Geoservices
A Schlumberger Company

DQ1000

Wellsite mass spectrometer gas analyzer

APPLICATIONS

- Exploration and field development
- Conventional and unconventional reservoirs
- Difficult logging environments with minimal log suites
- Subtle show scenarios with low gas returns
- Horizontal well placement (and potential geosteering applications)
- Air drilling
- Operations with manpower constraints, minimal infrastructure, or both

BENEFITS

- Obtain a semiquantitative continuous fluid log
- Improve detection and characterization of formation gas at low concentrations
- Anticipate potential high-water-saturation reservoirs ahead of testing
- Determine liquids-enriched intervals in unconventional reservoirs of questionable maturity
- Provide practical reservoir fluid data
- Monitor bit wear and contributions from bit-generated gas

FEATURES

- Detects C_1–C_{10} organic species and inorganic compounds
- Generates a complete mass spectrum at each depth for chemical fingerprinting
- LAN satellite and Internet enabled
- Dual- or single-port gas stream analysis
- Adjustable measurement cycle time
- Easily field-deployable on all rigs
- Compatible with oil-base and water-base mud systems
- No field calibration needed

The portable and fully automatic DQ1000* wellsite mass spectrometer gas analyzer provides real-time semiquantitative formation fluid analysis and evaluation. After hydrocarbons have been liberated from mud, organic and inorganic compounds in drilling mud are continuously analyzed and correlated with depth.

The analyzer operates on the principle of direct quadrupole mass spectrometry in which chemical compounds are ionized, isolated, and measured. In addition to total gas and C_1–C_5 hydrocarbon analysis, C_6–C_{10} hydrocarbons are measured and the three major classes of volatile organic species (alkanes, cycloalkanes, and aromatics) are distinguished. This enables enhanced geochemical fingerprinting for fluid type and compartmentalization studies.

The DQ1000 analyzer also monitors chemical species with variable solubility in water, such as benzene, toluene, n-hexane, and cyclohexane. Ratios of these compounds can be used to qualitatively anticipate water saturation as well as identify water-bearing zones that may be charged in a lateral position. Inorganic species (hydrogen, helium, nitrogen, carbon dioxide, oxygen, and argon) and sulfur-bearing compounds (COS, SO/SO_2 and CS_2) which are identified for a variety of applications including problem-gas recognition, atmospheric component monitoring, bit gas detection, and bit wear evaluation.

The analyzer employs a continuous scanning mode, providing a substantially complete mass spectrum at each depth and enabling a more comprehensive spectral fingerprinting of hydrocarbon characteristics. By correlating the abovementioned geochemical indicators with available drilling parameters and lithologic data, operators achieve real-time evaluation of hydrocarbon distribution, sweet spots (in unconventional reservoirs), petroleum type, reservoir compartmentalization, fluid contacts, hydrocarbon zone near-miss scenarios, and seals. The ability to measure the presence of bit-generated gas can help ensure the health of the BHA and reduce drilling costs.

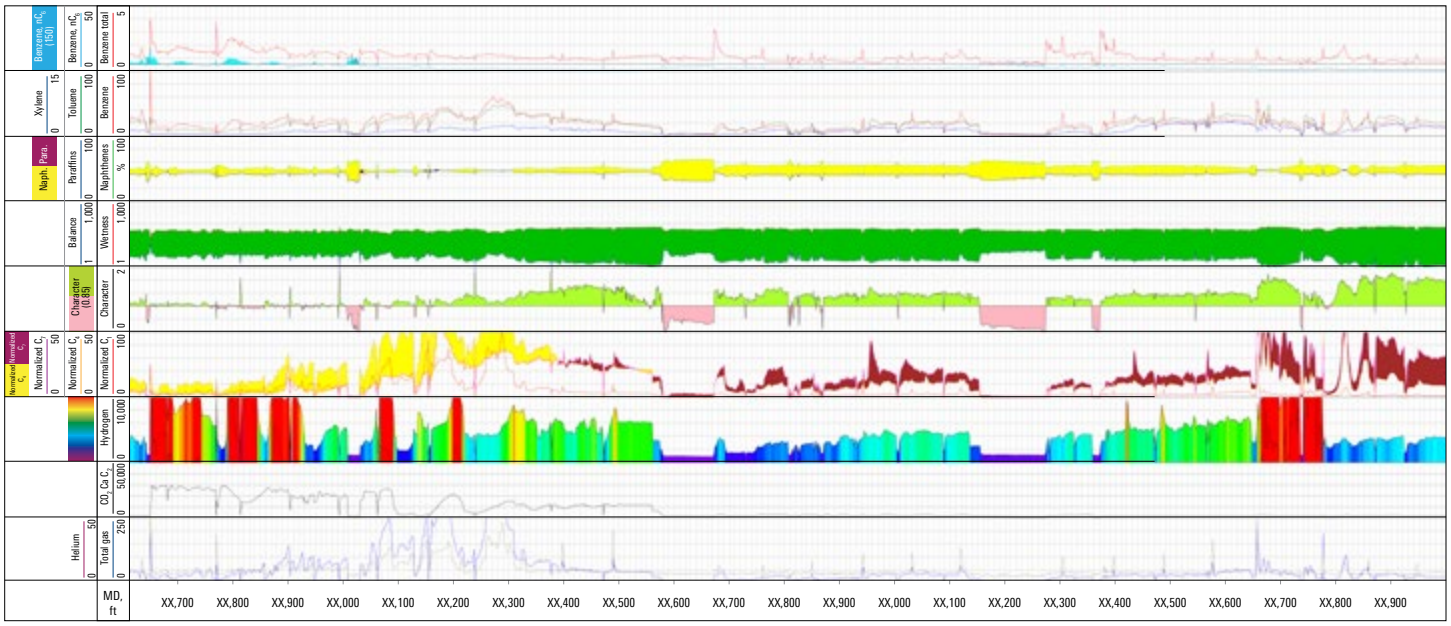
The analyzer's modest size, weight, and electrical requirements make deployment possible in even the most restrictive environments. The DQ1000 analyzer uses drilling data such as ROP, pumpstrokes, and depth to derive a lagdepth for geochemical logs. While drilling, analytical results can be viewed on-screen locally and remotely and are always available for immediate LAS import into commercially available graphics packages.

DQ1000 Analyzer Specifications	
Dimensions	26 in × 7½ in × 15 in
Weight	51 lbm
Power source	85–264 VAC (3.0–1.5 amp), 47–63 Hz
Cycle time	100 s

DQ1000

The DQ1000 analyzer requires no auxiliary gases, nor does it require combustion to produce a measurement, thereby reducing costs and HSE risk exposure. Analysis with a mass spectrometer also eliminates hydrocarbon-CO_2 interference. The instrument requires no field calibration for semiquantitative analysis and the continuous monitoring of five fixed atmospheric gases (N_2, O_2, Ar, He, and Kr) which enables additional postanalytical calibration.

The DQ1000 analyzer accurately distinguishes gas trapped in mud from atmospheric gas, enabling automated and remote monitoring of trap and extraction line performance. Optional two-port operation provides additional evaluation of hydrocarbon recirculation and potential mud additive interference. Instrument parameters are internally monitored on a continuous basis and automated email alerts are dispatched to appropriate technicians when optimal environmental or analytical criteria are not met. With this, the analyzer can be operated without dedicated support staff at the wellsite.



The DQ1000 analyzer uses direct quadrupole mass spectrometry to ionize, isolate, and detect conventional C_1–C_5 hydrocarbons, monitor C_6–C_{10} hydrocarbons, and distinguish the three major classes of volatile organic species (alkanes, cycloalkanes, and aromatics). The analyzer produces all of these outputs without the need for chromatographic preseparation.

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