

Complete Water Analysis for the **UPSTREAM OIL & GAS INDUSTRY**



Be Right™

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

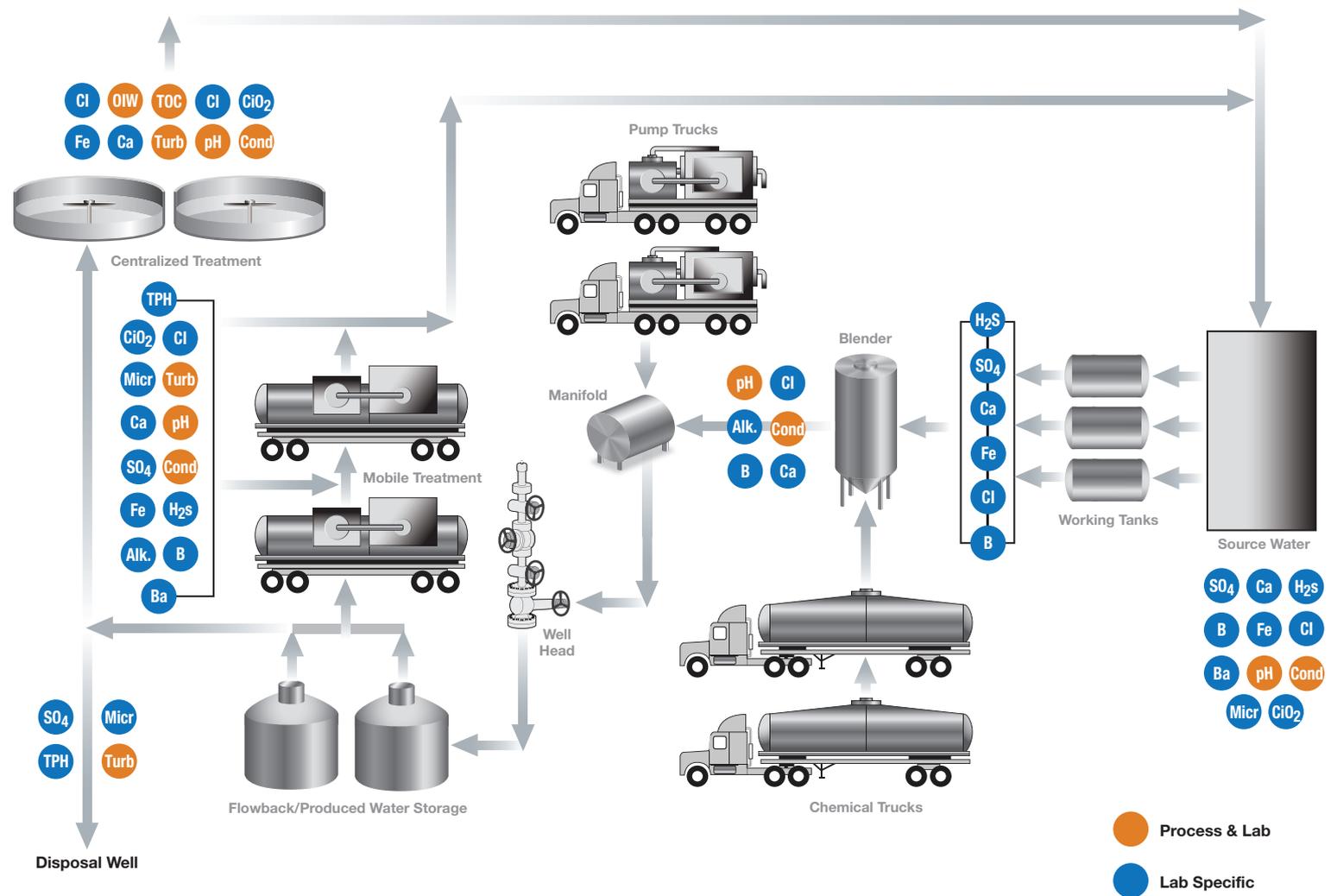
Whatever your water analysis challenge, Hach has the most complete solution—including a broad offering of easy-to-maintain on-line instrumentation, accurate laboratory equipment, comprehensive test kits, and high-quality prepared reagents, measuring the broadest range of test parameters in the industry.

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



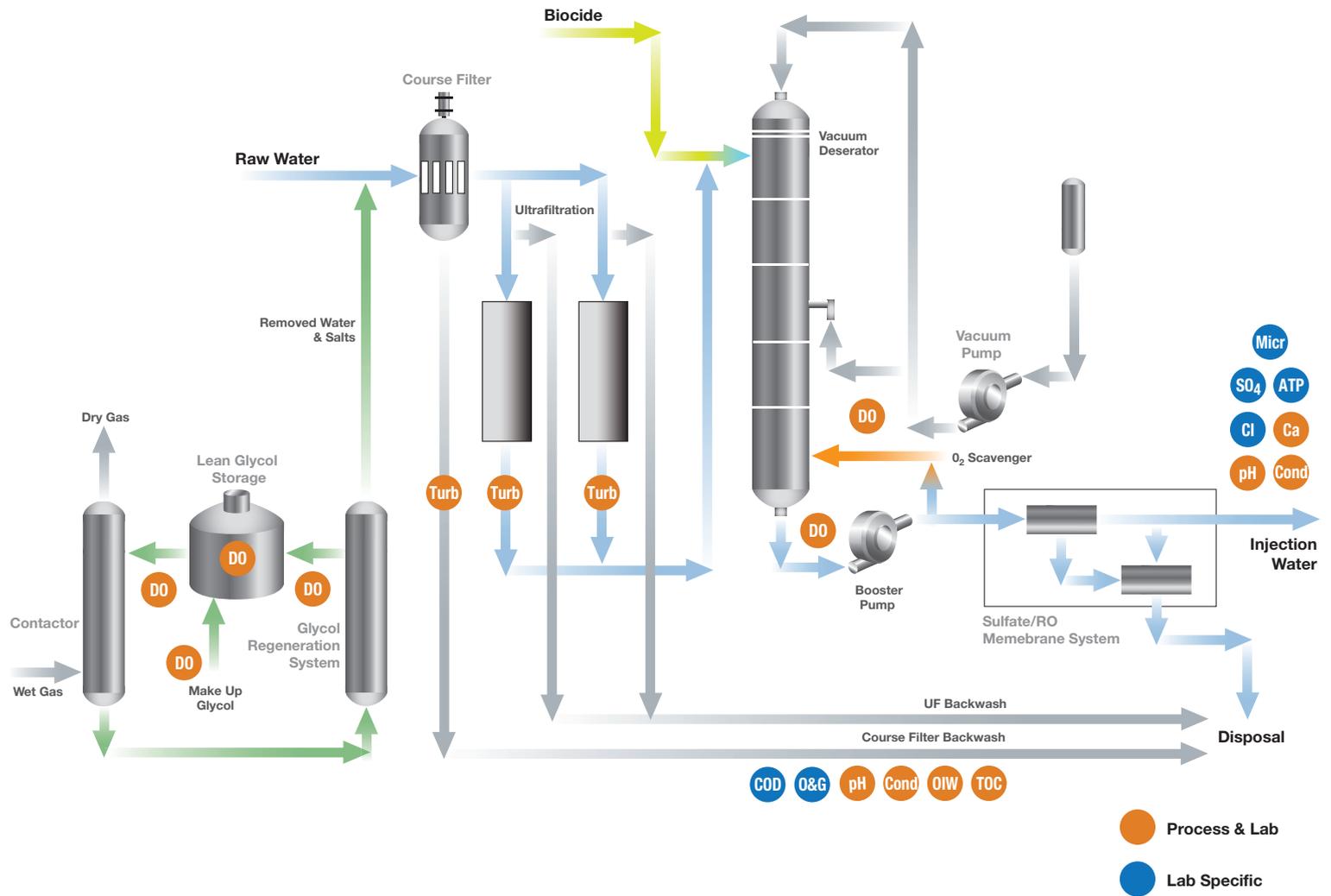
- ATP** Adenosine Triphosphate
- Alk** Alkalinity
- Ba** Barium
- B** Boron
- COD** Chemical Oxygen Demand
- Cl** Chloride
- Cl₂** Chlorine/Oxidants
- ClO₂** Chlorine Dioxide
- Cond** Conductivity/
Total Dissolved Solids (TDS)

- DO** Dissolved Oxygen
- Ca** Hardness/Alkalinity
- N₂H₄** Hydrazine/Oxygen Scavenger
- H₂S** Hydrogen Sulfide
- Fe** Iron
- Micr** Microbiology
- O&G** Oil & Grease
- ORP** Oxidation-Reduction Potential

- OIW** Oil & Grease
- pH** pH
- SiO₂** Silica
- SO₄** Sulfate
- SO₃** Sulfite
- TOC** Total Organic Carbon (TOC)
- TPH** Total Petroleum Hydrocarbon
- Turb** Turbidity and Suspended Solids

KEY MEASUREMENT PARAMETERS

Offshore



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HACH WATER ANALYSIS TOOLS FOR

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.

ANALYSIS PARAMETER	PROCESS INSTRUMENTS AND ANALYZERS	LAB ANALYSIS																	
		Photometric and Colorimetric					Electro Chem		Titra-metric		Micro		Other Tools		Applications				
		Hach Spectrophotometers	Hach Colorimeters	Hach Prepared Reagents	Hach Turbidimeters	Hach Test Strips	Hach HQd Meters & Probes	Hach sensION+ & Radiometer Analytical ISEs	Hach Digital Titrator	Hach AutoCAT 9000 Titrator	Hach Microbiology Media	LuminUltra	Hach Sigma Samplers	Hach Test Kits & Portable Labs	Laboratory Supplies	Hydraulic Fracturing	Steam-Assisted Gravity Drainage	Offshore	Other Onshore
Alkalinity	• APA 6000 Analyzer			■		■			■					■	■	■			■
Ammonia	• AMTAX sc Analyzer • APA 6000 Analyzer	■	■	■		■			■					■	■	■			■
ATP				■								■			■	■	■	■	■
Bacteria, Heterotrophic Aerobic											■			■		■	■	■	■
Bacteria, Iron Reducing											■			■		■	■	■	■
Bacteria, Slime Forming											■			■		■	■	■	■
Bacteria, Sulfate Reducing											■			■		■	■	■	■
Barium		■	■	■										■	■	■			
Biochemical Oxygen Demand (BOD)	• BioTector TOC Analyzer* • UVAS sc Sensor*	■	■	■											■	■	■		■
Boron		■	■	■											■	■			
Bromide								■						■	■	■			
Calcium								■	■					■	■	■			
Chemical Oxygen Demand (COD)	• UVAS sc Snesor* • BioTector TOC Analyzer*	■	■	■				■							■	■			■
Chloride							■	■	■					■	■	■	■	■	■
Chlorine	• Cl17 Analyzer • CLF10 & CLT10 sc Analyzers	■	■	■		■			■	■				■	■	■	■	■	■
Chlorine Dioxide	• 9187 sc Analyzer	■	■	■				■	■	■				■	■	■		■	■
Conductivity/TDS	• 3400 Contacting Conductivity Sensors • 3700 Inductive Conductivity (Electrodeless) Sensors						■	■					■	■	■	■	■	■	■
Dissolved Oxygen (DO)	• LDO Model 2 Probe (ppm) • K1100 LDO Analyzer (ppb) • 3100 Portable (ppb)	■	■	■			■		■						■	■	■	■	■
Hardness, Calcium	• APA 6000 Analyzer • SP510 Monitor	■	■	■		■			■	■				■	■	■	■	■	■
Hydrazine / Oxygen Scavengers / Reducing Agents	• 9586 Oxygen Scavenger Analyzer	■	■	■											■	■	■		

UPSTREAM OIL & GAS

For more information,
call 1-800-227-4224
or go to:
hach.com/oilandgas

ANALYSIS PARAMETER	PROCESS INSTRUMENTS AND ANALYZERS	LAB ANALYSIS																	
		Photometric and Colorimetric					Electro Chem		Titra-metric		Micro		Other Tools			Applications			
		Hach Spectrophotometers	Hach Colorimeters	Hach Prepared Reagents	Hach Turbidimeters	Hach Test Strips	Hach HQd Meters & Probes	Hach sensION+ & Radiometer Analytical ISEs	Hach Digital Titrator	Hach AutoCAT 9000 Titrator	Hach Microbiology Media	LuminUltra	Hach Sigma Samplers	Hach Test Kits & Portable Labs	Laboratory Supplies	Hydraulic Fracturing	Steam-Assisted Gravity Drainage	Offshore	Other Onshore
Iron		■	■	■		■					■			■	■	■	■		■
Manganese		■	■	■										■		■			
Microbiology											■	■			■	■	■	■	■
Nitrate	• NITRATAX plus sc Sensor	■	■	■			■	■						■	■			■	■
Oil & Grease	• FP360 sc OIW Sensor			■										■	■	■	■	■	■
Oil-In-Water	• FP360 sc OIW Sensor			■										■	■	■	■	■	■
Organics	• BioTector TOC Analyzer* • UVAS sc Sensor*	■	■	■										■	■	■			■
Ozone	• ORBISPHERE C1100 Ozone Sensor	■	■	■										■	■	■	■		
pH / ORP	• pH / ORP Sensors • 8362 sc High Purity pH / ORP		■	■		■	■	■					■	■	■	■	■	■	■
Phosphate	• PHOSPHAX sc Analyzer • 5500 sc Phosphate Analyzer	■	■	■		■								■	■	■			
Potassium		■	■	■				■						■	■	■			
Salinity									■					■	■	■		■	■
Silica	• 5500 sc Silica Analyzer	■	■	■										■	■	■	■		■
Sodium	• 9245 Sodium Analyzer						■	■						■	■	■	■		■
Sulfate		■	■	■										■	■	■	■		■
Sulfide, H ₂ S		■	■	■				■						■	■	■	■		■
Sulfite				■					■	■				■	■	■			
Tannins		■	■	■										■	■	■			
Total Organic Carbon (TOC)	• BioTector TOC Analyzer	■	■	■										■	■	■			■
Total Suspended Solids	• TSS sc Sensor	■	■											■	■	■	■	■	■
Total Petroleum Hydrocarbon (TPH)	• APA 6000 Analyzer	■	■	■										■	■	■	■	■	■
Turbidity	• TSS sc Sensor • Surface Scatter 7		■		■									■	■	■	■	■	■

*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

**EPA
COMPLIANT**



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

**EPA
COMPLIANT**

CONDUCTIVITY

3700 sc Digital Inductive (Electrodeless) On-Line Sensors

200 to 2,000,000 $\mu\text{S}/\text{cm}$

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 carbonylhydrazide programmable range



pHD™ Digital Differential On-Line pH/ORP Sensors

For moderate- or high-conductive applications (>10 $\mu\text{S}/\text{cm}$) 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 Prognosis 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.



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

SODIUM

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

**EPA
COMPLIANT**



ELECTROCHEMICAL



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.

TITRAMETRIC & TOTAL OXIDANTS

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



HACH SERVICE PROGRAMS



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.

Whether it is a lack of resources or skills, an instrument that is down, bringing your plant back online or the need for a predictable budget, we have programs to fit the unique challenges you face in your organization.

Get your problems solved with Hach ServicePlus programs.

hach.com/service | 800-227-4224



For more information, visit hach.com/oilandgas or call toll-free 800-227-4224.



Be Right™

YOUR PARTNER FOR WATER ANALYSIS IN UPSTREAM OIL & GAS

We invite you to take a look at our comprehensive line of product solutions and services. They're the most accurate, dependable, and cost-effective products you can buy.

Hach offers:

- On-line process instrumentation and reagents
- Laboratory equipment, reagents, and supplies
- More EPA-approved methods than any other company
- Portable test kits and field instruments
- Automatic samplers and flow meters
- Local sales and service teams
- Service partnership programs and customized training

For more information, visit hach.com/oilandgas or call toll-free 800-227-4224.

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