SAMPLING OVERVIEW

CHEM 251 SDSU

SAMPLING

- Though the central focus of most analyses is upon the procedure of the analysis, the sampling is a crucial factor in the overall process.

- Taking the right sample, not losing or altering the analyte, are all important in order to get a proper measurement of the **target population**.

- As sampling can introduce some error into the measurements, we can associate a variance to the sampling process.

SAMPLING VARIANCE

$$\mu = \bar{X} \pm \frac{ts}{\sqrt{n}}$$

- When comparing the sample mean to the population mean we account for all sources of variance (s^2) in the analysis.

$$\mu = \bar{X} \pm \frac{ts}{\sqrt{n}}$$

- The standard deviation (s) in this equation can be simplified as being from two sources, the analytical method, and the sampling.

$$s^2_{samp}$$

$$s^2_{meth}$$

$$s^2 = s^2_{samp} + s^2_{meth}$$

$$s^2_{samp}$$

$$s^2_{meth}$$

IMPACT OF SAMPLING

An analysis has a sampling standard deviation of 3.4 ppm and a method standard deviation of 2.1 ppm. Which of the scenarios below would result in a lower overall standard deviation for the method?

A - Reducing the method standard deviation by 20%
B - Reducing both standard deviations by 8% each

CONTRIBUTIONS

- Since the measured result contains both sampling and method variances it can be difficult to isolate the contributions of each source.

- Using standard reference materials (standards with very low sampling error) or replicate analyses of homogeneous samples (e.g. aqueous solutions) can make the sampling variance negligible.

- In such cases, the dominant variance will be from the method. Knowing the contribution of one variance to the total can allow you to determine the other.

SAMPLING PLAN

For proper quantitative analysis the sample must accurately represent the target population, thus several factors must be considered when sampling:

1. From where within the target population should we collect samples?
2. What type of samples should we collect?
3. What is the minimum amount of sample for each analysis?
4. How many samples should we analyze?
5. How can we minimize the overall variance for the analysis?