

COURSE OVERVIEW LE0216 Process Chemicals Testing Methods

Course Title

Process Chemicals Testing Methods

Course Date/Venue

Session 1: April 14-18, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: August 17-21, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

LE0216

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description





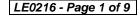




This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Process Chemicals Testing Methods. It covers the importance of process chemicals and its role in oil and gas production, refining and transportation; the chemical performance and quality control; the regulatory compliance and environmental considerations; the basic principles and international standards for chemical testing; the laboratory safety, testing equipment and instruments and demulsifier testing methods; and the corrosion inhibitor testing, scale inhibitor performance testing, biocide testing and effectiveness measurement.

During this interactive course, participants will learn the anti-foaming and foam-control agent testing, drag reducing agent (DRA) testing, refining catalysts testing and hydrogen sulfide (H₂S) scavenger testing; the antioxidant and fuel stabilizer testing, anti-fouling and sludge dispersant testing and oxygen scavenger testing; the spectroscopy techniques for chemical characterization, chromatography techniques chemical analysis and gravimetric and titration methods for chemical quantification; the rheological testing, compatibility testing and troubleshooting chemical performance issues; and the real-time of chemical performance, predictive monitoring analytics for chemical dosage optimization and Aldriven automation in laboratory testing.





















Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a good working knowledge on process chemicals testing methods
- Discuss the importance of process chemicals and its role in oil and gas production, refining and transportation
- Ensure chemical performance and quality control and discuss regulatory compliance and environmental considerations
- Explain the basic principles of chemical analysis and testing as well as the international standards for chemical testing
- Apply laboratory safety in chemical testing, testing equipment and instruments and demulsifier testing methods
- Carryout corrosion inhibitor testing, scale inhibitor performance testing, biocide testing and effectiveness measurement
- Employ anti-foaming and foam-control agent testing, drag reducing agent (DRA) testing, refining catalysts testing and hydrogen sulfide (H₂S) scavenger testing
- Illustrate antioxidant and fuel stabilizer testing, anti-fouling and sludge dispersant testing and oxygen scavenger testing for water systems
- Apply spectroscopy techniques for chemical characterization, chromatography techniques for chemical analysis and gravimetric and titration methods for chemical quantification
- Employ rheological testing for process chemicals, compatibility testing of chemicals with production fluids and troubleshooting chemical performance issues
- Carryout real-time monitoring of chemical performance, predictive analytics for chemical dosage optimization and Al-driven automation in laboratory testing

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive "Haward Smart Training Kit" (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a Tablet PC.

Who Should Attend

This course provides an overview of all significant aspects and considerations of process chemicals testing methods for, quality assurance/quality control (QA/QC) professionals, chemists and chemical engineers, laboratory technicians and Analysts, process engineers, research and development (R&D) personnel, regulatory and compliance officers, production managers and supervisors, supply chain and procurement professionals, environmental health and safety (EHS) professionals, industry consultants and auditors, academics and students, technical sales and marketing professionals.













Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -



British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.





Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Nikolas Karnavos, MSc, BSc, is a Senior Analytical Chemist with over 35 years of extensive experience within the Oil, Gas, Refinery and Petrochemical industries. His expertise widely covers Gas & Liquid Chromatograph Process Analysers, Process Analyzer Techniques (Online & Offline), Laboratory Information Management System (LIMS), Data & Method Validation in Analytical Laboratory Automation Techniques. **Practical Statistical** Problem Solving in Chemical Analysis.

of Lab Data, Chemical Laboratory, Analytical Laboratory Instrumentation, Laboratory Health & Safety, GLP, Laboratory Quality Management (ISO 17025), ISO 9001 and Medical Laboratory Quality Management (ISO 15189). Further, he is also well-versed in Environmental Online Analyzers (Air & Water), Gas Chromatography and various instrumental methods of analysis such as Water Analysis & Quality Control, Water and Wastewater Chemical Analysis, Statistical Data and Laboratory Analysis, Gas Analysis, Qualitative Fuel Analysis, Environmental Chemical Analysis, Laboratory Environmental Analysis including Water Quality Testing, Process Water and Wastewater Effluents, Oily Sludge **Treatment**, Atomic Absorption and Spectroscopic Methods in Analytical Chemistry, Analytical Method Development and Methods of Environmental Measurements (Water, Air, Liquid & Solid Wastes).

Mr. Karnavos was the Laboratory Manager of Exxon wherein he was responsible for ISO 17025 certification, upgrading laboratory equipment in refinery, petrochemical and **polypropylene** plants, upgrading and extending LIMS, handling the transition plan process of the existing laboratory to a new as well as formulating and executing the plans for applied research and technology transfer. During his career life, he had occupied several significant positions as the Laboratory Analyst, Laboratory Professor, Quality Manager, Partner & Managing Director, Environmental Engineer, Process Engineer, Environmental Management Corporate Department Head and Quality Control & Plastics Application Head with different international companies like the AQUACHEM, Hellenic Petroleum (EXXON) and Technological Institute.

Mr. Karnavos holds a **Master** degree in **Chemical Engineering** and **Bachelor** degrees in Mechanical Engineering and Petroleum Engineering from the Aristotelian University of Thessaloniki, Technological Institute and KATEE respectively. He is an **Accredited Trainer** for the Organization for the Certifications & Vocational Guidance (EOPPEP), a Certified Internal Verifier/Assessor/Trainer by the Institute of Leadership & Management (ILM), a Certified Instructor/Trainer and an Accredited Environmental Auditor from the IEMA. Further, he is the President of Greek Association of Chemical Engineers and an active member of various professional engineering bodies internationally like the IEMA, Technical Chamber of Greece and the CONCAWE. He also published numerous books and scientific **papers** and delivered various trainings and workshops worldwide.









Training Methodology

All our Courses are including Hands-on Practical Sessions using equipment, Stateof-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures

20% Practical Workshops & Work Presentations

30% Hands-on Practical Exercises & Case Studies

20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US\$ 5,500 per Delegate + VAT. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0830 - 0930	Introduction to Process Chemicals in Petroleum Industry Definition & Importance of Process Chemicals • Role of Chemicals in Oil & Gas Production, Refining, & Transportation • Classification of Process Chemicals (Corrosion Inhibitors, Demulsifiers, Scale Inhibitors, etc.) • Standards & Best Practices for Chemical Testing
0930 - 0945	Break
0945 - 1030	Importance of Testing Process Chemicals Ensuring Chemical Performance & Quality Control • Regulatory Compliance & Environmental Considerations • Impact of Improper Chemical Testing on Production Efficiency • Quality Assurance Framework for Process Chemicals
1030 – 1130	Basic Principles of Chemical Analysis & Testing Qualitative versus Quantitative Chemical Testing • Role of Laboratory Testing in Oil & Gas Industry • Common Analytical Techniques Used in Process Chemical Analysis • Interpretation of Test Results & Decision-Making
1130 - 1215	International Standards for Chemical Testing API, ASTM, ISO, & NACE Standards for Chemical Testing • Specifications for Process Chemical Testing • Importance of Standardization in Chemical Analysis • Case Studies on Compliance with International Standards
1215 – 1230	Break













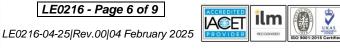
1230 – 1330	Laboratory Safety in Chemical Testing Handling Hazardous Chemicals & Risk Mitigation • PPE Requirements for Chemical Analysis • Safe Disposal of Laboratory Waste • HSE Guidelines for Chemical Testing Labs
1330 – 1420	Overview of Testing Equipment & Instruments Spectroscopy Techniques (UV-Vis, FTIR, XRF) • Chromatography Techniques (GC, HPLC, IC) • Titration & Gravimetric Methods • Emerging Technologies in Process Chemical Testing
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

Day Z	
	Demulsifier Testing Methods
730 - 0830	Bottle Test Method for Evaluating Demulsifier Efficiency • Dynamic & Static
	Interfacial Tension Measurement • Water Separation Rate & Emulsion
	Stability Testing • Specifications for Demulsifier Performance
	Corrosion Inhibitor Testing
0020 0020	Rotating Cylinder Electrode (RCE) Test for Corrosion Rate Measurement •
0830 - 0930	Linear Polarization Resistance (LPR) Method • High-Pressure Autoclave
	Corrosion Testing • Criteria for Corrosion Inhibitor Efficiency
0930 - 0945	Break
	Scale Inhibitor Performance Testing
0045 1100	Dynamic Tube Blocking Test for Scale Inhibition Assessment • Static Bottle
0945 – 1100	Test for Scale Inhibitor Evaluation • Scale Solubility & Precipitation Analysis •
	Requirements for Scale Inhibitor Testing
	Biocide Testing & Effectiveness Measurement
1100 – 1215	Minimum Inhibitory Concentration (MIC) Test • ATP (Adenosine
1100 - 1213	Triphosphate) Bioluminescence Method • Culture-Based Microbial Activity
	Testing • Standards for Biocide Efficiency Assessment
1215 - 1230	Break
	Anti-Foaming & Foam-Control Agent Testing
1230 - 1330	Foam Column Test for Defoaming Efficiency • Dynamic Foam Stability
1230 - 1330	Assessment • Compatibility Testing with Crude Oil & Production Fluids •
	Requirements for Anti-foam Agent Selection
1330 – 1420	Drag Reducing Agent (DRA) Testing
	Rheological Testing for Viscosity Reduction • Flow Loop Testing for Pipeline
	Friction Reduction • Compatibility Assessment with Pipeline Fluids • Best
	Practices for DRA Evaluation
1420 - 1430	Recap
	Using this Course Overview, the Instructor(s) will Brief Participants about the
	Topics that were Discussed Today & Advise Them of the Topics to be Discussed
	Tomorrow
1430	Lunch & End of Day Two











Day 3

Testing of Refining Catalysts BET Surface Area Analysis for Catalyst Activity • Thermogravimetric Analysis (TGA) for Catalyst Degradation • Catalyst Poisoning & regeneration Testing • Criteria for Catalyst Degradation • Catalyst Poisoning & regeneration Testing • Criteria for Catalyst Performance Evaluation Hydrogen Sulfide (H ₂ S) Scavenger Testing Wet Chemical Methods for H ₂ S Quantification • Gas Chromatography for Sulfur Compound Analysis • Reaction Kinetics Studies for Scavenger Efficiency • Standards for H ₂ S Scavenger Selection Break Antioxidant & Fuel Stabilizer Testing Oxidation Stability Test for Fuel Aging Analysis • Induction Period Measurement Using Rancimat Method • Compatibility Assessment with Different Fuel Compositions • Requirements for Fuel Stabilizers Anti-Fouling & Sludge Dispersant Testing Thermal Fouling Tendency Test • Sludge Dispersant Effectiveness Evaluation • Compatibility Testing with Refinery Process Fluids • Standards for Anti-Fouling Agents Break Oxygen Scavenger Testing for Water Systems Redox Titration Method for Residual Oxygen Measurement • Electrochemical Analysis of Oxygen Scavenger Efficiency • Thermal Degradation Study of Scavenger Compounds • Best Practices for Oxygen Scavenger Selection Case Studies on Refinery Chemical Testing Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow 1430 Lunch & End of Day Three	Day 3	
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Measurement Using Rancimat Method • Compatibility Assessment with Different Fuel Compositions • Requirements for Fuel Stabilizers Anti-Fouling & Sludge Dispersant Testing Thermal Fouling Tendency Test • Sludge Dispersant Effectiveness Evaluation • Compatibility Testing with Refinery Process Fluids • Standards for Anti-Fouling Agents Break Oxygen Scavenger Testing for Water Systems Redox Titration Method for Residual Oxygen Measurement • Electrochemical Analysis of Oxygen Scavenger Efficiency • Thermal Degradation Study of Scavenger Compounds • Best Practices for Oxygen Scavenger Selection Case Studies on Refinery Chemical Testing Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow		
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1100 – 1215 Anti-Fouling & Sludge Dispersant Testing Thermal Fouling Tendency Test • Sludge Dispersant Effectiveness Evaluation • Compatibility Testing with Refinery Process Fluids • Standards for Anti-Fouling Agents Break Oxygen Scavenger Testing for Water Systems Redox Titration Method for Residual Oxygen Measurement • Electrochemical Analysis of Oxygen Scavenger Efficiency • Thermal Degradation Study of Scavenger Compounds • Best Practices for Oxygen Scavenger Selection Case Studies on Refinery Chemical Testing Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow	0545 - 1100	
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• Compatibility Testing with Refinery Process Fluids • Standards for Anti-Fouling Agents 1215 - 1230 Break 1230 - 1330		Anti-Fouling & Sludge Dispersant Testing
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1230 - 1330 1230 - 1330 Redox Titration Method for Residual Oxygen Measurement • Electrochemical Analysis of Oxygen Scavenger Efficiency • Thermal Degradation Study of Scavenger Compounds • Best Practices for Oxygen Scavenger Selection Case Studies on Refinery Chemical Testing Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow		Fouling Agents
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Case Studies on Refinery Chemical Testing Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow	1230 - 1330	Analysis of Oxygen Scavenger Efficiency • Thermal Degradation Study of
Chemical Testing in Refining Operations • Challenges in Quality Control for Process Chemicals • Lessons Learned from Refinery Chemical Failures • Future Innovations in Chemical Testing for Refining Processes Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow		Scavenger Compounds • Best Practices for Oxygen Scavenger Selection
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Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow	1330 - 1420	
1420 – 1430 Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow		Innovations in Chemical Testing for Refining Processes
Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow	1420 – 1430	•
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		Topics that were Discussed Today & Advise Them of the Topics to be Discussed
1430 Lunch & End of Day Three		Tomorrow
	1430	Lunch & End of Day Three

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Day 4	
0730 - 0830	Spectroscopy Techniques for Chemical Characterization UV-Vis Spectroscopy for Colorimetric Analysis • Fourier Transform Infrared (FTIR) Spectroscopy for Chemical Identification • X-Ray Fluorescence (XRF) for Elemental Composition Analysis • Case Studies on Spectroscopy Applications in Labs
0830 - 0930	Chromatography Techniques for Chemical Analysis Gas Chromatography (GC) for Hydrocarbon Analysis • High-Performance Liquid Chromatography (HPLC) for Organic Compounds • Ion Chromatography (IC) for Anion & Cation Separation • Use of Chromatography for Chemical Verification
0930 - 0945	Break
0945 – 1100	Gravimetric & Titration Methods for Chemical Quantification Acid-Base Titration for pH Control in Chemical Formulations • Complexometric Titration for Metal Ion Analysis • Gravimetric Methods for Total Dissolved Solids Measurement • Requirements for Gravimetric Chemical Testing









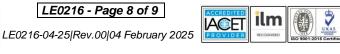




1100 – 1230	Rheological Testing for Process Chemicals Viscosity Measurement Using Rotational Viscometers • Shear Stress versus Shear Rate Analysis for Fluid Behavior • Flow Curve Generation for Chemical Formulations • Standards for Rheological Testing of Process Chemicals
1230 - 1245	Break
1245 – 1420	Compatibility Testing of Chemicals with Production Fluids Emulsion Stability Assessment • Solubility Testing in Different Hydrocarbon Matrices • Thermal Degradation Analysis Under Operating Conditions • Criteria for Chemical-Fluid Compatibility
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5	
0730 - 0930	Case Studies on Analytical Techniques in Operations Real-World Examples of Chemical Quality Assurance • Lessons Learned from Lab & Field Testing Failures • Integration of Multiple Analytical Methods for Comprehensive Chemical Evaluation • Future Trends in Process Chemical
0930 - 0945	Analysis Break
0945 - 1100	Chemical Testing Procedures Sample Preparation for Lab Testing • Calibration of Analytical Instruments • Performing Key Chemical Tests in a Simulated Environment • Data Recording & Interpretation
1100 – 1230	Troubleshooting Chemical Performance Issues Identifying Root Causes of Chemical Failures • Addressing Common Quality Control Problems • Optimizing Chemical Dosage Based on Test Results • Case Study Exercises on Troubleshooting Process Chemicals
1230 – 1245	Break
1245 – 1345	Digitalization & AI in Chemical Testing Real-Time Monitoring of Chemical Performance • Predictive Analytics for Chemical Dosage Optimization • AI-Driven Automation in Laboratory Testing • Adoption of Digital Technologies in Chemical Management
1345 - 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about Topics that were Covered During the Course
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course













<u>Practical Sessions</u>
This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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