MTBM

MEASUREMENT UNCERTAINTY FOR CHEMICAL ANALYSIS TRAINING

MTBM Group Sdn. Bhd. (1600656-M)

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Course Title: Measurement Uncertainty for Chemical Analysis Training

Course Validity: 2 Days

Validity: Not Applicable

HRD Corp Scheme: Claimable

INTRODUCTION

This training provides participants with practical and systematic knowledge on estimating Measurement Uncertainty (MU) specifically tailored for chemical testing laboratories. The course follows ISO/IEC 17025:2017, EURACHEM/CITAC Guides, and the GUM (Guide to the Expression of Uncertainty in Measurement). Participants will learn how to identify major uncertainty sources in chemical analysis such as sampling, sample preparation, weighing, volumetric measurements, standards preparation, instrument calibration, and reproducibility. The program includes hands-on calculation workshops using real chemical testing data, ensuring participants can confidently generate MU budgets for their methods..

OBJECTIVE(S):

- Understand MU concepts for chemical analysis based on ISO/IEC 17025 & EURACHEM guidelines.
- Identify uncertainty contributors in chemical testing workflows.
- Perform Type A and Type B evaluations for chemical analysis.
- Calculate standard, combined, and expanded uncertainty using real laboratory data.
- Develop uncertainty budgets for different chemical testing methods (e.g., AAS, ICP-OES, HPLC, UV-Vis, titration).
- Apply MU in conformity decisions and reporting test results.

TARGET GROUP(S):

- Chemical Analysts & Laboratory Technicians
- QA/QC Personnel
- Laboratory Managers & Supervisors
- Internal Auditors & Technical Assessors
- Anyone involved in method validation or chemical testing data analysis

ENTRY REQUIREMENT(S):

- Able to read, write, and communicate in Malay/English
- Basic understanding of chemical testing or laboratory operations

TOPIC(S):

1. Fundamentals of Measurement Uncertainty
2. ISO/IEC 17025:2017 Requirements for MU
3. EURACHEM Guide: Quantifying Uncertainty in Analytical Measurement
4. Identifying MU Sources in Chemical Analysis
5. Type A & Type B Evaluations
6. Standard, Combined & Expanded Uncertainty
7. Sensitivity Coefficients & Mathematical Models in Chemistry
8. MU in Calibration Curves & Instrument Response
9. MU for Titration, AAS/ICP, HPLC/GC, UV-Vis & Gravimetry
10. Developing Uncertainty Budgets for Chemical Methods
11. Decision Rules & Reporting with MU
12. Full MU Calculation Workshop

LIST OF REFERENCE BOOK(S):

- ISO/IEC 17025:2017 Standard
- EURACHEM/CITAC Guide (2012/2019)
- JCGM 100:2008 (GUM)

LIST OF TEACHING AID(S):

- LCD projector
- Computer
- Whiteboard with accessories

METHODOLOGY(S):

- Lecture
- Group discussions
- Case studies
- MU calculation workshops with chemical data

TRAINING SCHEDULE

Day 1

Time	Activity / Topic
8:30 am – 9:00 am	Registration and Introduction
9:00 am – 9:45 am	Topic 1: Fundamentals of Measurement Uncertainty
9:45 am – 10:30 am	Topic 2: ISO/IEC 17025 Requirements (MU)
10:30 am – 10:45 am	**Morning Tea Break**
10:45 am – 11:30 am	Topic 3: EURACHEM Guidance for Chemical Analysis
11:30 am – 12:30 pm	Topic 4: Identifying Uncertainty Sources in Chemical Testing
12:30 pm – 1:30 pm	**Lunch Break**
1:30 pm – 2:30 pm	Topic 5: Type A & Type B Evaluations (Chemical Context)
2:30 pm – 3:30 pm	Topic 6: Standard Uncertainty & Probability Distributions
3:30 pm – 3:45 pm	**Afternoon Tea Break**
3:45 pm – 5:00 pm	Exercise 1: MU Components in Chemical Workflow (Weighing, Pipetting, Standards)

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TRAINING SCHEDULE

Day 2

Time	Activity / Topic
8:30 am – 9:00 am	Recap of Day 1
9:00 am – 9:45 am	Topic 7: Sensitivity Coefficients & Mathematical Models in Chemistry
9:45 am – 10:30 am	Topic 8: Combined & Expanded Uncertainty
10:30 am – 10:45 am	**Morning Tea Break**
10:45 am – 11:30 am	Topic 9: MU in Calibration Curves (Regression, Linearity, Instrument Response)
11:30 am – 12:30 pm	Topic 10: MU for Common Chemical Methods (AAS, ICP, HPLC, UV-Vis, Titration)
12:30 pm – 1:30 pm	**Lunch Break**
1:30 pm – 2:30 pm	Topic 11: Developing the Uncertainty Budget (Chemical Method Templates)
2:30 pm – 3:30 pm	Topic 12: Decision Rules & Reporting with MU
3:30 pm – 3:45 pm	**Afternoon Tea Break**
3:45 pm – 5:00 pm	Exercise 2: Full MU Calculation Workshop Using Real Chemical Data