Aufgabe 01.2

(a) Erdradius : $R_E = 6371\,Km = 6.371 \times 10^6\,m$

Äquator Länge : $s_E = 2\pi R_E = 2 \cdot 3.1415 \cdot 6.371 \times 10^6$

$= 40.028993 \times 10^6$

$\approx 4.0029 \times 10^7\,m$

$M_{Au} = 196,9665 \cdot 1.66054 \cdot 10^{-27}\,kg$

$= 327.07091 \times 10^{-27}$

$\approx 3.27 \times 10^{-25}\,kg.$

$V_{Au} = \frac{M_{Au}}{\varphi} = \frac{3.27 \times 10^{-25}\,kg}{1.932 \times 10^4\,kg/m^3} = 1.69254 \times 10^{-29}\,m^3$

$r_{Au} = \sqrt[3]{\frac{3V_{Au}}{4\pi}} = \sqrt[3]{4.0407 \times 10^{-30}} = 1.59277 \times 10^{-10}\,m$ $\quad (V = \frac{4}{3}\pi r^3)$

Zahl n =>

$n = \frac{s_E}{2 \cdot r_{Au}} = \frac{4.0029 \times 10^7\,m}{2 \times 1.59277 \times 10^{-10}\,m} = 1.25658 \times 10^{17}$

$\approx 1.26 \times 10^{17}$ (Atome)

Aufgabe 01.2

(b) $n = 1.28 \times 10^{17}$ Atom

$r_{Au} = 1.59 \times 10^{-10}\ m \rightarrow S_{Au} = \pi r_{Au}^2 = 7.94 \times 10^{-20}\ m^2$

$S_{bigA} = S_{Au} \cdot n \div 90.69\% = 1.103 \times 10^{-2}\ m^2$

$D_{bigA} = \sqrt{\frac{4 S_{bigA}}{\pi}} = \sqrt{\frac{4 \times 1.103 \times 10^{-2}}{3.14}} = 0.118\ m$

$(S = \pi R^2,\ D = 2R) \Rightarrow D = \sqrt{\frac{4S}{\pi}}$

(c) $n = 1.26 \times 10^{17}$ Atom

$V_{Au}^3 = 1.69 \times 10^{-29}\ m^3$

$V_{bigB}^3 = n \cdot V_{Au} \div 74.05\% = 2.8756 \times 10^{-12}\ m^3$ $(V = d^3)$

$d_{bigB} = \sqrt[3]{2.8756 \times 10^{-12}\ m^3} = 1.42 \times 10^{-4}\ m$