Math Diversion Problem 710: Stoichiometry

P. Reany

July 9, 2025

I love it when a plan comes together.
— Hannibal Smith, *The A-Team*

1 Problem

(Problem 7: Volume-to-Moles)

This problem is taken from *Chemistry–Unit 5: Stoichiometry: Practice Problems*, found online at

`https://www.dsd.k12.wi.us/faculty/SBAXTER/Unit%205%20Practice%20Problems%20(answers).pdf`

6) How many liters of carbon monoxide at STP are needed to react with 4.80 g of O_2 to produce CO_2? The equation for the reaction is

$$2CO(g) + O_2(g) \rightarrow 2CO_2(g)\,. \tag{1}$$

2 Solution

To solve this problem, we need to know that every ideal gas at STP contains about 22.4 liters per mole of gas molecules. Of course, we will model our carbon monoxide gas as ideal for this problem. As usual, we present a graphic for assistance.

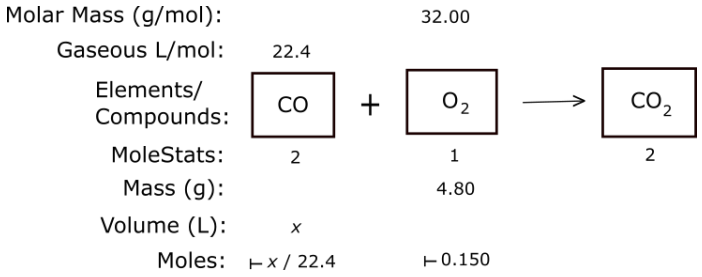

Figure 19. A sparse diagram. The CO is contained at STP.

Next, we write down our mole proportion from columns 1 and 2:

$$\frac{2}{1} = \frac{\text{moles CO}}{\text{moles O}_2} = \frac{x/22.4}{0.150}\,. \tag{2}$$

On solving for x, we get

$$x = 6.72\,\text{L}\,. \tag{3}$$

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).