CONCEPT

Petroleum Geochemistry and Basin Modelling: Source Rock Evaluation and Charge Risk

22 – 26 March 2027
Paris - Right Bank business hotel



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Ref: 488_14605 **Date:** 22 – 26 March 2027 **Location:** Paris - Right Bank business hotel **Fees:** 23500 SAR

Introduction:

Exploration wells still fail for lack of charge: source rocks assumed rather than measured, maturity read from a single sample, and oils never tied back to the kitchen that expelled them. Prospect risk sheets then carry optimistic source and timing factors that no data supports. This Core Concept course trains exploration geoscientists to apply petroleum geochemistry to kerogen typing, TOC and Rock-Eval screening, vitrinite reflectance maturity, GC and GC-MS biomarker correlation, and 1D and 2D basin modelling of generation, expulsion and migration. Participants produce a Source Rock and Charge Assessment for a prospect.

Course Objectives:

- Construct a petroleum system events chart that places source deposition, burial, generation, trap formation and preservation on one timeline
- Classify organic matter and kerogen types from elemental ratios and pyrolysis data and rank source intervals by richness and generative potential
- Interpret TOC, Rock-Eval, hydrogen and oxygen index, Tmax and vitrinite reflectance results to map thermal maturity and flag unreliable samples
- Correlate oils, condensates and source rock extracts using gas chromatography, GC-MS biomarkers and stable carbon isotopes
- Build and calibrate 1D and 2D basin models that estimate burial history, heat flow, transformation ratio and expulsion timing
- Translate geochemical and modelling results into source and charge chance-of-success factors within a prospect risk assessment

Target Audience:

- Exploration geology functions responsible for play evaluation and prospect generation in frontier and mature basins
- Petroleum geochemistry functions that commission laboratory programmes and interpret source rock and fluid analyses
- Basin modelling functions that build burial, thermal and charge models for exploration portfolios
- Prospect assurance and risk functions that review chance-of-success factors and volumetric ranges before drilling decisions
- Development and appraisal geoscience functions that use oil fingerprinting to assess compartments and fill history

Course Outline:

Day 1: Petroleum Systems, Organic Matter and Kerogen

- Petroleum System Elements and Processes: Source, Seal, Overburden, Generation, Migration and Accumulation
- Petroleum System Events Chart and Critical Moment Definition
- Organic Matter Preservation in Anoxic Marine, Lacustrine and Deltaic Source Facies
- Kerogen Types I to IV on the Van Krevelen Diagram Using H/C and O/C Ratios
- Diagenesis, Catagenesis and Metagenesis Stages with Oil Window and Gas Window Boundaries

Day 2: Source Rock Screening and Thermal Maturity Measurement

- Geochemical Sampling Plans for Cuttings, Sidewall Samples and Outcrops with Caving and Mud Additive Checks
- Total Organic Carbon TOC Measurement and Organic Richness Screening Logs
- Rock-Eval Pyrolysis Parameters: S1, S2, S3, Tmax and Production Index
- Hydrogen Index versus Oxygen Index Plots for Kerogen Typing and Remaining Potential
- Vitrinite Reflectance Depth Profiles and Tmax Cross-Checks for Maturity Calibration

Day 3: Oil and Gas Geochemistry and Oil-Source Correlation

- Whole-Oil Gas Chromatography Fingerprints: N-Alkane Envelopes and Pristane/Phytane Ratio
- GC-MS Biomarkers: Steranes, Hopanes and Tricyclic Terpanes for Source Facies and Maturity
- Stable Carbon Isotopes of Oils, Extracts and Natural Gas Components
- Oil-Source Rock and Oil-Oil Correlation Matrices with Multivariate Family Grouping
- Biodegradation, Water Washing and Thermal Cracking Effects on Fluid Fingerprints

Day 4: 1D and 2D Basin Modelling, Migration and Charge Risk

- Burial History Reconstruction with Decompaction, Erosion Estimates and Hiatus Handling
- Heat Flow Scenarios, Thermal Conductivity and Palaeo-Surface Temperature Inputs
- Model Calibration Against Measured Vitrinite Reflectance, Tmax and Bottom-Hole Temperatures
- Generation Kinetics, Transformation Ratio and Expulsion Timing Outputs
- Migration Pathway Mapping, Drainage Area Estimation and Charge Timing Versus Trap Formation

Day 5: Capstone: Source Rock and Charge Assessment for a Prospect

- Prospect Data Pack Review: Geochemical Logs, Oil Samples and Stratigraphic Inputs
- Pseudo-Well 1D Model Build with Sensitivity Runs on Heat Flow and Source Richness
- Charge Volume Estimate from Kitchen Area, Source Thickness and Expulsion Efficiency
- Source Presence, Maturity and Timing Factors in the Prospect Risking Sheet
- Source Rock and Charge Assessment Presentation and Peer Challenge

Skills You Will Gain:

- Petroleum System Events Charting
- Kerogen Typing
- Pyrolysis Data Interpretation
- Thermal Maturity Mapping
- Biomarker Fingerprinting
- Oil-Source Correlation
- Basin Model Calibration
- Charge Risk Quantification

Why Attend This Course:

- Leave with a Source Rock and Charge Assessment built from geochemical logs, oil samples and a calibrated pseudo-well model
- Replace assumed source and timing factors in risk sheets with values traceable to laboratory data and model sensitivities
- Recognise contaminated samples, suppressed maturity readings and altered oils before they mislead a correlation
- Test interpretations with geologists, geochemists and modellers working rift, passive margin and foreland basins

Conclusion:

Charge is often the least tested element of a prospect, yet the data to test it already sits in laboratory reports and well files. The course moves from petroleum systems and kerogen types through TOC, pyrolysis and vitrinite reflectance screening, then to oil and gas fingerprinting and correlation, and on to calibrated 1D and 2D basin models of generation, expulsion and migration. The final day builds a Source Rock and Charge Assessment that feeds source, maturity and timing factors straight into prospect risking.