

Problem 57

Assuming the human body is primarily made of water, estimate the number of molecules in it. (Note that water has a molecular mass of 18 g/mol and there are roughly 10^{24} atoms in a mole.)

Solution

The mass of a typical grown person can be rounded up to a hundred kilograms, and the molecular mass of water can be rounded down to 10 g/mol. Therefore, the number of water molecules in a person is roughly

$$100 \cancel{\text{kg}} \times \frac{1000 \text{ g}}{1 \cancel{\text{kg}}} \times \frac{1 \cancel{\text{mol}}}{10 \text{ g}} \times \frac{10^{24} \text{ molecules}}{1 \cancel{\text{mol}}} = 10^{28} \text{ molecules.}$$