

19. If M_E is the mass of Earth, m is the average mass of an atom in Earth, and N is the number of atoms, then $M_E = Nm$ or $N = M_E/m$. We convert mass m to kilograms using Appendix D ($1 \text{ u} = 1.661 \times 10^{-27} \text{ kg}$). Thus,

$$N = \frac{M_E}{m} = \frac{5.98 \times 10^{24} \text{ kg}}{(40 \text{ u})(1.661 \times 10^{-27} \text{ kg/u})} = 9.0 \times 10^{49} .$$