

4.10 The concentration of an element in an alloy, in atom percent, may be computed using Equation 4.5. However, it first becomes necessary to compute the number of moles of both Cu and Zn, using Equation 4.4. Thus, the number of moles of Cu is just

$$n_{m\text{Cu}} = \frac{m'_{\text{Cu}}}{A_{\text{Cu}}} = \frac{33 \text{ g}}{63.55 \text{ g/mol}} = 0.519 \text{ mol}$$

Likewise, for Zn

$$n_{m\text{Zn}} = \frac{47 \text{ g}}{65.39 \text{ g/mol}} = 0.719 \text{ mol}$$

Now, use of Equation 4.5 yields

$$\begin{aligned} C'_{\text{Cu}} &= \frac{n_{m\text{Cu}}}{n_{m\text{Cu}} + n_{m\text{Zn}}} \times 100 \\ &= \frac{0.519 \text{ mol}}{0.519 \text{ mol} + 0.719 \text{ mol}} \times 100 = 41.9 \text{ at\%} \end{aligned}$$

Also,

$$C'_{\text{Zn}} = \frac{0.719 \text{ mol}}{0.519 \text{ mol} + 0.719 \text{ mol}} \times 100 = 58.1 \text{ at\%}$$