Example: Calibration Curve Methods Development

$stock := 850.0$ concentration, in ppm, of stock solution of copper

First we need to decide what volumes of calibration standards are necessary - ie, what volumetrics we will be using to make the standards. For flame AA, 50 mL standards should be enough.

Next we need to calculate what volume of stock would be needed to create 50 mL of 5 and 50 ppm standards.

$$50 \cdot mL \cdot \frac{5}{850} = 0.2941 \cdot mL \qquad 50 \cdot mL \cdot \frac{50}{850} = 2.9412 \cdot mL$$

Thus, to create 5 and 50 ppm standards, we need to add 0.294 and 2.941 mL of stock solution, respectively, to 50 mL volumetrics and dilute to the mark. These volumes are not very convenient; instead, let's round up to 0.3 and 3.0 mL volumes to create these two standards.

Now we also need to decide how many standards to create. Presumably the calibration curve is linear within this range; thus, 4-5 standards should be sufficient. Let's pick three more volumes between our two extreme volumes.

$vol := (0.3 \quad 1.0 \quad 1.5 \quad 2.0 \quad 3.0)^T$ volume of stock to be diluted for our five standards

$conc := stock \cdot \frac{vol}{50}$ $conc^T = [5.1 \quad 17.0 \quad 25.5 \quad 34.0 \quad 51.0]$ concentration of the five standards

Thus, diluting 0.3, 1.0, 1.5, 2.0 and 3.0 mL of the stock solution to the mark in 50 mL volumetrics will create calibration standards with concentrations of 5.1, 17.0, 25.5, 34.0 and 51.0 ppm. The last standard is slightly greater than the 50 ppm originally specified as the upper limit of our linear dynamic range. If that is a problem, the volume for that standard can be reduced slightly (to, say, 2.9 mL).