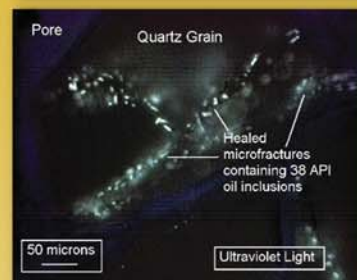
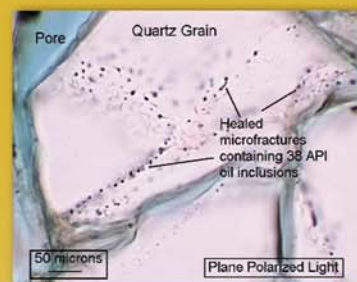


Fluid Inclusion Petrography and Microthermometry

What is Fluid Inclusion Petrography and Microthermometry?

Fluid inclusions contain information that can be translated to temperature, pressure and compositional constraints. These data are useful for understanding petroleum migration, reservoir filling, and diagenesis as well as helping constrain basin models. Transparent, polished slabs of rock material are studied optically with a petrographic microscope. Aromatic species within natural oils and condensate inclusions fluoresce when excited by ultraviolet light; hence, aqueous inclusions, non-fluorescent gas inclusions and fluorescent condensates and oils can be identified and discriminated, and the inclusions' relationship to each other, diagenetic features (e.g., physical and chemical compaction) and the rock matrix can be assessed. Individual inclusions are then visually monitored while heating and cooling them in a controlled temperature chamber. Phase equilibria within the trapped fluids reflect their composition and bulk density, which, in turn, are related to trapping temperature, pressure and fluid composition. Temperature, API gravity and salinity are the main measurements that are collected.

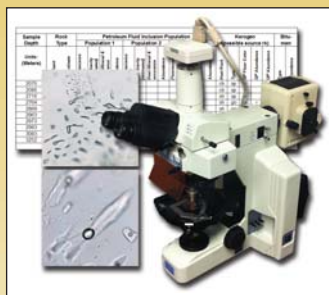
Fluid Inclusions are microscopic traces of past or present-day subsurface fluids that become entrapped in rocks during burial. They are completely encapsulated within their host minerals, hence are distinctive from adsorbed or residual fluids in open porosity. As such, fluid inclusions are not subject to evaporation during sample storage, loss of light ends during sampling from depth or contamination from the mud system. They persist in the geologic record even after the parent fluids have moved on; thus, a given sample contains the fluid history of the area. Specific tests can be done on fluid inclusions to study processes occurring within the earth, particularly those involving migration and accumulation of oil and gas.



Applications:

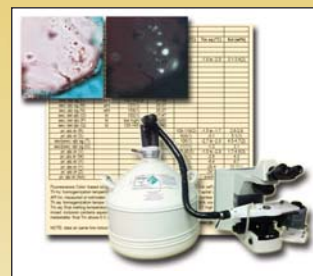
Petrography

- Timing of fluid emplacement
- Multiple hydrocarbon pulses
- Qualitative API gravity estimation
- Fluid contacts
- Petroleum type and quality
- Paleocharge
- Kerogen abundance and type
- Hydrocarbon staining/bitumen presence



Microthermometry

- Quantitative API gravity
- Temperature of oil emplacement or cementation
- Reservoir salinity
- Petroleum type and quality
- Petroleum saturation
- Presence of gas cap
- Maximum burial temperature
- Thermal maturity

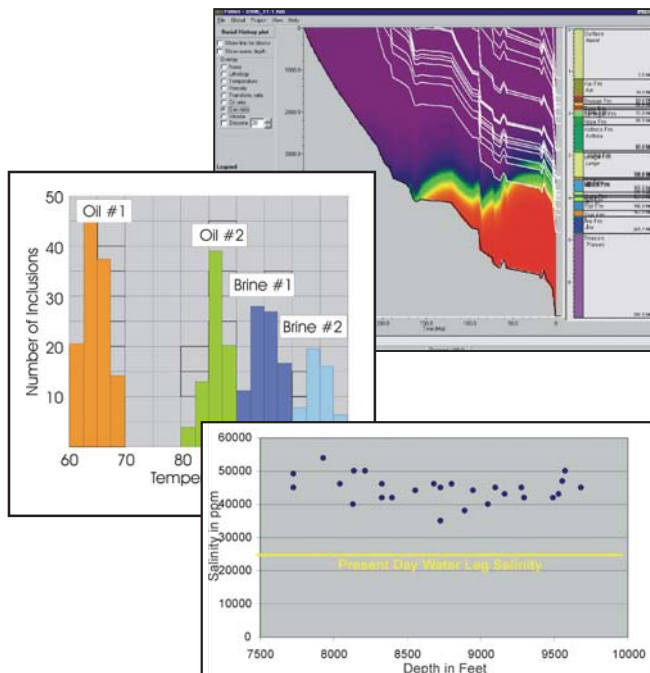
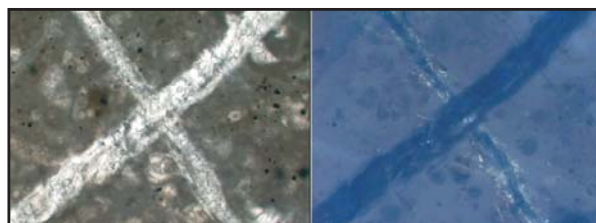


When Should I Use Fluid Inclusion Petrography and/or Microthermometry?

Fluid Inclusion Petrography without microthermometry is used almost exclusively for documenting the presence, abundance and distribution of liquid petroleum inclusions (oil or condensate) and qualitative API gravities in small numbers of samples. FIS is the more appropriate and cost-effective choice for large sample sets (>20), or where specific chemical information is necessary (including gas-related questions).

Fluid Inclusion Microthermometry provides very specific information on physical properties of fluids, and conditions of entrapment, such as temperature, salinity and API gravity. Typical applications for these techniques include:

- Evidence for liquid petroleum migration or paleocharge in a wet reservoir
- Defining paleo-oil-water contacts
- Evidence for earlier liquid petroleum charge in a gas reservoir
- Evidence for coexisting oil gas in a reservoir
- API gravity prediction in a zone of variable oil quality
- Relative or absolute timing of petroleum migration
- Maximum burial temperature
- Cementation / Fracturing temperature
- Reservoir salinity



Sample Requirements:

Cuttings, core and/or outcrop 5 gms clean rock material spacing: dependent on question; dense for paleocharge delineation; sparse for burial temperature

Where to Send Samples:

Fluid Inclusion Technologies
2217 N. Yellowwood Ave
Broken Arrow, OK 74012 USA

Suggested Supporting Information:

FIT service request form Logs, including BHT
Geochemistry Diagenetic sequence

Where to Send Support Information:

Fluid Inclusion Technologies
2217 N. Yellowwood Ave
Broken Arrow, OK 74012 USA

Deliverable:

A Fluid Inclusion Petrography and Microthermometry report contains the results of optical evaluation and photodocumentation of each thin section, collection of temperature, API gravity and salinity data, where possible, and interpretation of all data.