

Petroleum Geochemistry

Understanding petroleum origin and processes controlling fluids behavior to improve exploration success and production efficiency

APPLICATIONS

- Exploration and appraisal
 - Source rock evaluation
 - Charge and petroleum system modeling
 - Reservoir continuity and flow assurance
 - Assessment of tight oil and tight gas reservoirs
 - In-reservoir process assessment
 - Compositionally graded fluid column assessments
 - Caprock evaluation
 - Acid gas studies
 - Aqueous geochemistry
- Development and production
 - Production allocation
 - Lateral and vertical fluid gradient evaluation
 - Flow assurance
 - Thermal-recovery monitoring
 - Oil-to-surface and production-string studies
 - Reserves assessment
- Downstream
 - Crude oil typing
 - Fluid properties and behavior analysis

BENEFITS

- Reduced HSE and quality risks associated with sample shipments
- Accurate, repeatable results representative of the reservoir
- Technical expertise and reliable advice
- Integrated fit-for-purpose sampling and analysis solutions

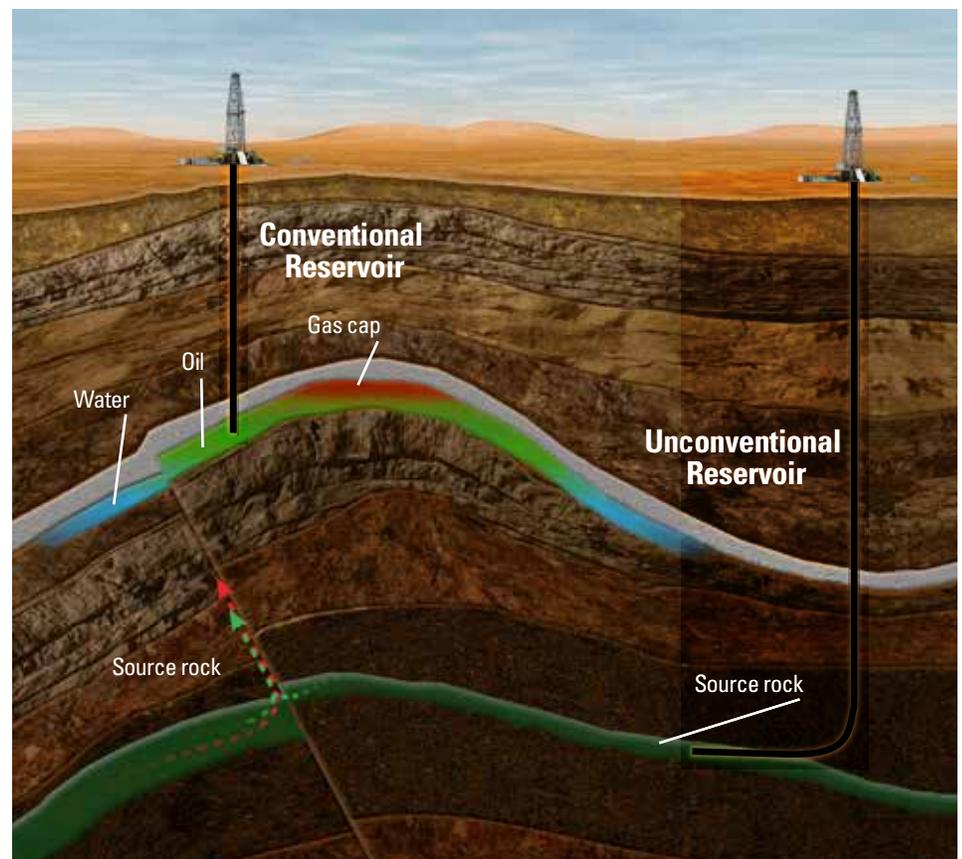
FEATURES

- Full chain of custody
- Advanced equipment operated by industry experts
- Standardized analytical methods with strict QA/QC
- Unique workflows supported by Malcom* interactive fluid characterization software
- Centralized technical and domain support from leading geochemists

The petroleum geochemistry domain is fundamental to understanding exploration targets and risks as well as constraining basin-scale processes and models. It also directly applies to reservoir development and production and increasingly contributes to engineering domains such as flow assurance, phase behavior (PVT), and downstream processing. Geochemical evaluation helps assess caprock integrity, carbon storage, and other subsurface containment challenges. Knowledge of the molecular composition, origin of fluids, and postplacement processes, together with understanding of their transport properties, is key to defining fluid property variations in reservoirs and developing the optimal approach to effective recovery.

Geochemical evaluation of source rocks and generated fluids is essential in modern exploration and production activities. Source rock research has advanced to include chemical and physical characterization technologies that enable a broader understanding of complex exploration and production targets, including shale reservoirs, where conventional approaches may no longer be effective.

Schlumberger Reservoir Laboratories perform full chain-of-custody rock and fluids services, from routine PVT to specialized analyses, under one roof. Analytical laboratory hubs in Houston, Dubai, and Aberdeen — as well as a dedicated analysis laboratory in Calgary — employ leading geochemists who use highly specialized technologies and support a wide range of characterization projects.



Geochemical evaluation, in the context of geological and basin history, is critical to characterizing petroleum generation, migration, and entrapment as well as future in-reservoir processes and leads to greater exploration and drilling success.

Petroleum Geochemistry

Incorporating petroleum geochemistry processes into all other fluid, rock, modeling, and reservoir engineering services enables

- reduced HSE and service-quality risks that are associated with shipments
- ensured data accuracy through standardized analytical methods and strict QA/QC
- expedited workflow from sampling and analysis (PVT, water, flow assurance) through final data delivery and interpretation.

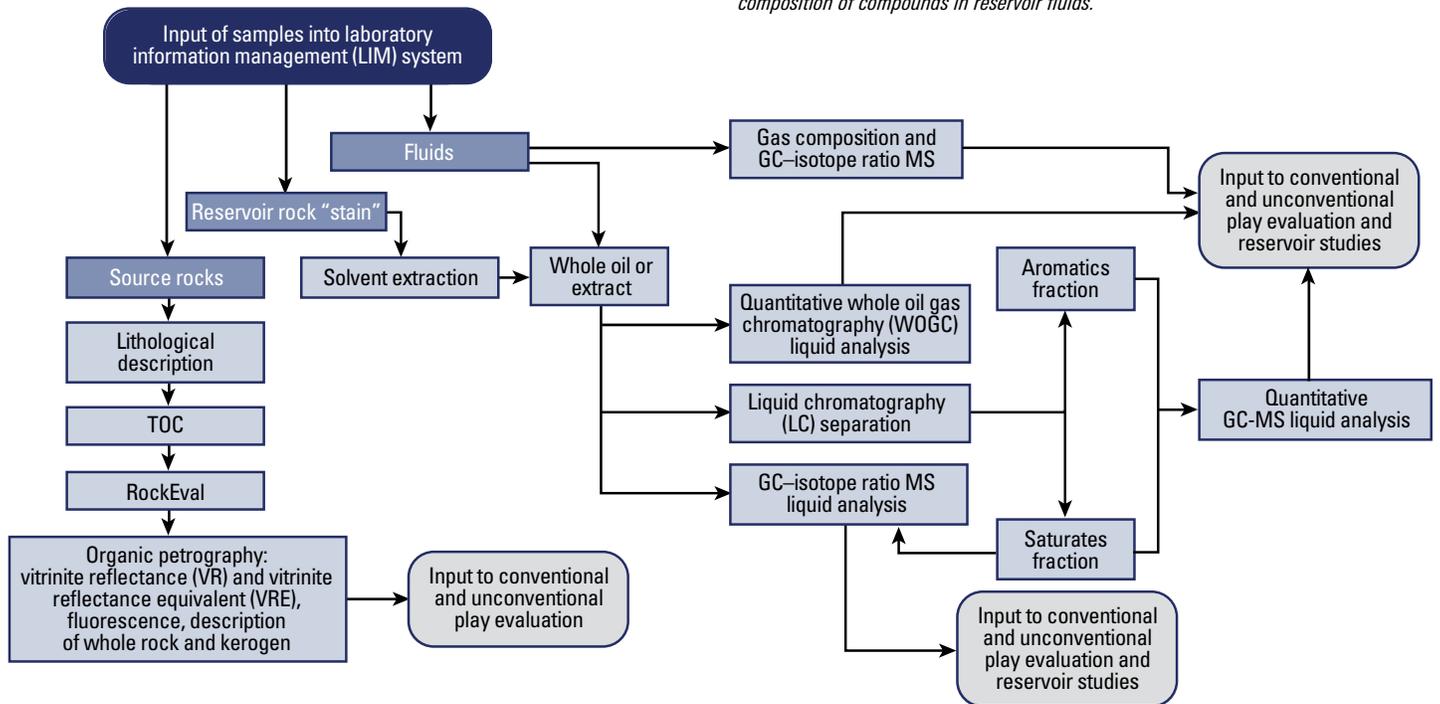
SERVICES

- Source rock evaluation
 - Basic evaluation (total organic carbon [TOC]; RockEval™ pyrolysis; organic petrography)
 - Advanced extraction (correlation of source rock and oil; pyrolysis gas chromatography [GC], mass spectrometry [MS], or both [GC-MS]; geomechanics integration)
- Biomarkers and molecular markers
 - Quantitative saturated- and aromatic-hydrocarbon fraction analysis
 - Custom polar-fraction analyses
- Geochemical fingerprinting
 - Quantitative high-resolution GC for standard fluids
 - Quantitative GC-MS for heavy oils
 - Evaluation using Malcom software
- Gas and liquid stable-isotope analysis
 - Gas-source determination (biogenic vs. thermogenic)
 - Alteration-process identification (primary vs. secondary cracking)

- Reservoir continuity study support
- Mixing processes study support
- Correlation and production allocation
- Unconventional reservoir evaluation
 - Characterization of heavy oil and oil sand reservoirs
 - Study of self-sourcing liquid-rich and gas-rich shale reservoirs
 - High-resolution organic facies and maturity studies
 - Multiwell dataset integration
 - Mapping of high-quality reservoir zones
 - Integration with petroleum systems modeling
- Project design and results interpretation



Gas chromatography with isotope-ratio mass spectrometry measures the isotopic composition of compounds in reservoir fluids.



Schlumberger petroleum geochemists customize analytical workflows to support exploration and production activities.

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