For a review of determining concentration of solutions, click the following link and select CoreChem: Solution Concentrations

**Example 1** Determine the safe molar concentration for mercury in drinking water, given that the MCL for mercury is 0.002 mg/L.

Remember that molarity, or molar concentration, can be expressed in a variety of ways, including moles per liter. Expressed in this way, and using the conversion 1 g = 1000 mg and the molar mass of mercury, allows us to solve this problem:

\[
(0.002 \text{ mg/L}) \times (1 \text{ g/1000 mg}) \times (1 \text{ mol Hg/200.59 g}) = 9.97 \times 10^{-9} \text{ mol/L}
\]

**Example 2** A water drinking source with a total volume of \(2.35 \times 10^8\) m\(^3\) is contaminated with 51.70 grams of mercury. Is this concentration more or less than the maximum contaminant level set by the EPA?

In example one above, the units for the final answer were expressed in moles per liter. Using the above information, grams can be converted into moles and cubic meters can be converted into liters:

\[
51.70 \text{ g Hg} \times (1 \text{ mol Hg/200.59 g Hg}) = 2.58 \times 10^{-1} \text{ mol Hg}
\]

Molarity = moles / liters = \(2.58 \times 10^{-1} \text{ mol Hg/2.35 x 10^{11}} \text{ L} = 1.10 \times 10^{-12} \text{ M}
\]

This concentration is an acceptable level for mercury because it is less than the maximum contaminant level of \(9.97 \times 10^{-9}\) mol/L set by the EPA.

**PRACTICE PROBLEMS**

1. 92.56 grams of mercury have contaminated a drinking water source with a volume of \(7.5 \times 10^5\) m\(^3\). Does this mercury concentration fall below the EPA's maximum contaminant level?

2. Suppose the EPA revises its maximum contaminant level goal to 0.0015 mg/L. What would this concentration be expressed in moles per liter?

**Solutions to Practice Problems**

1. \(7.5 \times 10^5\) m\(^3\) \times (1000 L/1 m^3) = \(7.5 \times 10^8\) L

\[
92.56 \text{ g Hg} \times (1 \text{ mol Hg/200.59 g Hg}) = 4.61 \times 10^{-1} \text{ mol Hg}
\]

Concentration = moles / liters = \(4.61 \times 10^{-1} \text{ mol Hg/7.5 x 10^8 L} = 6.15 \times 10^{-10} \text{ M}
\]

Yes, this concentration falls below the EPA's maximum contaminant level.

-9

http://water.epa.gov/drink/contamina...on/mercury.cfm

**Contributors**
• Ed Vitz (Kutztown University), John W. Moore (UW-Madison), Justin Shorb (Hope College), Xavier Prat-Resina (University of Minnesota Rochester), Tim Wendorff, and Adam Hahn.