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 (H_2S) 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 for chemical analysis and gravimetric and titration methods for chemical quantification; the rheological testing, compatibility testing and troubleshooting chemical performance issues; and the real-time monitoring of chemical performance, predictive analytics for chemical dosage optimization and AI-driven 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 (H_2S) 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 AI-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 Laboratories**, Laboratory **Automation Techniques**, **Practical Problem Solving in Chemical Analysis**, **Practical Statistical 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 Kavala** 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, State-of-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

730 – 0830	***Demulsifier Testing Methods*** *Bottle Test Method for Evaluating Demulsifier Efficiency • Dynamic & Static Interfacial Tension Measurement • Water Separation Rate & Emulsion Stability Testing • Specifications for Demulsifier Performance*
0830 – 0930	***Corrosion Inhibitor Testing*** *Rotating Cylinder Electrode (RCE) Test for Corrosion Rate Measurement • Linear Polarization Resistance (LPR) Method • High-Pressure Autoclave Corrosion Testing • Criteria for Corrosion Inhibitor Efficiency*
0930 – 0945	*Break*
0945 – 1100	***Scale Inhibitor Performance Testing*** *Dynamic Tube Blocking Test for Scale Inhibition Assessment • Static Bottle Test for Scale Inhibitor Evaluation • Scale Solubility & Precipitation Analysis • Requirements for Scale Inhibitor Testing*
1100 – 1215	***Biocide Testing & Effectiveness Measurement*** *Minimum Inhibitory Concentration (MIC) Test • ATP (Adenosine Triphosphate) Bioluminescence Method • Culture-Based Microbial Activity Testing • Standards for Biocide Efficiency Assessment*
1215 – 1230	*Break*
1230 – 1330	***Anti-Foaming & Foam-Control Agent Testing*** *Foam Column Test for Defoaming Efficiency • Dynamic Foam Stability 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

0730 – 0830	***Testing of Refining Catalysts*** *BET Surface Area Analysis for Catalyst Activity • Thermogravimetric Analysis (TGA) for Catalyst Degradation • Catalyst Poisoning & regeneration Testing • Criteria for Catalyst Performance Evaluation*
0830 – 0930	***Hydrogen Sulfide (H_2S) Scavenger Testing*** *Wet Chemical Methods for H_2S Quantification • Gas Chromatography for Sulfur Compound Analysis • Reaction Kinetics Studies for Scavenger Efficiency • Standards for H_2S Scavenger Selection*
0930 – 0945	*Break*
0945 – 1100	***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*
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*
1215 – 1230	*Break*
1230 – 1330	***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*
1330 – 1420	***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*
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 Three*

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 Analysis*
0930 – 0945	*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 t Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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