Water management, treatment and control in upstream oil and gas operations

Focus on: The Manager ☐ The Specialist ☑ Spotlight Programme ☑ Hands-on Skills ☑

Course Overview

This 5-day intensive course equips engineers and chemists with the latest technical and operational strategies for managing produced water in upstream operations. Combining fundamental theory with practical applications, the program covers water chemistry, scaling/corrosion mechanisms, separation technologies, and advanced treatment methods, including membrane processes, electrocoagulation, and zero liquid discharge (ZLD). Participants will gain hands-on experience with industry software (ScaleChem, OLI Studio) for scaling/corrosion prediction and engage in real-world case studies on emulsion treatment, fouling mitigation, and injection well compatibility. The course also explores emerging innovations, such as AI-driven monitoring, nanomaterials, and bio-treatment, while addressing regulatory compliance and environmental best practices. Designed for field and lab professionals, this training enhances troubleshooting skills and optimizes produced water systems for cost-effective, sustainable operations.

Course Objectives		This Course is Ideal For:	
1	Understand Produced Water Chemistry & Challenges	✓	Process/Chemical Engineers
2	Master Separation & Treatment Technologies	✓	Production/Operations Engineers
3	Apply Industry Software & Modeling Tools	✓	Chemists/Lab Technicians
4	Design Sustainable Water Management Strategies	✓	Environmental Specialists
5	Troubleshoot Real-World Problems	✓	Water Treatment Service Providers

Course Content

Day	Theme	Coverage

1	Produced Water Chemistry & Fundamentals	• **Core Chemistry & Sampling**
		  ○ Water composition (salts, hydrocarbons, gases, NORM)
		  ○ Sampling protocols (field vs. lab, preservation, QA/QC)
		• **Scaling & Corrosion**
		  ○ Scaling mechanisms ($CaCO_3$, $BaSO_4$, solubility calculations)
		  ○ Corrosion control (CO_2/H_2S mitigation, chemical inhibitors)
		• **Microbiology & Environmental Compliance**
		  ○ SRBs & biofilm risks (monitoring, biocide selection)
		  ○ Environmental compliance (discharge, reinjection, ZLD)

2	Separation Theory & Emulsions	• **Emulsion Science**
		  ○ Emulsion stabilization/destabilization (interfacial chemistry)
		  ○ Demulsifier selection & testing (bottle tests, formulation trade-offs)
		• **Gravity Separation**

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		○ API separators & plate coalescers (design principles, efficiency factors) ○ Hydrocyclones (sizing, pressure-drop considerations) • **Software Modeling** ○ ScaleChem demo (predicting $CaSO_4$/$BaSO_4$ scaling risks) • **Case study:** Mismatch between model predictions vs. field data
3	Treatment Technologies	• **Gas Flotation & Filtration** ○ Dissolved gas flotation (A/S ratio, recycle rates) ○ Media filtration (sand, anthracite, fouling indicators) • **Membranes & Ion Exchange** ○ RO/NF system design (flux rates, pretreatment needs) ○ Ion exchange resins (regeneration, organic fouling risks) • **Thermal Methods** ○ MVC evaporators (energy efficiency, scaling control) ○ ZLD economics (CapEx vs. OpEx trade-offs) ○ wells
4	Reinjection & Residuals Management	• **Reinjection Water Quality** ○ Compatibility studies (geochemical modeling basics) ○ Suspended solids control (filtration, well impairment risks) • **Chemical Residuals & Toxicity** ○ Biocide/byproduct toxicity (LC50, bioassays) ○ Case study: **Reservoir Souring** • **Filtration Technologies & Mechanical filters** • Downhole Oil/Water Separation (DHOWS)
5	Optimization, Monitoring & Future Trends	• **Disposal & Reuse** ○ De-oiling/soluble organics removal ○ Evaporative processes & waste minimization • **Real-Time Monitoring** ○ Sensors (oil-in-water, corrosion probes) • **Future Trends** ○ Nanomaterials (graphene filters, catalytic NPs) Bio-treatment (Microbial Enhanced Oil Recovery MEOR, bioaugmentation)

Course Assessment	Certification
Participants will be assessed on: Participation in sessions Completion of exercises & case studies Performance in assessments	Upon successful completion of the course, participants will receive a **Certificate of Successful Completion**, along with a **Transcript of Marks** showing the performance by grade in each element of assessment and overall.

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Course Instructor

With BSc and PhD degrees from the UK, and with over 30 years of refinery technology, operations, and management expertise for several famous-name oil companies, this speaker is now an internationally-famous chemical engineering consultant.
As a Chartered Chemist, a Member of the Royal Society of Chemistry and a Member of the American Institute of Chemical Engineers, he holds honorary appointments at a number of European universities and conducts cutting-edge research into vacuum distillation, gas recovery, absorption and pyrolysis.