Math Diversion Problem 907

P. Reany

November 16, 2025

Good detective always look for something unusual.
— Charlie Chan

```
Source:  The Ether of Great Mathematical Ideas
 Title:   Calcium in Calcium Phosphate
  Presenter: Patrick
```

1 Problem

How many grams of calcium are present in 890 grams of calcium phosphate?

2 Solution

Step 1. The formula for calcium phosphate is $Ca_3(PO_4)_2$.

Step 2. Once again, a diagram.

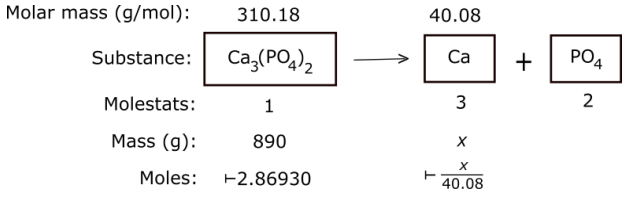

Figure 1. This figure does not represent a chemical reaction. It represents the calcium phosphate as a 'total equaling the sum of its logical parts', and that includes my treating PO_4 as a logical part.

Step 3. We can calculate x by using a mole proportion on columns 1 and 2:

$$\frac{3}{1} = \frac{x/40.08}{2.86930}\,. \tag{1}$$

Thus,

$$x = 345\,\mathrm{g}\,. \tag{2}$$

3 Appendix: How to interpret the Stoich diagrams

There are four main types of data in the stoich diagrams I make. The most common are data from given information, from the coefficients of the balanced equation, and from data tables, such as a periodic table of elements for molar mass information. This kind of data I do not mark up. The second kind of data in stoich diagrams comes from computations based on data in the same column, for which I use the turnstile ($\vdash$) to indicate. The third kind of data is a result in one column that required data from at least one other column to calculate it, and I indicate that kind of value or result by use of the underlining. The fourth kind of data in the figures is the result of combining given information to derive a secondary value. I indicate this kind of data with a right arrowhead ($\blacktriangleright$).