COURSE OVERVIEW DE0149
Chemical Handling & Injection – Basics

Course Title
Chemical Handling & Injection – Basics

Course Date/Venue
Session 1: August 24-28, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 17-21, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
DE0149

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.

Production chemistry issues occur as a result of chemical and physical changes to the well stream fluids, as it is transported from the reservoir through the processing system. The well stream fluids may consist of a mixture of liquid hydrocarbon (oil or condensate), gaseous hydrocarbon (raw natural gas), and associated water. This mixture passes from the reservoir, through the tubular string and wellhead, and then along flowlines to the processing plant where the various phases are separated. As the fluids will experience a significant drop in pressure, a change in temperature, and considerable agitation, there will be predictable and sometimes unpredictable changes in state that impact on the efficiency of the overall operation. In general, production chemistry problems are one of four types:

- Problems caused by fouling. This is defined as the deposition of any unwanted matter in a system and includes scales, corrosion products, wax (paraffin), asphaltenes, biofouling, and gas hydrates.
- Problems caused by the physical properties of the fluid. Foams, emulsions, and viscous flow are examples.
- Problems that affect the structural integrity of the facilities and the safety of the workforce. These are mainly corrosion-related issues.
- Problems that are environmental or economic. Oily water discharge can damage the environment and the presence of sulfur compounds such as hydrogen sulfide (H_2S) has environmental and economic consequences.

The resolution of these problems can be made by the application of nonchemical techniques and through the use of properly selected chemical additives. A good facilities design and correct choice of materials can significantly reduce production chemistry issues later in field life. Unfortunately, crude oil production is characterized by variable production rates and unpredictable changes to the nature of the produced fluids. It is therefore essential that the production chemist can have a range of production chemical additives available that may be used to rectify issues that would not otherwise be fully resolved.

Modern production methods, the need to upgrade crude oils of variable quality, and environmental constraints demand chemical solutions. Oilfield production chemicals are therefore required to overcome or minimize the effects of the production chemistry problems.

This course is designed to provide participants with a detailed and an up-to-date overview of chemical injection and well production optimization. It covers the production chemistry and environmental issues; the control for water, gas and asphaltene; the acid stimulation; the control of naphthenate and other carboxylate fouling; the methods of corrosion control, corrosion inhibitors and film-forming corrosion inhibitors during production; the control of gas hydrate, wax (paraffin) and methods of demulsifiers; and the foam control, flocullants and biocides.

During this interactive course, participants will learn the hydrogen sulfide and oxygen scavengers; the drag-reducing agents; the production system of reservoir, well-bore, vertical flow, constraints and interactions; the performance of productive formation and vertical lift; the flowing well performance of pressure gradient curves and traverses, determination of well deliverability, graphical solution of pressure losses in oil wells and two phase flow through chokes; and the artificial lift systems.

Course Objectives

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

- Apply and gain an in-depth knowledge on chemical injection and well production optimization
- Discuss production chemistry and environmental issues
- Employ control for water, gas and asphaltene
- Describe acid stimulation including fracture acidizing of carbonate formations, matrix acidizing, acids used and potential formation damage from acidizing
- Carryout control of naphthenate and other carboxylate fouling
- Apply methods of corrosion control, corrosion inhibitors and film-forming corrosion inhibitors during production
- Control gas hydrate, wax (paraffin) and discuss methods of demulsifiers
- Carryout foam control and identify flocullants and biocides
- Explain hydrogen sulfide and oxygen scavengers as well as drag-reducing agents
- Recognize the production system of reservoir, well-bore, vertical flow, constraints and interactions

- Describe the performance of productive formation and vertical lift
- Analyze flowing well performance of pressure gradient curves and traverses, determination of well deliverability, graphical solution of pressure losses in oil wells and two-phase flow through chokes
- Recognize artificial lift systems including continuous gas lift, gas lift valves general consideration, design criteria, compressor requirements, design of electric submersible pumps (ESP) and operational problems of ESP

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 of chemical injection and well production optimization. Production engineers, facility engineers, production controllers and other technical staff dealing with well and near well operations, who are responsible for recognizing and treating problems which require chemicals will definitely benefit from this course.

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$ 8,000 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 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:

Dr. Hesham Abdou, PhD, MSc, BSc, is a **Senior Drilling & Petroleum Engineer** with over **35 years** of integrated industrial and academic experience as a **University Professor**. His specialization widely covers in the areas of **Drilling & Completion** Technology, **Directional Drilling**, **Horizontal & Sidetracking**, **Drilling Operation** Management, **Drilling & Production** Equipment, **ERD Drilling & Stuck Pipe** Prevention, **Natural & Artificial Flow Well Completion**, **Well Testing** Procedures & Evaluation, **Well** Performance, **Coiled Tubing** Technology, **Oil Recovery Methods** Enhancement**, Well Integrity** Management, **Well Casing & Cementing**, **Acid Gas** Removal, **Heavy Oil Production** & Treatment Techniques, **Crude Oil Testing & Water Analysis**, **Crude Oil & Water** Sampling Procedures, **Equipment Handling** Procedures, **Crude & Vacuum Process** Technology, **Gas Conditioning & Processing**, **Cooling Towers** Operation & Troubleshooting, **Sucker Rod Pumping**, **ESP & Gas Lift**, **PCP & Jet Pump**, **Pigging** Operations, Electric Submersible Pumps (**ESP**), Progressive Cavity Pumps (**PCP**), **Water Flooding**, **Water Lift Pumps** Troubleshooting, **Water System Design** & Installation, **Water Networks Design** Procedures, **Water Pumping** Process, **Pipelines**, **Pumps**, **Turbines**, **Heat Exchangers**, **Separators**, **Heaters**, **Compressors**, **Storage Tanks**, **Valves** Selection, **Compressors**, **Tank & Tank Farms** Operations & Performance, **Oil & Gas Transportation**, **Oil & Gas Production** Strategies, **Artificial Lift** Methods, **Piping & Pumping** Operations, Oil & Water Source Wells Restoration, **Pump** Performance Monitoring, **Rotor Bearing** Modelling, **Hydraulic** Repairs & Cylinders, **Root Cause Analysis**, **Vibration & Condition** Monitoring, **Piping Stress** Analysis, **Amine Gas Sweetening & Sulfur Recovery**, Heat & Mass Transfer and Fluid Mechanics.

During his career life, Dr. Hesham held significant positions and dedication as the **General Manager**, **Petroleum Engineering Assistant General Manager**, **Workover Assistant General Manager**, **Workover Department Manager**, **Artificial Section Head**, **Oil & Gas Production Engineer** and **Senior Instructor/Lecturer** from various companies and universities such as the Cairo University, Helwan University, British University in Egypt, Banha University and Agiba Petroleum Company.

Dr. Hesham has a **PhD** and **Master** degree in **Mechanical Power Engineering** and a **Bachelor** degree in **Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Peer Reviewer**. Dr. Hesham is a member of Egyptian Engineering Syndicate and the Society of Petroleum Engineering. Moreover, he has published technical papers and journals and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

Course Program

The following program is planned for this course. However, the course director(s) may modify this program before or during the course 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	***Production Chemistry & Environmental Issues*** *Production Chemistry Overview ● Factors that Affect the Choice of Production Chemicals ● Environmental & Ecotoxicological Regulations ● Designing Greener Chemicals ● Mercury & Arsenic Production*
0930 – 0945	*Break*
0945 – 1100	***Water & Gas Control*** *Introduction ● Resins & Elastomers ● Inorganic Gels ● Cross-Linked Organic Polymer Gels for Permanent Shut-Off ● Viscoelastic Surfactant Gels ● Disproportionale Permeability Reducer or Relative Permeability Modifier ● Water Control Using Microparticles ● Gas Shut-Off*
1100 – 1230	***Scale Control*** *Introduction ● Types of Scale ● Nonchemical Scale Control ● Scale Inhibition of Group II Carbonates & Sulfates ● Sulfide Scale Inhibition ● Halite Scale Inhibition ● Methods of Deploying Scale Inhibitors ● Performance Testing of Scale Inhibitors ● Chemical Scale Removal*
1230 – 1245	*Break*
1245 – 1345	***Asphaltene Control*** *Introduction ● Asphaltene Dispersants & Inhibitors ● Low Molecular Weight, Nonpolymeric Asphaltene ● Oligomeric (Resinous) & Polymeric AIs ● Summary of ADs & AIs ● Asphaltene Dissolvers*
1345 - 1420	***Acid Stimulation*** *Introduction ● Fracture Acidizing of Carbonate Formations ● Matrix Acidizing ● Acids Used in Acidizing ● Potential Formation Damage from Acidizing ● Acidizing Additives ● Axial Placement of Acid Treatments ● Radial Placement of Acidizing Treatments*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Control of Naphthenate & Other Carboxylate Fouling*** *Introduction ● Naphthenate Deposition Control Using Acids ● Low-Dosage Naphthenate Inhibitors*
0930 – 0945	*Break*
0915 – 1100	***Corrosion Control During Production*** *Introduction ● Methods of Corrosion Control ● Corrosion Inhibitors ● Film-Forming Corrosion Inhibitors*
1100 – 1230	***Gas Hydrate Control*** *Introduction ● Chemical Prevention of Hydrate Plugging ● Gas Hydrate Plug Removal*

1230 – 1245	Break
1245 – 1345	***Wax (Paraffin) Control*** *Introduction ● Wax Control Strategies ● Chemical Wax Removal ● Chemical Wax Prevention*
1345 - 1420	***Demulsifiers*** *Introduction ● Methods of Demulsifiers ● Water-in-Oil Demulsifiers*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 093	***Foam Control*** *Introduction ● Defoamers & Antiforms*
0930 – 0945	*Break*
0915 – 1100	***Flocullants*** *Introduction ● Theory of Flocullation ● Flocullants*
1100 – 1230	***Biocides*** *Introduction ● Chemicals for Control of Bacteria ● Biocides ● Bioslats (Control "Biocides" or Metabolic Inhibitors) ● Summary*
1230 – 1245	*Break*
1245 – 1330	***Hydrogen Sulfide Scavengers*** *Introduction ● Nonregenerative H_2S Scavengers ● Summary*
1330 - 1420	***Oxygen Scavengers*** *Introduction ● Classes of Oxygen Scavengers*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Drag-Reducing Agents*** *Introduction ● Drag-Reducing Agents Mechanisms ● Oil-Soluble DRAs ● Water- Soluble DRAs*
0930 – 0945	*Break*
0945 – 1100	***Overview of the Production System*** *The Reservoir • Well-bore • Vertical Flow, etc ● Constraints and Interactions • Types of Reservoirs • Vapor/Liquid Behavior in the Well-bore*
1100 – 1230	***Overview of the Production System (cont'd)*** *Formation Volume Factors • Gas Solubility in Crude Oils • Gas/Oil (Liquid/oil) Ratio ● Volume Factor • Water/Oil Ratio • Completion Practices*
1230 – 1245	*Break*
1245 – 1330	***The Performance of the Productive Formation*** *Productivity Index (PI) ● Inflow Performance (IPR) ● Use of Radial Flow Equation to Determine PI ● Factors Affecting the Shape of IPR • Vogel's and Fetkovitch Equations*
1330 - 1420	***The Performance of the Productive Formation (cont'd)*** *Gas Well Productivity • Back Pressure Equation for Gas Wells • Generalized Pressure Equation • Effect of Skin Resistance and Non-Darcy Flow • Methods Used in Prediction of Future IPR*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Vertical Lift Performance*** *Application of the General Energy Equation in Performing Flow Calculations • Determining the Static BHP in Gas Wells • Vertical and Inclined Two-phase Flow*
0930 – 0945	*Break*
0945 – 1100	***Vertical Lift Performance (cont'd)*** *Energy and Pressure Losses • Flow Regimes • Correlations • Computational Methods*
1100 – 1215	***Flowing Well Performance*** *Pressure Gradient Curves and Traverses • Determination of Well Deliverability • Graphical Solution of Pressure Losses in Oil Wells*
1215 – 1230	*Break*
1230 – 1315	***Flowing Well Performance (cont'd)*** *Two Phase Flow through Chokes • Analysis of Well Performance*
1315 - 1345	***Artificial Lift Systems*** *Continuous Gas Lift • Gas Lift Valves General Consideration • Design Criteria • Compressor Requirements • Design of Electric Submersible Pumps (ESP) • Operational Problems of ESP*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course 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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