CHAPTER OVERVIEW

8: Calibrating Data

A calibration curve is one of the most important tools in analytical chemistry as it allows us to determine the concentration of an analyte in a sample by measuring the signal it generates when placed in an instrument, such as a spectrophotometer. To determine the analyte's concentration we must know the relationship between the signal we measure , S, and the analyte's concentration, C_A, which we can write as

$$S = k_A C_A + S_{blank}$$

where k_A is the calibration curve's sensitivity and S_{blank} is the signal in the absence of analyte.

How do we find the best estimate for this relationship between the signal and the concentration of analyte? When a calibration curve is a straight-line, we represent it using the following mathematical model

$$y = \beta_0 + \beta_1 x$$

where *y* is the analyte's measured signal, *S*, and *x* is the analyte's known concentration, C_A, in a series of standard solutions. The constants β_0 and β_1 are, respectively, the calibration curve's expected *y*-intercept and its expected slope. Because of uncertainty in our measurements, the best we can do is to estimate values for β_0 and β_1, which we represent as b_0 and b_1. The goal of a linear regression analysis is to determine the best estimates for b_0 and b_1.