kg/m^3$, $\rho_{Al} = 2'700\ kg/m^3$

$\rho_{Au} = \frac{m_{Au}}{V_{Au}}$; $\rho_{Al} = \frac{m_{Al}}{V_{Al}}$

$V_{Au} = V_{Al}$

$\frac{m_{Au}}{\rho_{Au}} = \frac{m_{Al}}{\rho_{Al}} \Rightarrow m_{Au} = m_{Al} \cdot \frac{\rho_{Au}}{\rho_{Al}}$

$= 1kg \cdot \frac{19290}{2700} = \underline{7.14\ kg}$

④ wie ③: $V_{Pb} = V_{Al}$ $\rho_{Pb} = 11'340\ kg/m^3$

$\frac{m_{Pb}}{\rho_{Pb}} = \frac{m_{Al}}{\rho_{Al}}$

$m_{Al} = \frac{\rho_{Al}}{\rho_{Pb}} \cdot m_{Pb} \cong \underline{11.905\ kg}$

(5) $\rho = \frac{m}{V} = \frac{\frac{F_G}{g}}{V}$ $\qquad F_G = mg$ (Gewichtskraft)

$= \frac{F_G}{g \cdot V} = \frac{187.96\,N}{9.81\,m/s^2 \cdot 0.001\,m^3} \cong \underline{\underline{19'160\ kg/m^3}}$

(18'796 kg/m³ für $g = 10\ m/s^2$)

(6) $\rho = \frac{m}{V}$; μ = Molare Masse in kg pro Mol

$\frac{m}{\mu}$ = Anzahl Mol

$\frac{m}{\mu} \cdot N_A$ = Anzahl Atome in Masse m

$\rho = \frac{m}{V} \Rightarrow m = \rho \cdot V$

$\Rightarrow \frac{\rho \cdot V \cdot N_A}{\mu}$ = Anzahl Atome im Volumen V

$\Rightarrow \boxed{\frac{\rho \cdot N_A}{\mu} = \begin{matrix}\text{Anzahl Atome} \\ \text{pro} \\ \text{Volumen } V\end{matrix} = n}$

(7) $n = \frac{\rho N_A}{\mu} \cong 8.476 \cdot 10^{28}\ /m^3$

(8) $\rho_{Fe} = 7'860\ kg/m^3$

Grösse eines Atoms: $n = \frac{\rho N_A}{\mu}$ = Atome pro Vol

$\Rightarrow \frac{1}{n} = \frac{\mu}{\rho N_A}$ = Volumen pro Atom

$\Rightarrow$ Kantenlänge $= \sqrt[3]{\frac{1}{n}} = \underline{\underline{\sqrt[3]{\frac{\mu}{\rho N_A}}}}$

1 Atom: Grösse $\approx 0.228\,nm$, 1000 Atome: $\underline{\underline{228\,nm}}$