Exercise 86

The mercury content of a stream was believed to be above the minimum considered safe—1 part per billion (ppb) by weight. An analysis indicated that the concentration was 0.68 parts per billion. What quantity of mercury in grams was present in 15.0 L of the water, the density of which is 0.998 g/ml? (1 ppb Hg = $\frac{1 \text{ ng Hg}}{1 \text{ g water}}$)

Solution

Start with the given volume of water and use conversion factors to obtain the mass of mercury.

$$15.0 \cancel{\text{L water}} \times \frac{1000 \cancel{\text{mL water}}}{1 \cancel{\text{L water}}} \times \frac{0.998 \cancel{\text{g water}}}{1 \cancel{\text{mL water}}} \times \frac{0.68 \cancel{\text{ng mercury}}}{1 \cancel{\text{g water}}} \times \frac{1 \text{ g mercury}}{10^9 \cancel{\text{ng mercury}}} \approx 1.0 \times 10^{-5} \text{ g mercury}$$