

**Training Title**

**PRACTICAL PROBLEMS SOLVING IN CHEMICAL ANALYSIS**

**Training Duration**

5 days

**Training Venue and Dates**

REF LM038	Practical Problems Solving in Chemical Analysis	5	3 – 7 November, 2019	\$4,250	Dubai, UAE
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In any of the 5 star hotel. Exact venue will be informed soon.

**Training Fees**

- 4,250US\$ per participant for Public Training including Course Materials/Handouts, Tea/Coffee, Refreshments & International Buffet Lunch.

**Training Certificate**

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

**TRAINING DESCRIPTION**

The efficient use of chemical analysis and instrument technique are very imperative tools to solve any laboratory problem. The course provides laboratory analysis methods and troubleshooting techniques of most used instruments in any laboratory. In addition, it provides elegant tools for obtaining qualitative and quantitative data techniques with practice work on analysis Software. The aim of this course is to enrich and update the knowledge and skills of the participants for understanding the problem of chemical analysis and implementing analysis troubleshooting.

**TRAINING OBJECTIVES**

**The Course will enable Participants to:**

- To impart the participants technique of solving problem in the laboratory.
- To understand and apply practically the instruments troubleshooting.
- To know the difficult task of judging the accuracy and precision of experimental data and how these judgments can be sharpened by the application of statistical methods.
- To understand the tools and techniques for achieving process analysis, qualitative methods, cause and effect diagrams and calibration graph.
- Explain the on-bottom stability by describing the design of weight coatings and identifying the impact of climate change on pipeline stability and the additional provisions on bottom stability

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- Determine the various subsea pipeline failures and the different methods of repair of damaged subsea pipelines and explain the concept of cathodic protection including the design codes, methods of CP surveying, analysis of data & coating condition
- Describe internal corrosion comprising its morphology, inspection, monitoring and evaluation, identify the various types of pigging and explain their features, functions and limitations
- Implement the statistical methods used in corrosion data evaluation and the various procedures used in the prevention of corrosion
- Carryout methods of cathodic protection retrofitting and demonstrate the calculation method to evaluate protection limits

### PRACTICAL SESSION

The course includes practical session for problem solving where main parts of chromatography and spectroscopy instruments are demonstrated. In addition, the course includes also practical exercise for qualitative and quantitative methods using software, Minitab 15, and Excel program.

### OTHER INFORMATION

- Course document and presentation power point material is about 400 pages.
- Practical training for each participant will be arranged during the course.
- Examination will be conducted post and in end of the course.
- Video films of troubleshooting method for different components are available in the course.
- USB with course document, power point presentation, video films, articles and exercises will be offered to the participants

### TRAINING METHODOLOGY

A highly interactive combination of lecture and discussion sessions will be managed to maximize the amount and quality of information, knowledge and experience transfer. The sessions will start by raising the most relevant questions, and motivate everybody finding the right answers. The attendants will also be encouraged to raise more of their own questions and to share developing the right answers using their own analysis and experience.

All attendees receive a course manual as a reference.

This interactive training workshop includes the following training methodologies

30% Lectures

30% Workshops and work presentation

20% Group Work & Practical Exercises

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## 20% Videos & General Discussions

### WHO SHOULD ATTEND

The course is planned for chemist, lab technicians, chemical engineers, instrumental engineers and lab supervisors/managers.

### DAILY OUTLINE

Following Topics will be covered in details.

1. Chemistry Fundamental
2. Introduction to Chemical Analysis Technique
3. Basic Laboratory Technique: Sample Preparation, Analytical Measurement, Fundamental Concepts, Chemical Equation, Acidity of Solution, Buffers, Gravimetric Methods of Analysis
4. Preparation of Chemicals and Problem Solving
5. Titration Methods and Methods Problem
6. Potential Selectivity of Electrolytic Methods
7. Sample Contamination
8. Analyte Extraction by Manipulation Methods
9. Introduction to Analysis Instruments
10. Gas Chromatography Technique: Inject System, Column, Detector types
11. High Performance Liquid Chromatography: Mobile Phase, Pumping System, Sample Inject system, Column, Detector Types
12. Spectroscopy Technique: Infrared Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Mass Spectrometry, Atomic Spectroscopy
13. Organic Molecules Identifying and Spectrum Problem
14. Instrument Problems and Troubleshooting: Band Broadening, Broaden in Initial Peak Bandwidths, Retention Gap Sampling, Sampling By Solute Focusing, Retention Gaps Tube, Baseline Deviation, Noisy Baseline, Spikes in Baseline, Peak Shape Problems, Flat Top Peaks, Split Peaks, Negative Peaks, Retention Changes, Ghost Peak, Causes and Prevention of Column Damage, Column Contamination, Needle Discrimination, Change in Detectors Sensitivity, Difficulty in Lighting FID Flame, Loss of Detectors Linear Range, Leaks in MS, Excessive Noise or High Background in MS Chromatography Variables Effect, Band Broadening Effect, Techniques For Minimize Peak Broadening, Efficiency of Packed Columns with Gaseous Mobile Phases, Efficiency of Packed Columns with Liquid Mobile Phases, Efficiency of Open Tubular Columns with Gaseous Mobile Phases, /Column Selection, Column Condition and Regeneration Technique, GC Sample Introduction, Split Inlet System in GC, Splitless Inlet in GC, Cool On-Column Inlets, Effect of Mobile-Phase Flow Rate, Effect of Solvent Strength on Capacity Factors, Effect of Mobile Phase on Selectivity, Selectivity in Detector.

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15. Maintenance and Installation Methods: Clean and Condition Septa, Cleaning Injector Liners, Silylating Liners, Column Conditioning, Installation Fused Silica Capillary Columns, Column Placement in the oven, Column Installation, Leak Detection, Bleed Test, Fid Jet Cleaning Procedure, TCD Clean Detector Cell , Cleaning Of ECD, FPD Maintenance, Cleaning MS and Change The Filament
16. Error in Quantitative Analysis
17. Calibration Methods
18. External and Internal Standards
19. Outliers Test
20. Determination of Analyte Concentration
21. Standard Addition Method
22. Confidence Limits
23. Detection limit
24. Repeatability and Reproducibility.
25. Quality Control and Validation Method: Specificity, Linearity, Selectivity, Accuracy, Precision, Bias, Linearity, Range, Limit of Detection, Limit Of Quantification, Robustness, Ruggedness, Stability

**NOTE:**

**Pre & Post Tests will be conducted**

**Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.**

**TRAINING OUTCOME**

- To impart the participants technique of solving problem in the laboratory.
- To understand and apply practically the instruments troubleshooting.
- To know the difficult task of judging the accuracy and precision of experimental data and how these judgments can be sharpened by the application of statistical methods.
- To understand the tools and techniques for achieving process analysis, qualitative methods, cause and effect diagrams and calibration graph.

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