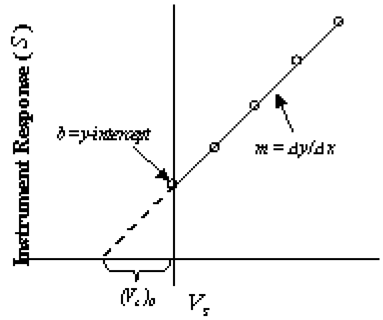
Standard Addition Method

ASI…MEASURING YOUR SUCCESS!

The standard additions method (often referred to as "spiking" the sample) is commonly used to determine the concentration of an analyte that is in a complex matrix such as biological fluids, soil samples, etc. The reason for using the standard additions method is that the matrix may contain other components that interfere with the analyte signal causing inaccuracy in the determined concentration. The idea is to add analyte to the sample ("spike" the sample) and monitor the change in instrument response. The change in instrument response between the sample and the spiked samples is assumed to be due only to change in analyte concentration.

The procedure for standard additions is to split the sample into several even aliquots in separate volumetric flasks of the same volume. The first flask is then diluted to volume with the selected diluent. A standard containing the analyte is then added in increasing volumes to the subsequent flasks and each flask is then diluted to volume with the selected diluent. The instrument response is then measured for all of the diluted solutions and the data is plotted with volume standard added in the x-axis and instrument response in the y-axis. Linear regression is performed and the slope (m) and y-intercept (b) of the calibration curve are used to calculate the concentration of analyte in the sample.



From the linear regression: S = mVS + b [Equation 1]

Where: S = instrument response (signal)
VS = volume of standard

Conceptually, if the curve started where the instrument response is zero, the volume of standard [(Vs)0] from that point to the point of the first solution on the curve (x = 0) contains the same amount of analyte as the sample. So:

Vxcx = |(VS)0|cS [Equation 2]

Where: Vx = volume of the sample aliquot
cx = concentration of the sample
cs = concentration of the standard

Combining Equation 1 and Equation 2 and solving for cx results in:

$$c_x = \frac{bc_s}{mV_x}$$

And one can then calculate the concentration of analyte in the sample from the slope and intercept of the standard addition calibration curve.