

# Math Diversion Problem 927

P. Reany

November 24, 2025

Source: Chemical Principles: Quest for Insight, 3rd Ed

Title: Problem 5. p. F54 Ex. G.2

Presenter: Atkins and Jones

## 1 Problem

Suppose we were asked to prepare 250 mL of a solution that was approximately 0.0380 M  $\text{CuSO}_4$  (aq) and we had available only Copper (II) sulfate pentahydrate  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . What mass of the solid do we need?

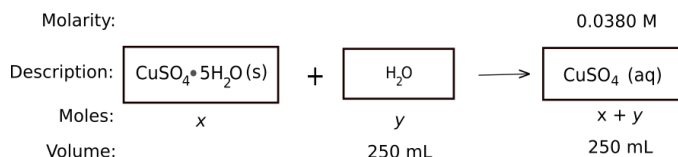


Figure 3. The moles line counts the moles of  $\text{CuSO}_4$  in each group. (In any closed chemical process, the number of moles of a given chemical element is fixed.) Of course, in this problem  $y = 0$ .

---

Calculate moles  $\text{CuSO}_4$ :

$$\begin{aligned}x &= (0.250\text{L})(0.0380\text{M}) \\ &= 9.5 \times 10^{-3}\text{moles}.\end{aligned}\tag{1}$$

Hence,  $9.5 \times 10^{-3}$  mol of  $\text{CuSO}_4$  corresponds to  $9.5 \times 10^{-3}$  mol of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . Therefore,

$$\begin{aligned}\text{Grams } \text{CuSO}_4 \cdot 5\text{H}_2\text{O} &= (9.5 \times 10^{-3}\text{mol})\left(249.7\frac{\text{g}}{\text{mol}}\right) \\ &= 2.37\text{g}.\end{aligned}\tag{2}$$

I'm not a lab technician, but I suppose the correct way to perform this process would be to put the dry chemical into a graduated beaker and then add pure water until the water level is at 250 mL, stirring as you go.