Exercise 1.4

The density of gold is 19.3 g/cm^3. What is this value in kilograms per cubic meter?

Solution

Start with 19.3 g/cm^3 and arrange the appropriate conversion factors so that the desired units remain.

$$19.3\ \frac{\cancel{\text{g}}}{\cancel{\text{cm}^3}} \times \frac{1\ \text{kg}}{1000\ \cancel{\text{g}}} \times \left(\frac{100\ \cancel{\text{cm}}}{1\ \text{m}}\right)^3 = \frac{(19.3)(1)(100)^3\ \text{kg}}{1000\ \text{m}^3} = 1.93 \times 10^4\ \frac{\text{kg}}{\text{m}^3}$$

Note that each fraction has a value of 1, so squaring or cubing one doesn't change anything. It's done here in order to cancel cm^3.