TRAINING PROGRAM

Advanced Statistical Analysis Of Laboratory Data Method Development, Method Validation, Uncertainty, Calibration, SQC And Data Interpretation

Introduction:

Quantitative chemical measurement has a degree of uncertainty linked to its results which is determined by the performance characteristics of the analytical method used. Measurement uncertainty has often been evaluated on the basis of repeatability and reproducibility of data, but the measurement uncertainty, as expressed in the "Guide to the Expression of Uncertainty in Measurement" published by ISO in 1993, goes further and gives general rules for the evaluation of measurement uncertainty based on both statistical (Type A) and non-statistical (Type B) uncertainties. The course covers the bulk of the methods and techniques documented in the ISO guide and give a general principle to the calculation of measurement uncertainty in quantitative chemical analyses.

Who Should Attend?

The course is designed for chemists, lab technicians, chemical engineers, instrument engineers and lab supervisors/managers.

Methodology:

This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include;

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions

Certificate:

BTS attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration

Course Objectives:

Upon the successful completion of this course, the participants will have an understanding of:

- Concepts involved in the calculation of measurement uncertainty.
- Calculating measurement uncertainty in a practical and pragmatic manner.
- Defining measurement processes.
- Identifying sources of measurement error.
- Selecting appropriate error distributions.
- Using different methods to evaluate measurement uncertainty.
- Measurement uncertainty by practice methods.

Course Outline:

- Instrument analysis data
- Peak evaluation
- Interpolated graph calibration using external/ internal standards
- Standard addition method extrapolated graph
- Errors in quantitative analysis
- Random and systematic errors in titration analysis
- Standard deviation of repeated measurements
- Distribution of errors
- Confidence limit of the mean of replicate measurements
- Measurement uncertainty
- Errors in instrumental analysis regression and correlation
- Use of regression lines for comparing analytical methods
- Confidence limit for X-value
- Outliers in regression
- Limit of detection
- Significance tests for evaluation of experimental results
- (T-test) comparison of a mean with a known value
- (T-test) comparison of the means of two samples with S1»S2
- (T-test) comparison of the means of two samples with S1 ¹ S2
- Paired T-test and One-tailed and Two-tailed tests
- (F-test) for the comparison of standard deviations
- Anova-test analysis of several means and variances
- Testing for normality of distribution
- Outliers test
- Non-parametric or distribution-free methods
- Box and whisker plots
- Comparison of a median with a known value (the sign test)
- Confidence interval for non-parametric methods
- Comparison of the medians of two methods (the sign test)
- Comparison median of two un-depended samples (Wilcoxon Rank-Sum est)
- Comparison spread of two sets of non-parametric results (Siegel-Tukey test)
- Rank Correlation for not quantified results (spearman method)

- Non-parametric method on more than two samples (Friedman´s test)
- Non-parametric regression methods (Theil´s test) quality control harts
- Quality control charts
- Shewhart and Cusum Chart
- Experimental design and optimization methods
- Factorial designs
- Estimation of factors interaction by two-way Anova test
- Optimization method and Three factors design