Problem 19

Calculate the approximate number of atoms in a bacterium. Assume the average mass of an atom in the bacterium is 10 times the mass of a proton.

Solution

According to Figure 1.4 on page 10,

$$\text{mass of bacterium} = 10^{-15}\ \text{kg}$$

$$\text{mass of proton} = 10^{-27}\ \text{kg}.$$

Then the mass of an atom in the bacterium is $10 \times 10^{-27}\ \text{kg} = 10^{-26}\ \text{kg}$. Divide the bacterium mass by the atomic mass to get the number of atoms.

$$\#\ \text{of atoms in bacterium} = \frac{\text{Bacterium Mass}}{\text{Bacterium Atomic Mass}} \approx \frac{10^{-15}\ \text{kg}}{10^{-26}\ \text{kg}} = 10^{11}$$