Math Diversion Problem 670: Stoichiometry

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> Genius is one percent inspiration and
> ninety-nine percent perspiration.
> — Thomas Edison

The problem is found at:

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Source: Chemistry: The Molecular Nature of Matter and Change
Title: Grams-to-Liters
 Presenter:  M. S. Silberberg.
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1 Problem 3: Grams-to-liters

This third problem is taken from the textbook *Chemistry: The Molecular Nature of Matter and Change* ([5], p. 120).

Given 0.10 grams of $Mg(OH)_2$ (a base) reacts completely with how many liters of 0.10 M HCl? The chemical equation for the reaction is

$$Mg(OH)_2(s) + 2HCl(aq) \longrightarrow MgCl(aq) + 2H_2O(l)\,. \tag{1}$$

First, the diagram:

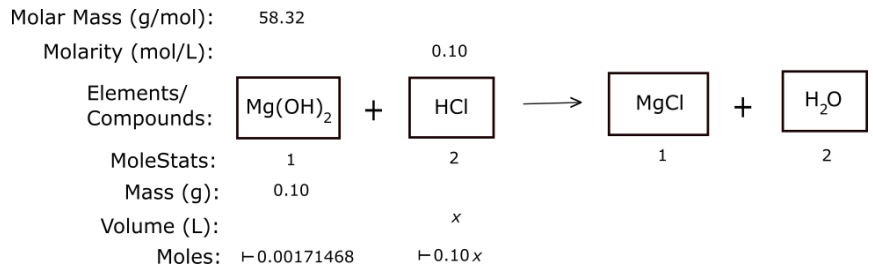

Figure 13. This graphic represents the neutralization of HCl acid with the base $Mg(OH)_2$. Note that x has unit of liters.

Next, we write down the mole proportion between columns 2 and 1:

$$\frac{2}{1} = \frac{\text{moles HCl}}{\text{moles Mg(OH)}_2} = \frac{0.10x}{0.00171468}\,. \tag{2}$$

On solving for x, we get

$$x = 3.4 \times 10^{-2}\,\text{L}\,. \tag{3}$$

References

[1] P. Atkins and L. Jones. *Chemical Principles: The Quest for Insight*, 3rd Ed. Freeman (2005).

[2] R. Blitzer. *Intermediate Algebra for College Students*, 3rd Ed. Prentice-Hall (2002).

[3] M. Hein and S. Arena *Foundations of College Chemistry*, alternate 12th ed, John Wiley & Sons (2007), 421–422.

[4] H. Rolf. *Finite Mathematics*, 5th Ed. Brooks/Cole (2002), p. 57.

[5] M. S. Silberberg. *Chemistry: The Molecular Nature of Matter and Change* 4th Ed. McGraw-Hill (2006).