YOUR PARTNER FOR WATER ANALYSIS IN THE UPSTREAM OIL & GAS INDUSTRY

At Hach, we understand your needs when it comes to maximizing the efficiency and effectiveness of your oil & gas operations. With more than 65 years as the leading expert in water quality analysis, you can trust Hach’s knowledgeable and responsive support team to address your unique needs for the water applications throughout your entire process:

- Boiler & cooling water
- Drilling & fracturing fluid
- Injection water
- Source, flowback, & produced water
- Wastewater treatment
- Water treatment

Whatever your water analysis challenge, Hach has the most complete solution—including a broad offering of easy-to-maintain on-line instrumentation, accurate laboratory equipment, comprehensive test kits, and high-quality prepared reagents, measuring the broadest range of test parameters in the industry.

Our lifetime technical support and a certified on-site service team are focused on keeping you on-line, extending the life of your equipment, and driving down your costs.

We invite you to review this brief introduction to Hach’s solutions for the upstream oil & gas industry, and let Hach know how our expertise can help you.
KEY MEASUREMENT PARAMETERS

Hydraulic Fracturing

- ATP: Adenosine Triphosphate
- Alk: Alkalinity
- Ba: Barium
- B: Boron
- COD: Chemical Oxygen Demand
- Cl: Chloride
- ClO₂: Chlorine Dioxide
- Cond: Conductivity/Total Dissolved Solids (TDS)
- ClO₂: Chlorine Dioxide
- Cl₂: Chlorine/Oxidants
- DO: Dissolved Oxygen
- Fe: Iron
- Micro: Microbiology
- O&G: Oil & Grease
- ORP: Oxidation-Reduction Potential
- pH: pH
- SiO₂: Silica
- SO₃: Sulfite
- SO₄: Sulfate
- TPH: Total Petroleum Hydrocarbon
- TOC: Total Organic Carbon (TOC)
- Turb: Turbidity and Suspended Solids
- Turbidity and Suspended Solids

Centralized Treatment

Flowback/Produced Water Storage

Mobile Treatment

Pump Trucks

Wellhead

Blender

Manifold

Working Tanks

Source Water

Disposal Well

Chemical Trucks

Process & Lab

Lab Specific
KEY MEASUREMENT PARAMETERS
Steam Assisted Gravity Drainage
KEY MEASUREMENT PARAMETERS

Offshore

- **ATP**: Adenosine Triphosphate
- **Alk**: Alkalinity
- **Ba**: Barium
- **B**: Boron
- **COD**: Chemical Oxygen Demand
- **Cl**: Chloride
- **ClO₂**: Chlorine Dioxide
- **Cond**: Conductivity/
  Total Dissolved Solids (TDS)
- **DO**: Dissolved Oxygen
- **Ca**: Hardness/Alkalinity
- **N₂H₄**: Hydrazine/Oxygen Scavenger
- **H₂S**: Hydrogen Sulfide
- **Fe**: Iron
- **Micro**: Microbiology
- **O&G**: Oil & Grease
- **ORP**: Oxidation-Reduction Potential
- **OiW**: Oil in Water
- **pH**: pH
- **SiO₂**: Silica
- **SO₄**: Sulfate
- **SO₃**: Sulfite
- **TOC**: Total Organic Carbon (TOC)
- **TPH**: Total Petroleum Hydrocarbon
- **Turb**: Turbidity and Suspended Solids
- **Vac**: Vacuum Deserator
- **Ultrafiltration**: Ultrafiltration
- **UF Backwash**: Ultrafiltration Backwash
- **Vacuum Deserator**: Vacuum Deserator
- **Vacuum Pump**: Vacuum Pump
- **O₂ Scavenger**: O₂ Scavenger
From Arsenic to Zinc, Hach offers portable, laboratory and process instruments, and reagents for more than 100 test parameters—the broadest range for water analysis in the upstream oil & gas industry.

### LAB ANALYSIS

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*By correlation.
Hach process instruments help you save money by controlling energy and chemical costs and optimizing staff efficiencies throughout your oil & gas operation.

CONTROLLERS

**Hach Digital Controllers**

Use any of the digital family sensors with the sc200 Digital Controller that accepts up to two sensors or the sc1000 Universal Controller that accepts up to eight sensors in any combination.

- Plug-and-play operation without special ordering or software configuration
- Many communication options including MODBUS® and wireless modes

Hach’s Digital Sensor family includes ammonia, chlorine, chlorine dioxide, conductivity, DO, nitrate, ORP, ozone, pH, phosphate, sludge blanket level, suspended solids, turbidity, and UV absorption.

**si792 2-Wire Transmitter**

A full-featured, intuitive 24 Vdc loop-powered electrochemistry transmitter for monitoring pH, ORP, and conductivity. Rugged construction is designed for Class I, Division 2 (C1D2) or Intrinsically Safe (IS) applications. Standard digital communication capabilities include HART®, PROFIBUS PA, or Foundation FIELDBUS.

FREE / TOTAL CHLORINE

**CL17 Free/Total Chlorine Analyzer**

0.035 to 5 mg/L free or residual chlorine

Dependable, colorimetric DPD free and total chlorine analysis.

- Chlorine analysis independent of pH, temperature, and sample flow
- Unattended operation up to 30 days
- Colorimetric DPD chemistry—fast, reliable, economical

**CLF10 sc and CLT10 sc Free and Total Reagentless Chlorine Analyzers**

Hach’s answer to reagentless amperometric chlorine measurement.

- Compatible with Hach’s “Plug-and-Play” Digital Controllers
- Real time process control
- EPA compliant according to Method 334.0
CONDUCTIVITY

3700 sc Digital Inductive (Electrodeless) On-Line Sensors
200 to 2,000,000 µS/cm
Blowdown, chemical concentration, leak detection, and dilution concentrations can be effectively monitored and controlled. There is no direct contact between the measuring element and the sample so they are contamination and corrosion resistant.
- Ideal for demineralizer regeneration
- Rugged, non-fouling design
- Sensor requires a Hach sc200™ or sc1000™ Digital Controller

Contacting Conductivity Sensor 8315
Monitor membrane health and demineralizer beds with any of these Contacting Conductivity/Resistivity Sensors. Offered in a variety of materials and mounting styles to exacting tolerances to accommodate most configurations
- High accuracy using Hach's DRY-CAL™ method
- Accurate temperature measurement

DISSOLVED OXYGEN

ORBISPHERE K1100 Optical Dissolved Oxygen Sensor
The first low-maintenance optical oxygen sensor.
- Only 1 calibration per year
- No membranes = 2 minutes of annual maintenance
- Compatible with Orbisphere 28 mm flow chamber for a low cost retrofit

ORBISPHERE 3100 Portable Optical Dissolved Oxygen Analyzer
Designed to be used in harsh environments, the Hach ORBISPHERE 3100 is the most rugged portable dissolved oxygen analyzer in the industry.
- Housed in a shock-tested stainless steel IP66 certified enclosure
- Advanced optical technology provides accurate results in seconds
- Brightly colored graphic display keypad, provides clear results in dark, cold or wet environments
- Only 1 calibration per year

Hach LDO® Model 2, Optical Process Dissolved Oxygen Probe
Hach's next generation LDO (Luminescent Dissolved Oxygen) Probe requires no calibration for the entire 2 year life of the sensor cap, which means it is ready to start measuring your DO (Dissolved Oxygen) right out of the box. With an added cutting-edge 3D calibration procedure that is conducted prior to shipping, the probe will not drift and is more accurate than ever before.
HARDNESS

**APA 6000™ Hardness Analyzer**

0.05 to 10 mg/L for hardness as calcium carbonate

Accurate, continuous hardness measurement.

- Accurately and continuously measures up to two sample streams (requires sample sequencing kit)
- Makes your water softening system more efficient and less costly

**SP 510™ Hardness Monitor**

Maximize your softener cycle time and minimize your regeneration cost.

- Low maintenance—operates unattended for two months
- Low reagent consumption
- Rugged, lightweight, and self-contained
- Immediately signals hardness breakthrough to activate regeneration

OIL-IN-WATER

**FP 360 sc Oil-in-Water Sensor**

Even the smallest oil traces can impair water quality. The FP 360 sc is specifically designed to detect traces of oil in industrial water all in a submersible probe design.

- Reduced laboratory testing
- High sensitivity and selectivity
- Calibrate once every two years
- Available in stainless steel or titanium

OXYGEN SCAVENGERS

**9586 sc Oxygen Scavenger Analyzer**

Save time on design. Accelerate your installation. Reduce training complexity. Simplify maintenance and operation.

- 0 to 500 ppb hydrazine programmable range
- 0 to 100 ppb carboydrazide programmable range
pH

pH™ Digital Differential
On-Line pH/ORP Sensors
For moderate- or high-conductive applications (>10 µS/cm) such as monitoring wastewater, cooling water blowdown, drum boiler water, or raw water treatment.
- Field-proven differential electrode measurement technique offers better accuracy
- Replaceable salt-bridge/protector simplifies maintenance and extends sensor life
- Sensor works with a Hach sc200 or sc1000 Digital Controller

SILICA/PHOSPHATE

Series 5500 sc Silica and Phosphate Analyzer
Lower Maintenance. Less Downtime.
- Only two liters of reagent are required for the analyzer to perform unattended for up to 90 days.
- The industry’s only pressurized reagent delivery system eliminates the frequent maintenance associated with pumps.
- Predictive diagnostic tools, including Hach’s proprietary Prognosys technology, warning LEDs, and high-visibility notification screens let you avoid unplanned downtime.
- No more dripping reagents on the instrument, the floor, or your clothing while fumbling with tubes and straws. Match the color-coded cap to the sealed reagent bottle and twist.
- Grab Sample In and Grab Sample Out features allow quick analysis of a grab sample poured into the analyzer, and facilitate taking a sample out of the analyzer to verify in a lab test.

SODIUM

9240 Sodium Analyzer
0 to 10,000 ppb, freely programmable 0 to 200 ppm with Cation-kit option
Low-level sodium measurement in high purity water.
- Automatic reactivation ensures optimum response time and performance; no acid etching required!
- Easy to operate and maintain with automatic calibration
- 100 days between reagent changes
- Up to 4 channels to analyze different sample streams on the same instrument
- 9245 Sodium Analyzer, single channel model, also available
TOTAL ORGANIC CARBON

Hach BioTector B7000 TOC Analyzer
A patented self-cleaning oxidation technology enables BioTector analyzers to easily handle difficult samples and significantly reduce the maintenance schedule and costs associated with traditional on-line measurement. BioTector analyzers eliminate build up issues from salts, particulates, fats, oils and greases that lead to drift and high maintenance. Configurations are available for TOC, TOC/TN, and TOC/TN/TP.

- Superior Reliability—Typically 99.7% uptime
- High Dependability—Patented two-stage advanced oxidation (TSAO) technology handles even the most challenging applications
- Smart Design—Self-cleaning technology and oversized tubing eliminates filtration and prevents clogging and sample contamination

Hach BioTector B3500c Analyzer
Maximum uptime and reliability for TOC analysis in condensate applications. Using patented technology, only requiring scheduled maintenance every 6 months, allowing for dual stream monitoring, and having one of the most compact analyzer footprints, the Hach BioTector B3500c delivers 99.8% uptime in condensate applications with the lowest operating cost.

- Worry-free TOC
- Lowest Cost of Ownership
- Small footprint = Critical Wall Space Savings
- Reagent Costs that Don’t Kill the Bottom Line
- One Instrument for Multiple Streams

TURBIDITY & SUSPENDED SOLIDS

TSS sc Turbidity and Suspended Solids Sensor
TSS sc probes can measure both online suspended solids and turbidity in one instrument. They cover the total measurement range from the finest turbidity to solids over a wide range. TSS sc probes have been specially developed for industrial applications.
Hach laboratory instruments are designed to help you confidently obtain accurate results to help monitor your process, verify online instrumentation, and meet compliance objectives.

**PHOTOMETRIC & COLORIMETRIC**

**DR 1900 Spectrophotometer**
- The lightest and most compact portable spectrophotometer
- Even in dusty or wet conditions, testing is easy
- With the highest number of preprogrammed methods and an easy-to-use interface

**DR 3900 Spectrophotometer**
- Easy step-by-step testing procedure
- Elimination of false readings
- Accurate results every time

**DR 6000 Spectrophotometer**
- Accessories for High Volume and High Accuracy Testing Needs
- Advanced Quality Assurance at Your Fingertips
- Guided Procedures and Elimination of False Readings
- Automatically Avoids Errors

**TNTplus® Bar-Coded Chemistries**
TNTplus vials work exclusively with the DR 6000, DR 3900, and DR 1900* Spectrophotometers.
- Error free and fast—instrument automatically detects and runs the correct method
- Easy, accurate recognition—color-coded parameters and ranges
- Best results—10 measurements in one rotation, eliminating outliers; optically superior glassware

*Barcode reading, vial spinning, and outlier rejection features not available on DR 1900.

**DR 900 Colorimeter**
- Water testing for the most demanding field environments
- Intuitive user interface
- Simple data communication
Hydraulic Fracturing Water Analysis Kit
Get real-time results in the field in minutes. Offering on-site results in an easy-to-use, rugged, portable lab, Hach’s Hydraulic Fracturing Water Analysis Kit covers parameters critical to water analysis in oil and gas applications, including source water, fracturing fluid, produced water, flowback water, water treatment, drilling fluids, and enhanced oil recovery.
- Obtain results in the field in just minutes for real-time decision making
- Proven methods designed for oil & gas applications with extended ranges
- Step-by-step procedures to make field testing simple

Hach Test Kits
From beakers to colorimeters, everything you need is supplied in Hach Single- and Multi-parameter Test Kits.
- Pre-measured reagents
- Accurate color matching
- Step-by-step instructions
- Upright reagent storage
- Rugged, chemical-resistant cases

2100AN Laboratory Turbidimeter and 2100Q Portable Turbidimeter
The primary standards for versatility, accuracy, and value in turbidity measurement.
- Pre-programmed calibration procedure
- Smart self diagnostics
- Meets or exceeds EPA criteria
**HQd Meters & IntelliCAL™ Probes**

*Use a single handheld HQd meter and interchangeable IntelliCAL probes for quick, simple, and reliable measurements.*

- Take the guesswork out of your measurements.
- Hach HQd smart probes automatically recognize the testing parameter, calibration history, and method settings to minimize errors and set-up time.
- HQd portable and benchtop meters and full suite of interchangeable IntelliCAL laboratory and field probes for testing Conductivity, DO, ORP, pH, Ammonia, and many more!

**sensION®+ Meters & Probes**

Hach sensION+, an all-in-one system with guided menu navigation makes general testing fast and simple. Each system is designed to be used in a wide variety of applications and comes complete with everything you need to start testing. Measurements for temperature, pH, conductivity, salinity, TDS, ORP, ammonia, nitrate, fluoride, sodium, chloride, and ammonium are available.
Radiometer Analytical TitraLab® Workstations

Offers a variety of options for customizable titration measurement in the chemical industry. Accuracy, reliability and ease of use are the key features of these titration systems. For example, the TitraLab 965 Potentiometric Titration Workstation can perform acid-base determinations in aqueous/non-aqueous media, redox determinations, KF titrations, and much more. The TitraLab 870 Combined Conductivity and Potentiometric Titration Workstation provides pH, conductivity and ion measurements.

Additional parameters for the TitraLab 870 include mercaptans, TAN, TBN, and chloride. The TitraLab 850 Karl Fischer Titration Workstation has an integrated solvent handling pump for routine Karl Fischer titrations for moisture content determination in solid or liquid samples.

AutoCAT™ 9000 Automatic Chlorine Dioxide and Chlorine Amperometric Titrator

Use to monitor and protect RO membranes and ion exchange resins, optimize dechlorination processes and calibrate process instruments. Measure free and total chlorine, chlorine dioxide, and sulfite.
Microbiology Media
Hach’s ready-to-use Microbiology Media eliminates measuring, mixing, and autoclaving necessary to prepare media. Glass and plastic ampules, bottled media, agar plates, powder pillows, and containers afford maximum shelf life and ease of use. Available for testing/measuring total coliforms, *E. coli*, yeast and mold, Heterotrophic bacteria, PRY, and more.

BART™: Easy Bacterial Detection
A simple and effective way to detect specific bacterial groups and algae in water. The Biological Activity Reaction Test (BART®) provides an excellent method for determining which specific type of bacteria is the source of an existing problem.

*BART is a trademark and patented product of Droycon Bioconcepts, Inc., U.S. Patent 4,906,566

LuminUltra Total Living Biomass Assessment (ATP)
Microbiological testing solutions provide feedback on contamination sooner for proactive control!
- Detect total active microorganisms in any type of sample
- Results in minutes—not hours or days—for real-time results
- Lab or field operable for maximum flexibility
At Hach we understand that your operation’s problems are unique and we have developed Hach ServicePlus® Certified Programs that are vital to helping you solve your maintenance and support problems.

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