

Math Diversion Problem 782

P. Reany

September 1, 2025

The Axiom of Choice is obviously true; the Well Ordering
Principle is obviously false; and who can tell
about Zorn's Lemma?
— Jerry Bona

Source: The Ether of Great Mathematical Ideas
Title: Mixing acids
Presenter: Patrick

1 Problem

A chemist needs to make as much 50% acid as he can starting with 5 liters of 70% acid and an unlimited amount of 40% acid (both acids of the same type and percentages are by volume). How much 40% acid should be added to the 70% acid?

2 Solution

Let's begin with a figure.

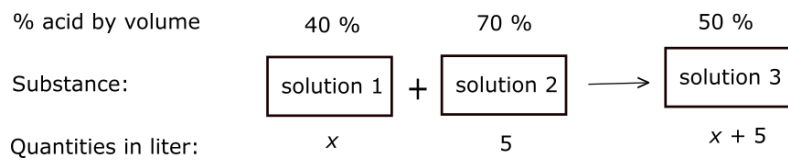


Figure 1. We've already indicated on the figure that the overall volume was conserved. Total acid by volume must be as well.

Next, total acid by volume is conserved:

$$.4(x) + .7(5) = .5(x + 5), \tag{1}$$

which has solution $x = 10$ liters.