



AL039: Quality Assurance of Chemical Measurements

Training Description:

This course is designed to provide participants with a detailed and up-to-date overview of quality assurance of chemical measurement. It covers the good knowledge and experience on how to apply concepts of quality assurance of chemical measurement in a manner that follows international best practice and determine the kind of tools appropriate for the task; the internationally accepted terminology that include quality, metrology, ISO and VIM; and the formal definitions for 100 of the most important terms in quality management and chemical metrology.

During this interactive course, participants will learn the statistics and its components including population distributions, measures of central tendency, dispersion, outliers, sampling theory and randomes; the calibration and its process, reference standards, calibration blank, functions, misuse of R-standard and linearity; the evaluation of linearity and calibration of uncertainties; the method validation covering fitness for purpose, establishing requirements and standard methods; the control charts and the various types of charts and trends; the measurement uncertainty (MU); and the sampling and variability.

Training Objective:

By the end of the training, participants will be able to:

- ✓ Apply and gain an in-depth knowledge on quality assurance of chemical measurements
- ✓ Acquire good knowledge and experience on how to apply concepts of quality assurance of chemical measurement in a manner that follows international best practice and determine the kind of tools appropriate for the task
- ✓ Discuss internationally accepted terminology that includes quality, metrology, ISO, VIM, as well as the formal definitions for 100 of the most important terms in quality management and chemical metrology, etc
- ✓ Define statistics and its components including population distributions, measures of central tendency, dispersion, outliers, sampling theory, randomes, etc
- ✓ Explain calibration including its process, reference standards, calibration blank, functions, misuse of R-standard, linearity and evaluating linearity and calibration uncertainties
- ✓ Determine method validation that include fitness for purpose, establishing requirements, standard methods, etc
- ✓ Develop and employ control charts as well as identify the various types of charts and trends
- ✓ Determine and employ measurement uncertainty (MU) as well as sampling and variability

Training Designed for:

This course is intended for all laboratory technicians and staff.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction to Laboratory Quality Assurance
- ❖ Terminology 1 - Internationally Accepted Terminology
 - Quality
 - Metrology



- ISO
- VIM
- Formal Definitions for 100 of the Most Important Terms Used in Quality Management and Chemical Metrology
- Examples of Proper Usage Suited to the Participant's Working Environment

❖ **Terminology 2 - Continuation of Terminology 1**

DAY TWO:

❖ **Statistics 1**

- Population Distributions
- Measures of Central Tendency
- Measures of Dispersion
- Outliers

❖ **Statistics 2**

- Sampling Theory
- Randomness
- Statistical Estimation Theory
- Confidence Intervals
- Inference and Inference Errors

❖ **Statistics 3**

- One and Two Tailed Tests
- Comparing Two Data Sets
- Small Sampling Theory
- Student T-Test
- F Test
- Chi-Squared Test
- ANOVA

DAY THREE:

❖ **Calibration**

- The Calibration Process
- Reference Standards
- Calibration Blank
- Calibration Functions
- Misuse of R-Squared (Correlation Coefficient)
- Linearity and Evaluating Linearity
- Calibration Uncertainties

❖ **Method Validation 1**

- What is Validation?
- Fitness for Purpose
- Establishing Requirements
- Standard Methods
- Modified Standard Methods
- User Developed Methods
- Figures of Merit: Detection Limit, Trueness, Uncertainty, Robustness

❖ **Method Validation 2**

- Documentation
- Evaluating Detection and Quantitation Limits
- Selectivity and Specificity
- Interferences and Matrix Effects
- Bias

DAY FOUR:

❖ **Control Charts 1**

- Testing Laboratories and Statistical Process Control (SPC)
- Multiple Processes in the Analytical Test
- Process Map for Testing Laboratories
- Monitoring Central Tendency
- Monitoring Precision

❖ **Control Charts 2**

- Shewhart Charts, Range and Range Ratio Charts, Cu-Sum Charts
- The J Chart
- Establishing Warning and Control Limits
- Monitoring Trends
- Trend Warning and Control Limits
- Accommodating Outliers
- Control Charts and ISO 17025

❖ **Measurement Uncertainty 1**

- What is Measurement Uncertainty (MU)?
- MU and Testing Laboratories
- ISO 17025 MU Requirements
- Propagation of Uncertainty
- MU and Regulatory Compliance

❖ **Practical Sessions**

- This hands-on, highly-interactive course includes real-life case studies and exercises

DAY FIVE:

❖ **Measurement Uncertainty 2**

- Practicum on Estimating MU

❖ **Sampling and Variability**

- Uncertainty Arising from Sampling Operations
- Field Sampling
- Sampling Operations in the Testing Laboratory
- Gy's Seven Sampling Errors

❖ **Summary and Review**

- ❖ Course Conclusion
- ❖ POST-TEST and EVALUATION

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant’s manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department