NEW TECHNOLOGY ADVANCEMENTS
OTCO - CLASS III AND IV WORKSHOP

Claros Water Intelligence System and Applitek

-Ted Simmons – Regional Sales Manager – S. Ohio

AGENDA

- What is the industry facing today?
- Where is the industry going?
- Evolving technology
- Hach evolving capabilities
- What is next?
- Applitek Analyzers- Brief Overview

THE CHALLENGE. . .

Evolving workforce

Budget pressure

Increasing regulations

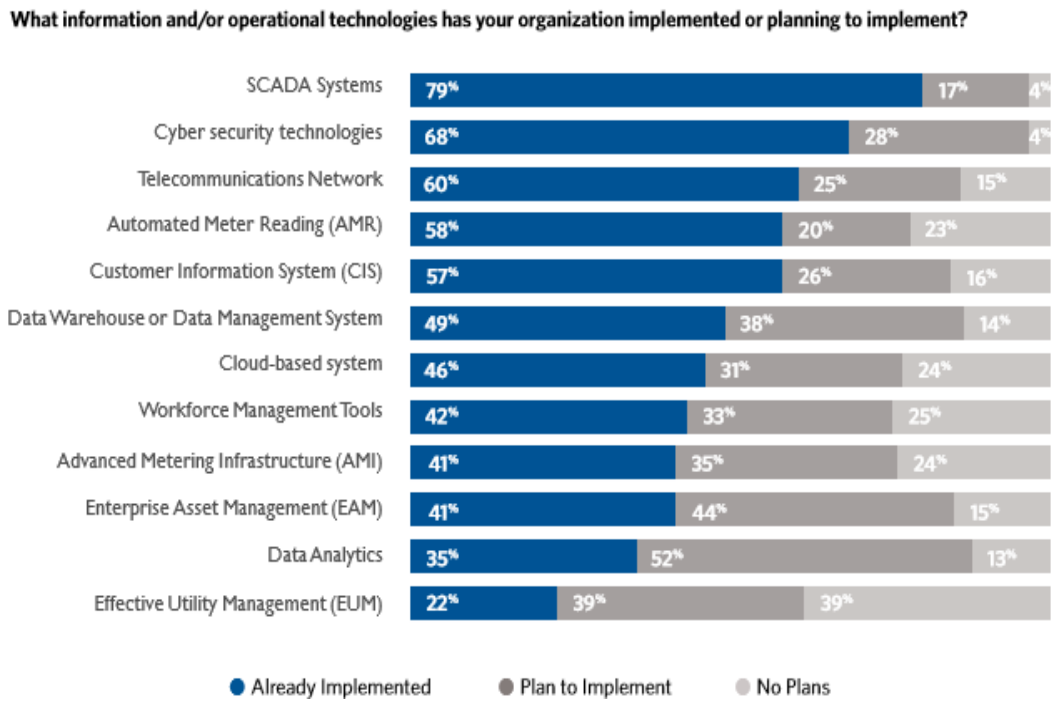
Technology Evolution

More data

What are your biggest issues?

HACH
Be Right™

WHERE IS THE INDUSTRY GOING?



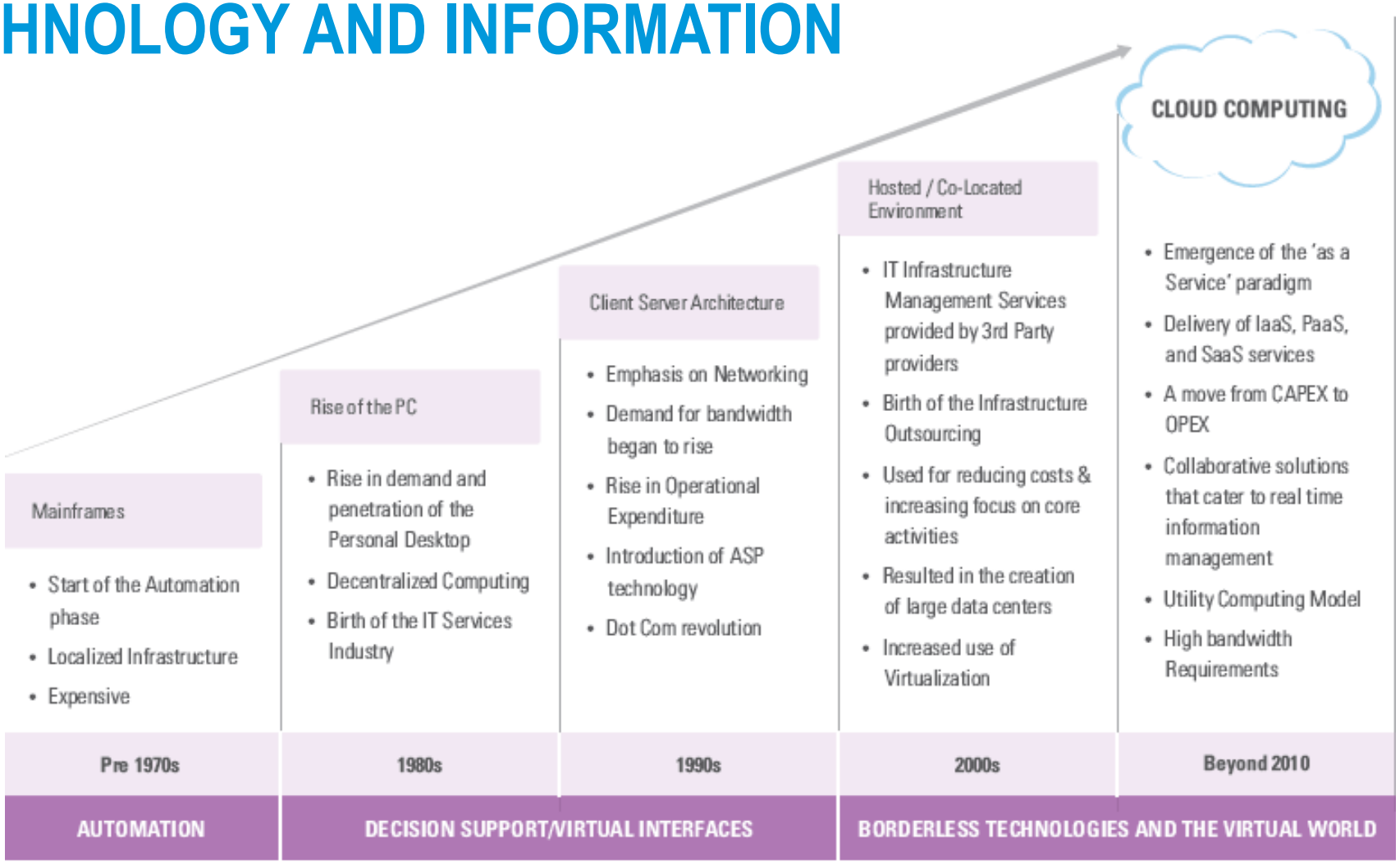
Source: Water Industry Report 2017, Black & Veatch

- Lots of “systems”
- Are the strategic goals aligned?
- Is anyone thinking of what information we need and why?

HACH
Be Right™

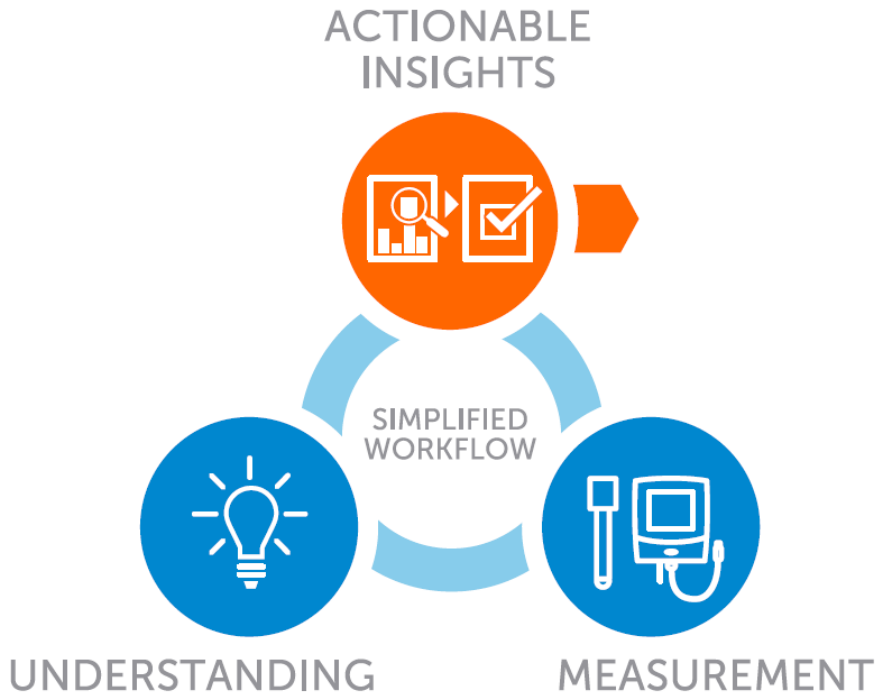
EVOLUTION OF TECHNOLOGY AND INFORMATION

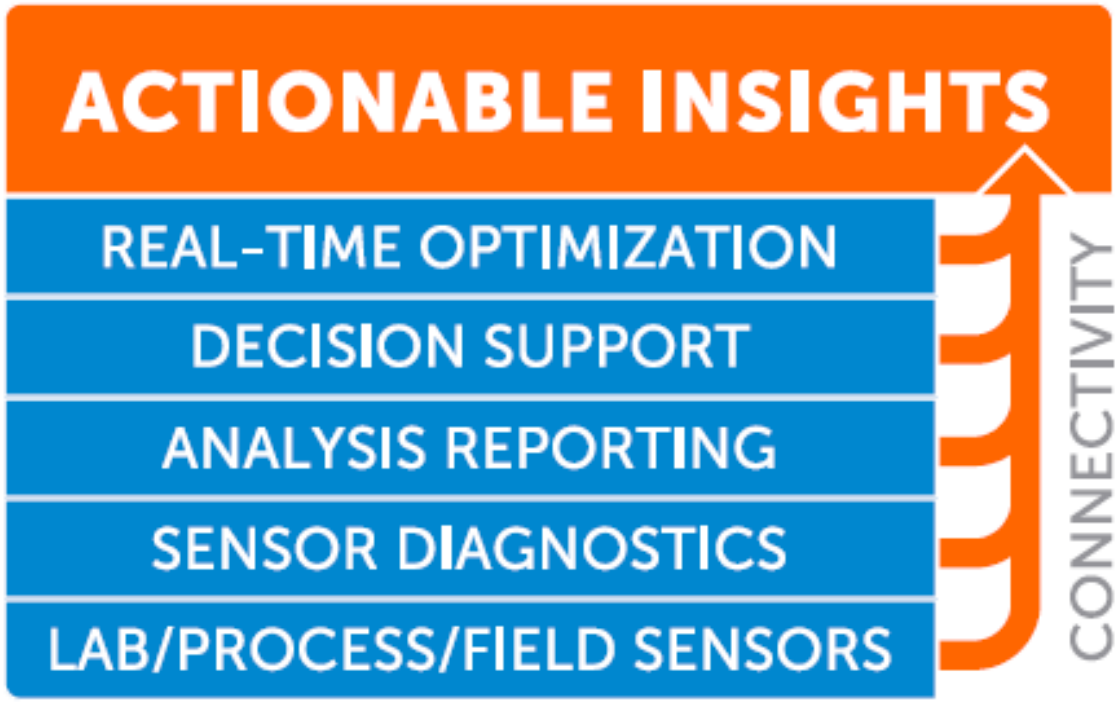
- Technology is evolving (ready or not!)
- Why should we care… uncover opportunity!
- Growth of data
- Growth of integration capabilities
- Chance to automate to boost quality and improve efficiencies



HACH
Be Right™

HACH'S EVOLUTION





HACH
Be Right™

OUR GOAL: DELIVER SOLUTIONS THAT IMPROVE DECISION MAKING

FROM…

Uncertainty

TO…

Clarity

HACH
Be Right™

FROM UNCERTAINTY TO CLARITY

Instrument

Predictive Diagnostics

Asset Maintenance

Data Management

Aggregate data

Standardize results

Visualize and collaborate

Process Management

(RTC) Real Time Control

Compliance
Energy
Chemicals

ELEMENTS WORK INDEPENDENTLY BUT CREATE A MORE POWERFUL SYSTEM WHEN COMBINED.

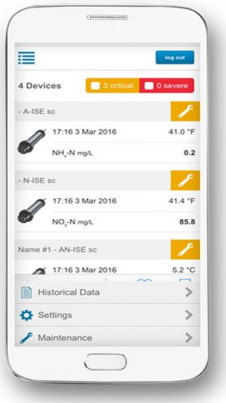
"IMPROVING CONFIDENCE AND UNDERSTANDING IN INFORMATION AND DATA"

HACH
Be Right™

CLAROS PRODUCTS & MODULES

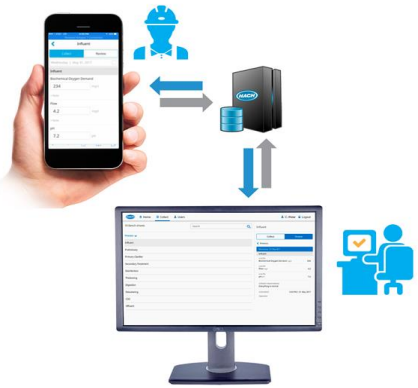
Instrument Management

Sensor Management Prognosys



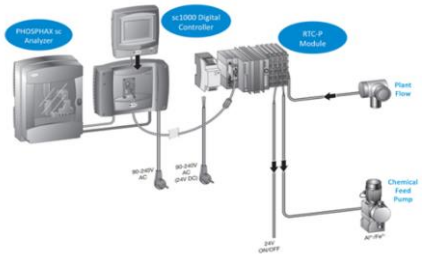
Data Management

Collect
Visualize
WIMS



Process Management

Real Time Control (multiple modules)



INSTRUMENT MANAGEMENT

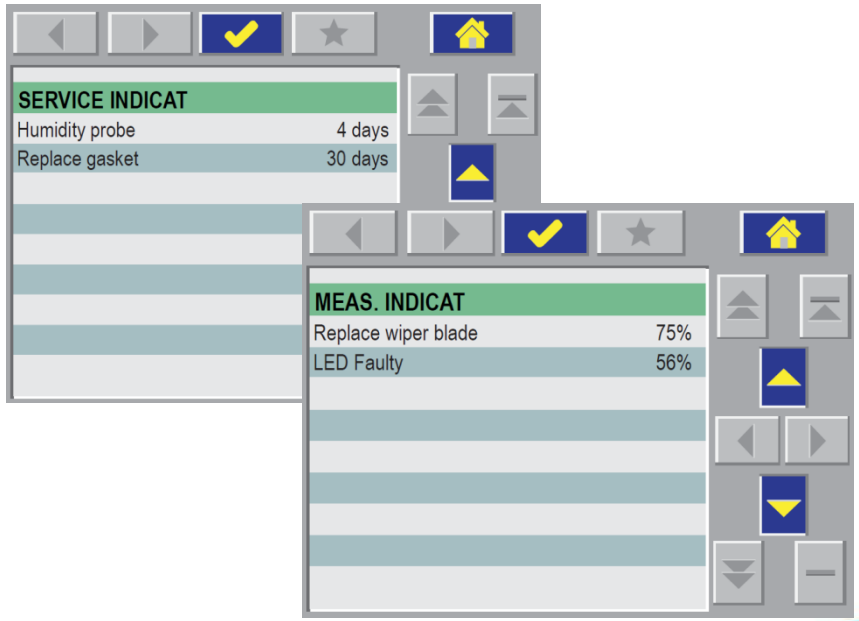
Instrument Management

- Sensor Management
- Prognosys™
  - Predictive
  - diagnostics

Providing validated water quality information.

PROGNOSYS™ PREDICTIVE DIAGNOSTICS
VALIDATED WATER QUALITY INFORMATION

- Evaluating internal sensor signals and calculating
  - Measurement indicator informing about measurement quality and accuracy
  - Service indicator predicting upcoming service tasks and advising operation to act



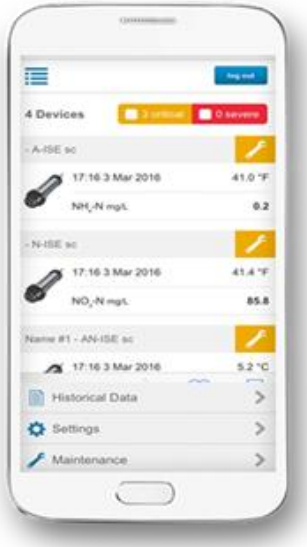
PROGNOSYS™

HACH
Be Right™

MOBILE SENSOR MANAGEMENT

Hach® Mobile Sensor Management provides clarity through easy access to crucial information, helping you manage your process and be proactive in your maintenance.

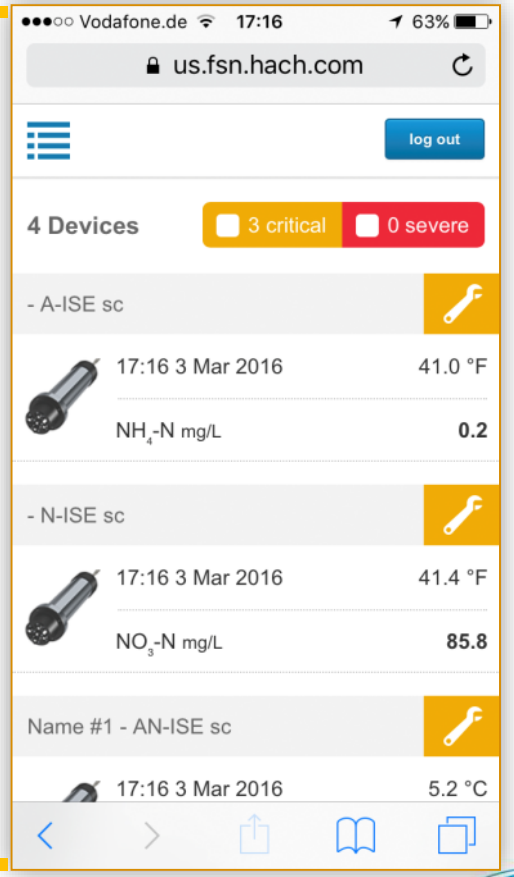
- **Guidance through actionable sensor information**
- **Alignment of process and laboratory measurements**
- **Simple maintenance instructions in the palm of your hand**



HACH
Be Right™

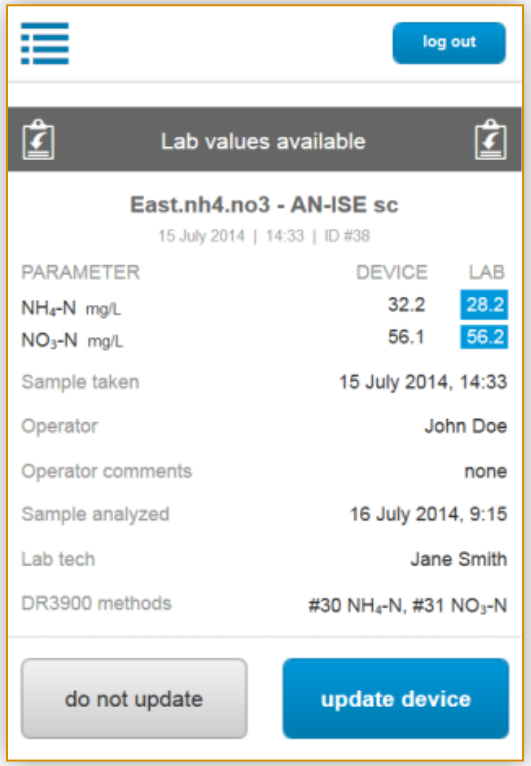
GUIDANCE THROUGH ACTIONABLE SENSOR INFORMATION

- Focus on your highest priorities, avoid unexpected downtime and reduce maintenance costs with access to actionable information and proactive notifications about maintenance needs
- Accessible anytime, anywhere on your smartphone, tablet or PC
  - All measurement values
  - Instrument status



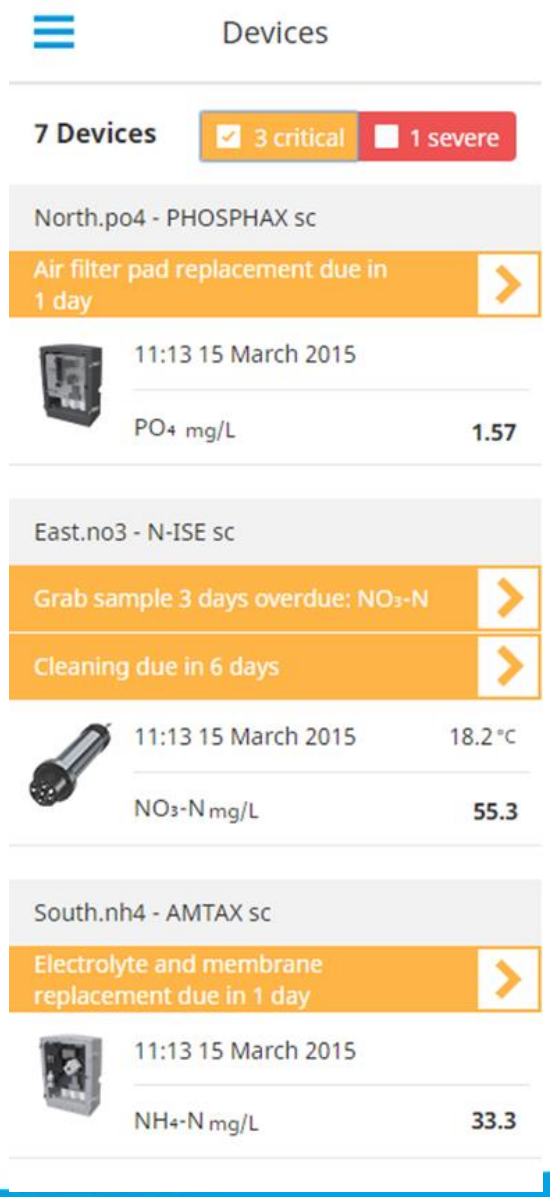
ALIGNMENT OF PROCESS AND LABORATORY MEASUREMENTS

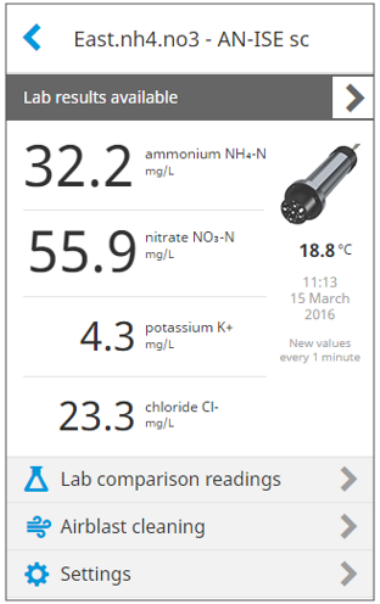
Verify and adjust process instrument measurements using laboratory reference values with the tap of a finger.

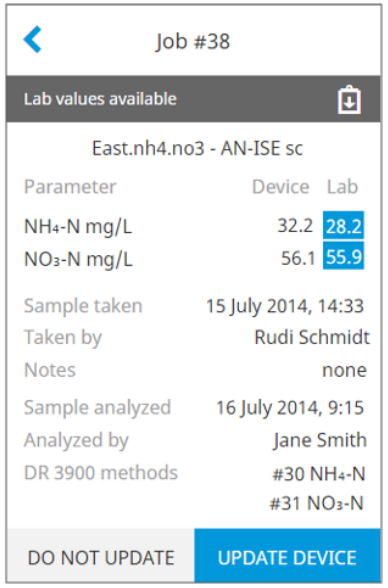


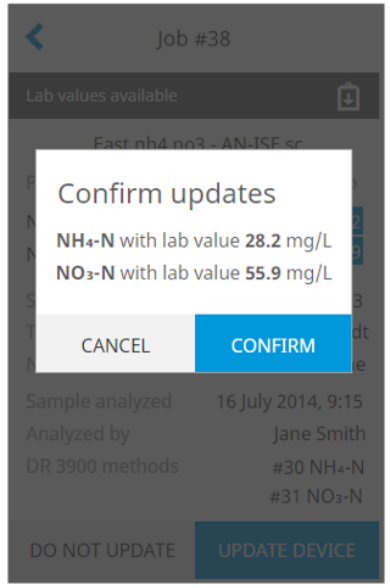
HACH
Be Right™

SENSOR MANAGEMENT CAPABILITIES





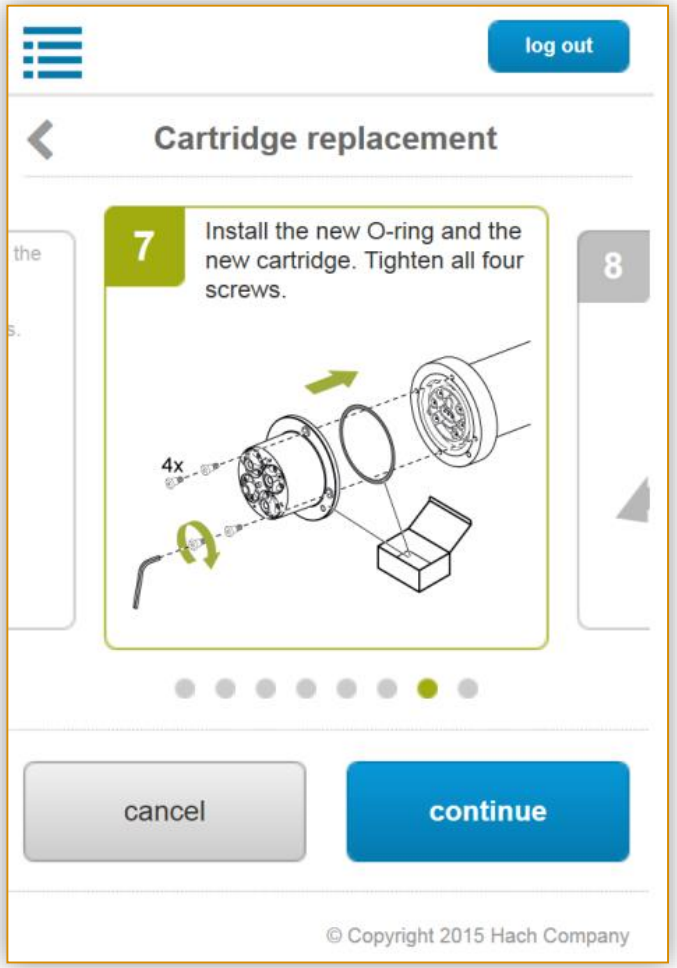




HACH
Be Right™

SIMPLE MAINTENANCE INSTRUCTIONS IN THE PALM OF YOUR HAND

- Perform instrument maintenance quickly and accurately by following step-by-step instructions on your mobile device

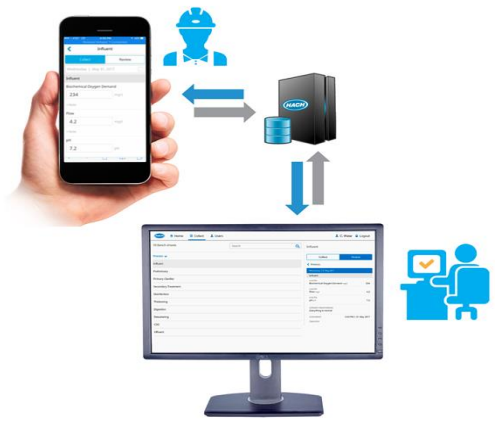


HACH
Be Right™

DATA MANAGEMENT

Data Management

Collect
Visualize
WIMS



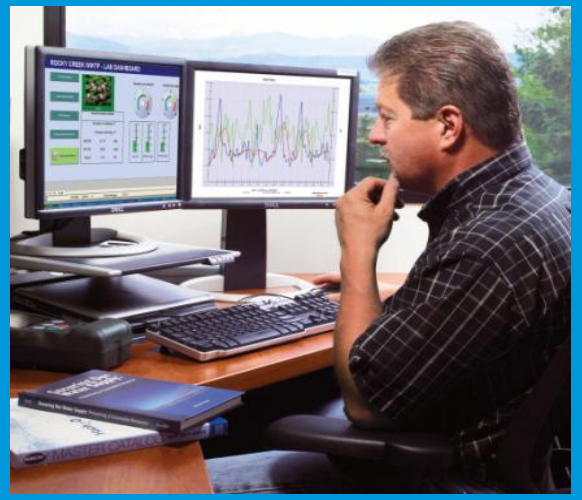
Water quality driven data management solution

Data management that can service many strategic needs:

- Centralization (Organize related processes around the globe)
- Data aggregation / Integration (Single integration point Hach data globally)
- Tool chain from device connectivity to predictive analytics

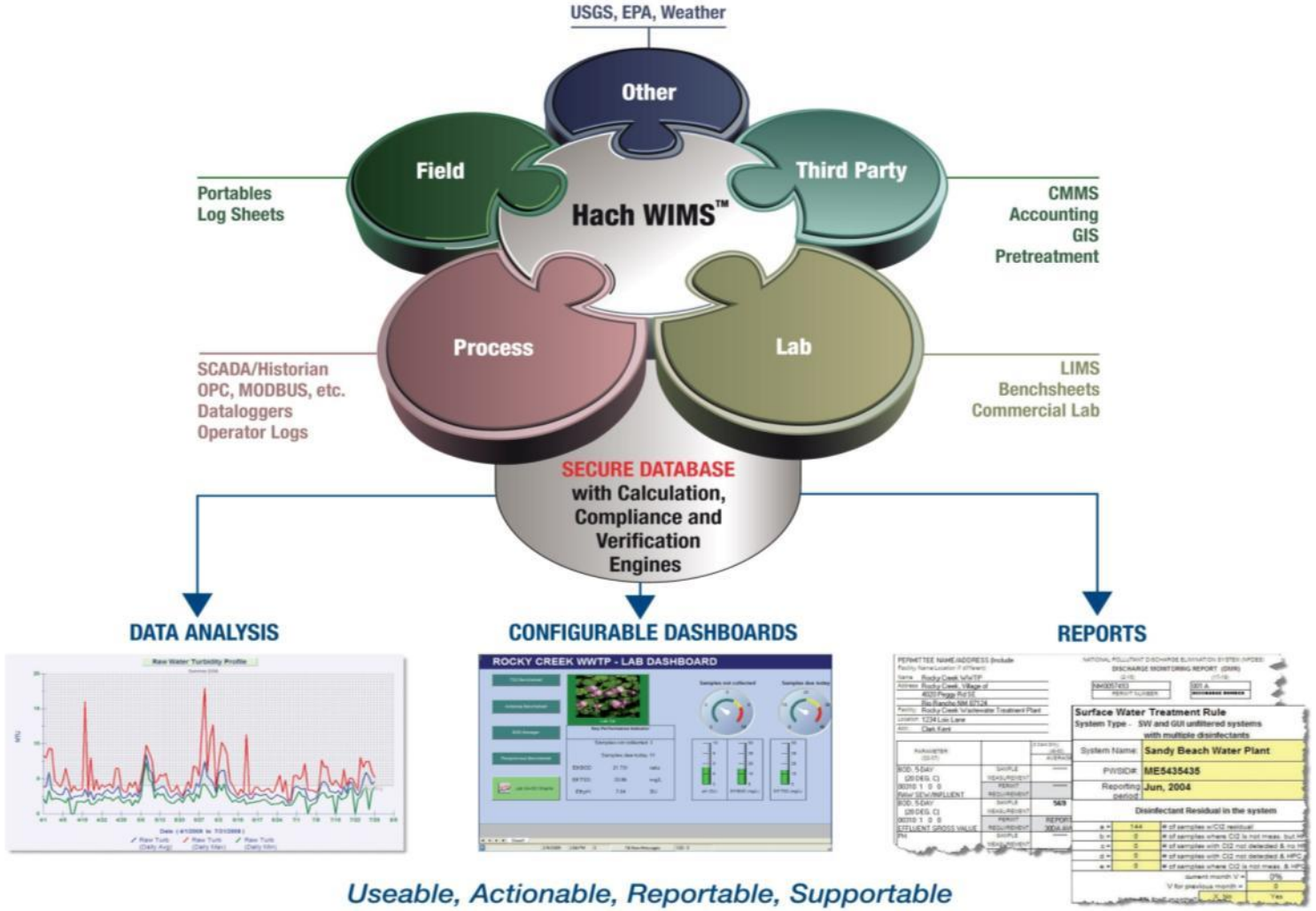
Make it Meaningful!

DATA?



Don’t get slowed down by:

- Piles of paperwork
- Time-consuming reports
- Mountains of unusable data
- Mind-numbing calculations

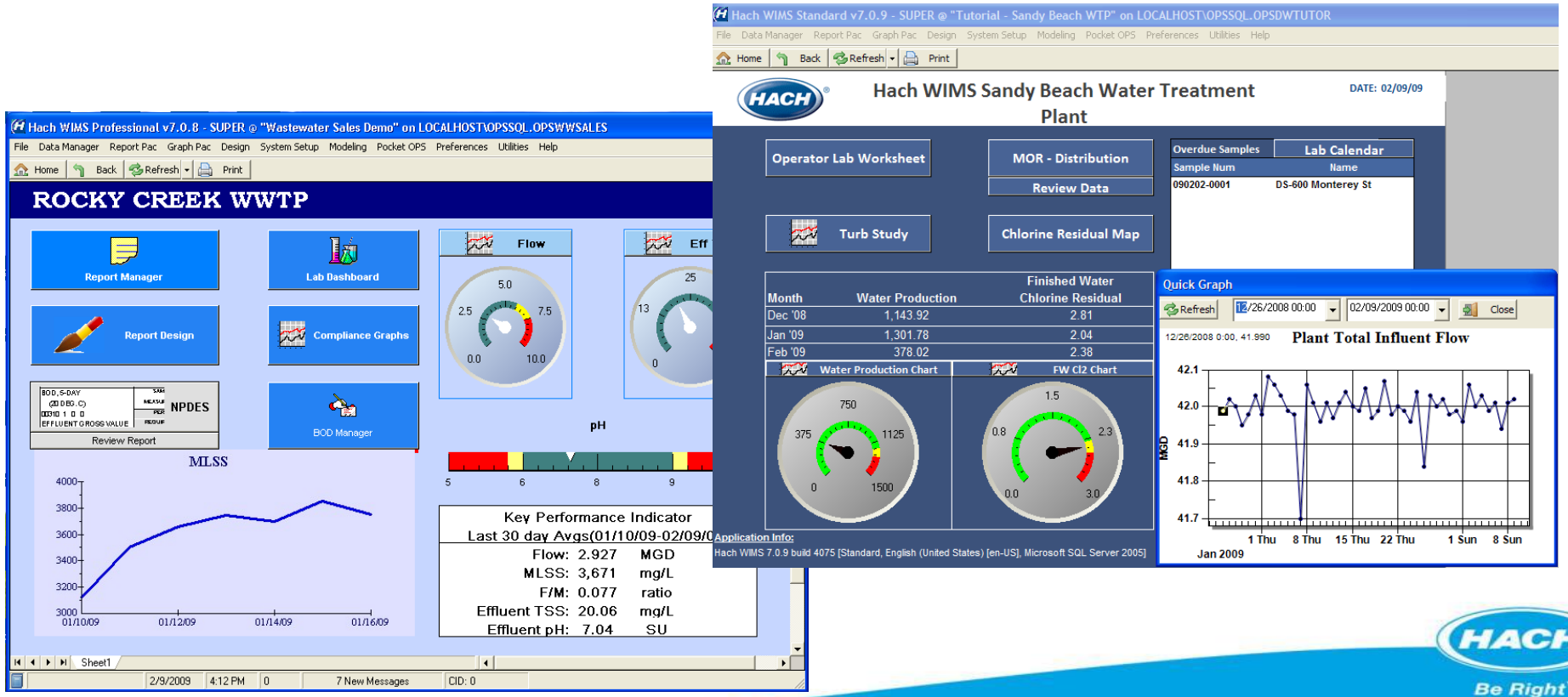


- Collects data in a central database
- Access to data provided locally or over secure Web
- Guarantees safe and secure historical records
- Eliminates multiple data entries
- Tracks inputs through audit trails

HACH
Be Right™

MONITOR ORGANIZATION PERFORMANCE

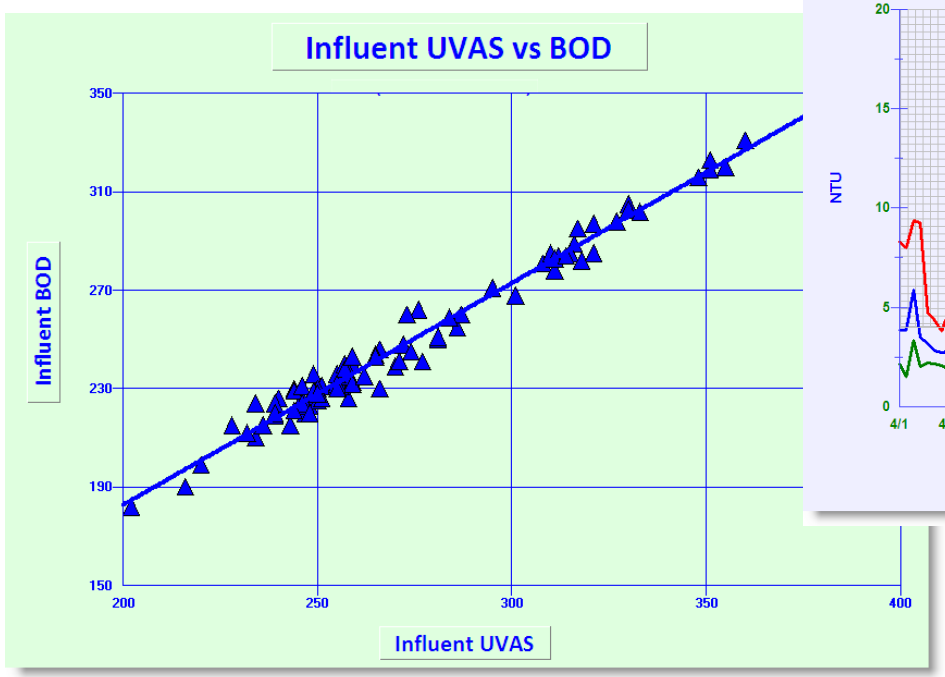
- Personalized dashboards allow you to:
  - Track the information specific to your use
  - Obtain quick retrieval of reports, graphs, and entry forms
  - Access shortcuts to other areas of the software

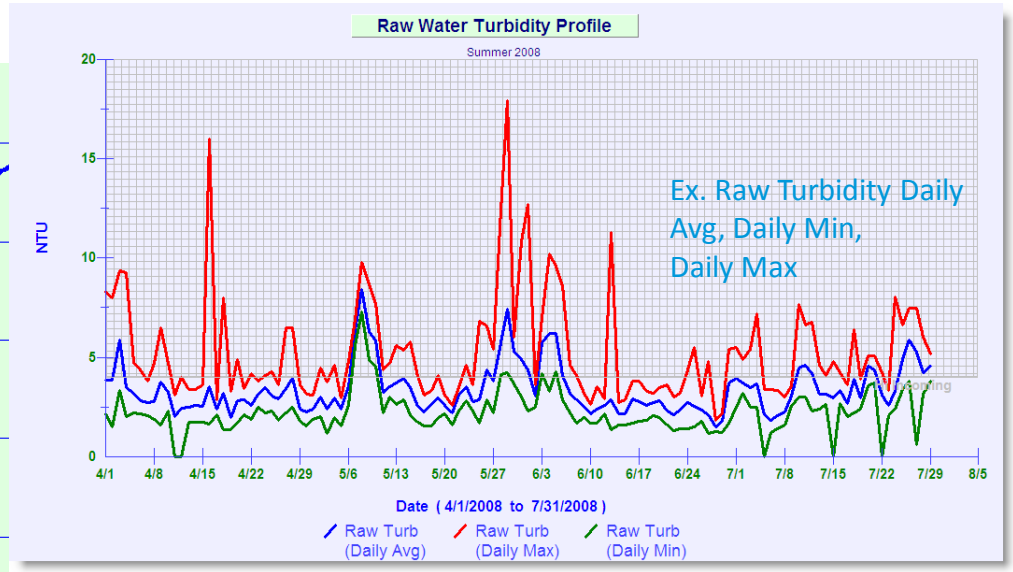


Be Right™

CHART DATA FOR COMPREHENSIVE ANALYSIS

- Integrated reporting and graphing tools allow you to:
  - Simplify report generation and data analysis
  - Configure graphs for trend analysis, correlations, and control charting
  - Easily compare various sets of data to identify cost reduction opportunities

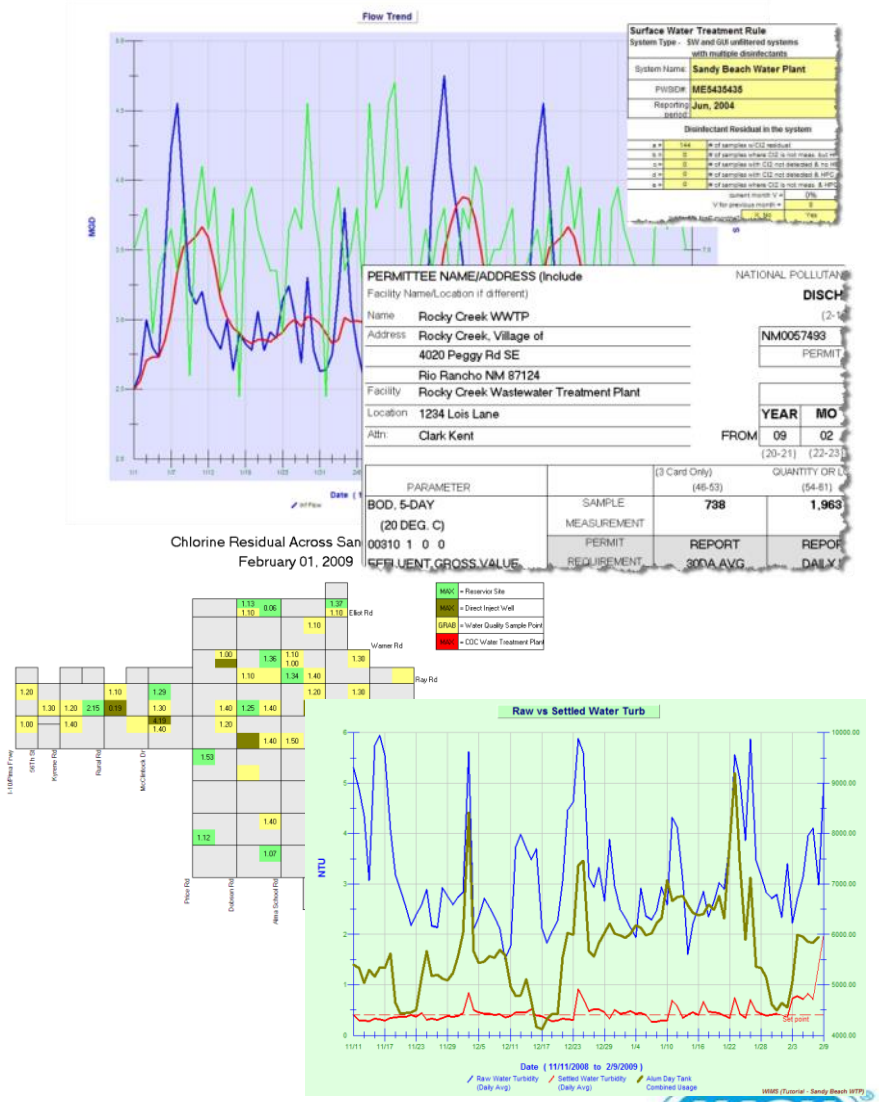




HACH
Be Right™

TURN RAW DATA INTO ACTIONABLE INFORMATION

- Create business and regulatory reports instantly
- Schedule automatic report output to the screen, print or email
- Utilize built-in EPA and state report templates (SWTR, DBR, NPDES, DMR, eDMR, MOR, SDWA, CCR, industrial pretreatment compliance, and more)
- Quickly configure standard reports using templates and wizards

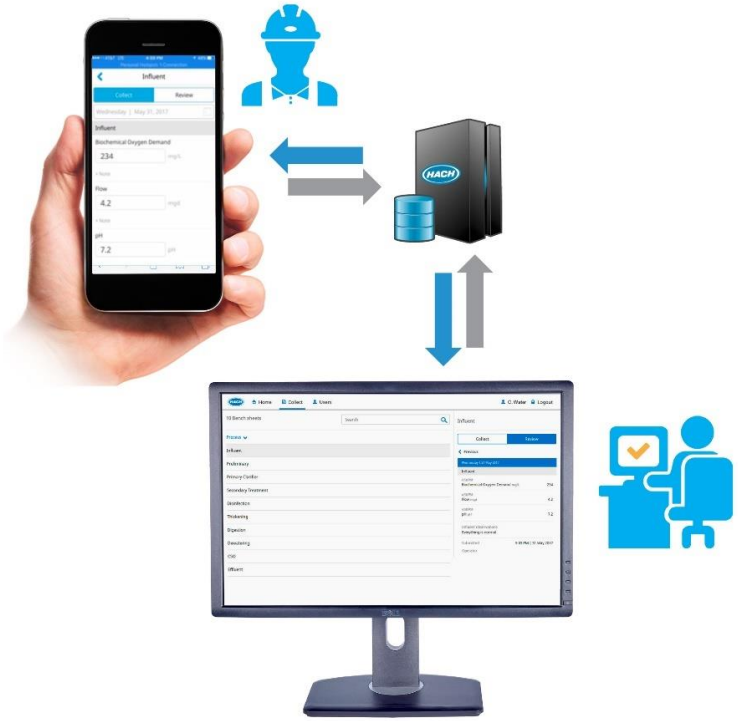


HACH
Be Right™

CLAROS COLLECT

Claros Collect helps your clients make informed decisions faster by reducing data errors at the source of collection and providing instant data availability in WIMS.

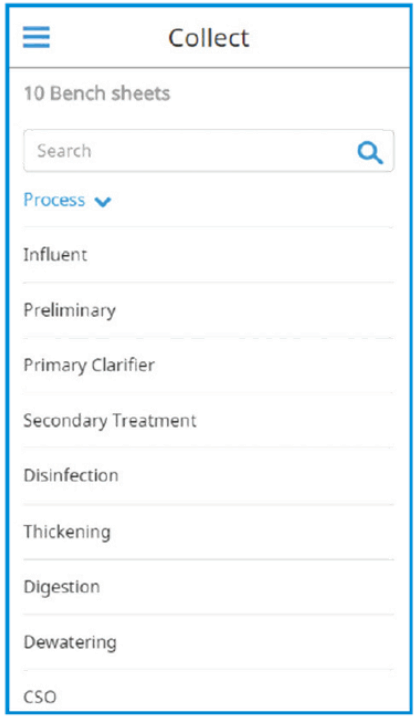
- Reduce data errors at the source of collection
- Make informed decisions with instant data availability
- Available anytime, anywhere, any device



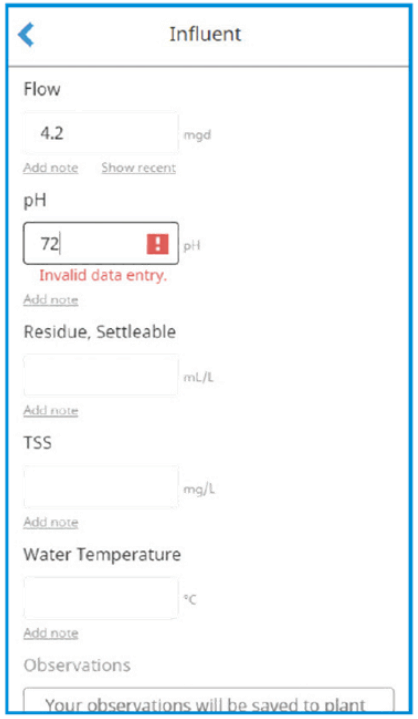
HACH
Be Right™

REDUCE DATA ERRORS @ THE SOURCE OF COLLECTION

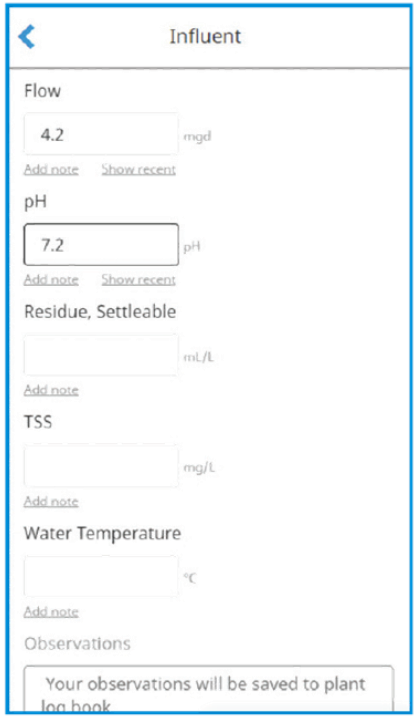
Claros collect alerts your clients when entered values are invalid or outside of expected range, and allows entry of field observations for additional context. Be confident your clients' data is accurate and complete.



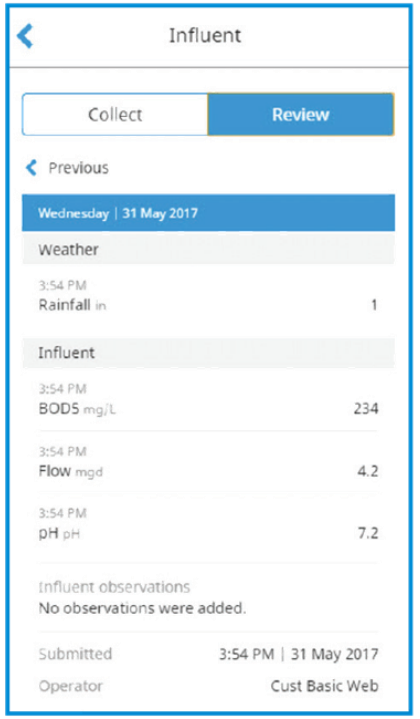
Select the process for data entry



Visual Warnings: Invalid data entry



Validate data

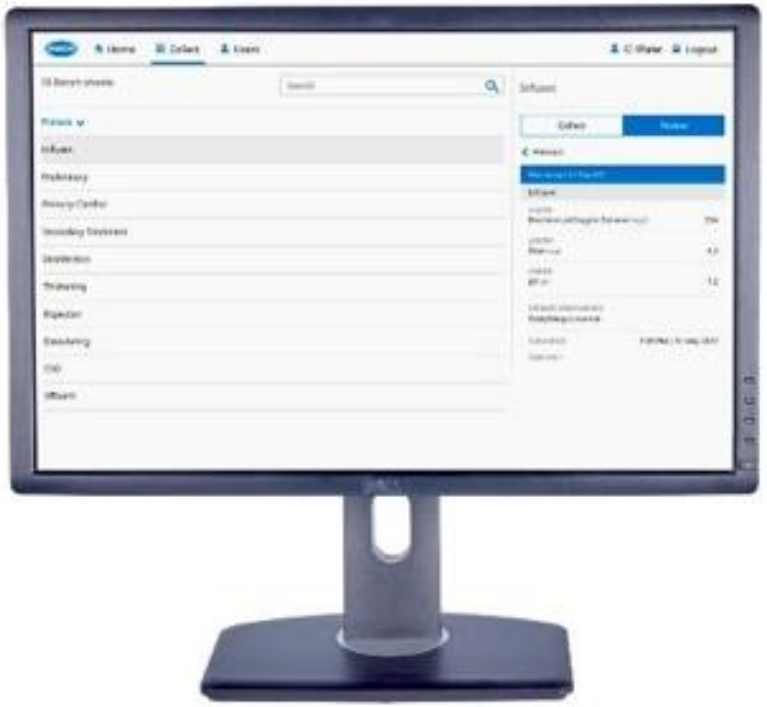


Data available for review

HACH
Be Right™

AVAILABLE ANYTIME, ANYWHERE, ANY DEVICE

- Use a variety of devices, online or offline. Whether in remote locations, the lab, or while walking around the plant, Claros Collect enables authorized users to capture, share or access data.



HACH
Be Right™

CLAROS COLLECT: PRINCIPLE OF OPERATION

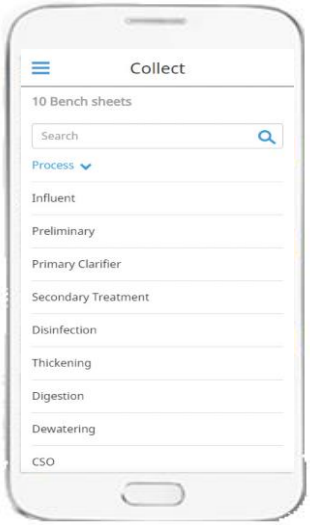
Authorized users can input data on any device using a web browser or an iOS application.

Data Collection forms are configured to match the processes and parameters in your operation.

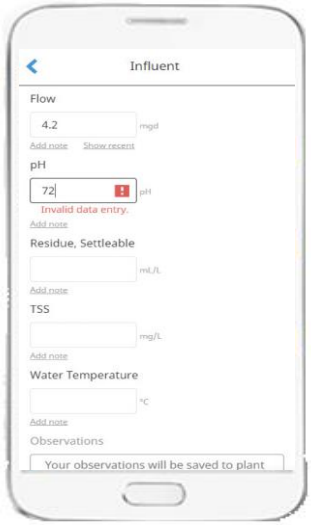
Visual warnings and messages provide users immediate feedback on invalid values, improving data quality at the time and source of entry.

When Network access is not available, data is saved on your mobile device and is automatically transmitted when a network connection is established.

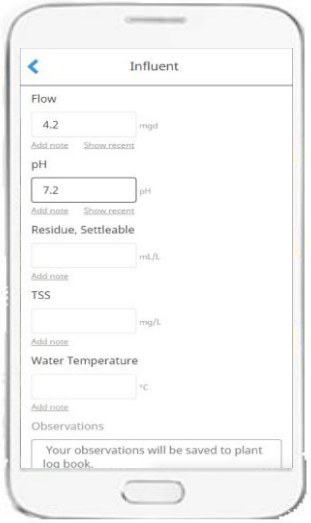
Using Claros Collect or WIMS, authorized users can view and analyze data entered by others.



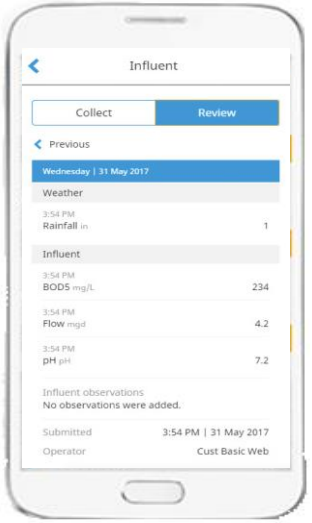
Select the process for data entry



Visual Warnings: Invalid data entry



Validated data

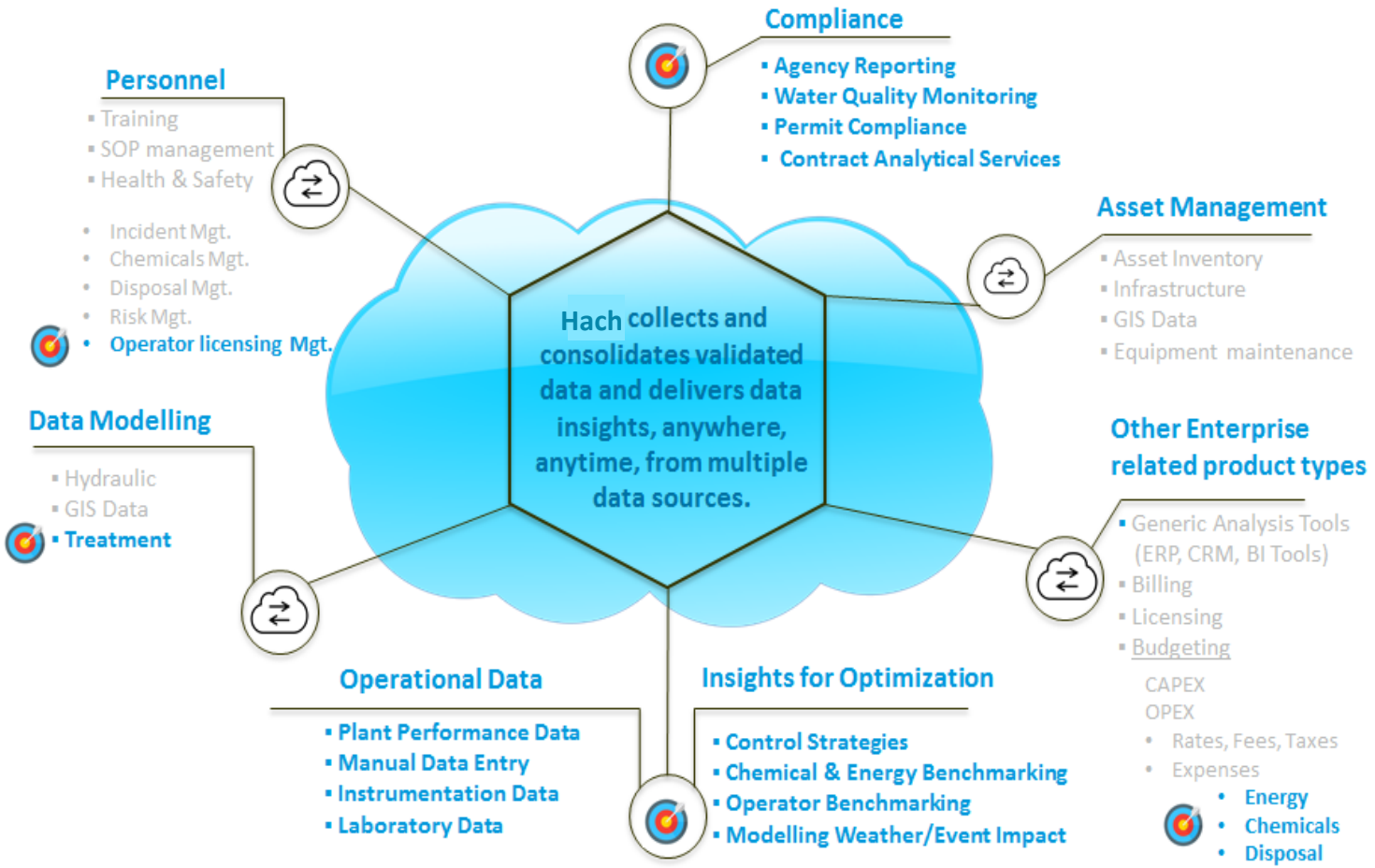


Data available for review

Accurate field data collection, available to authorized users, anytime, anywhere, any device

HACH
Be Right™

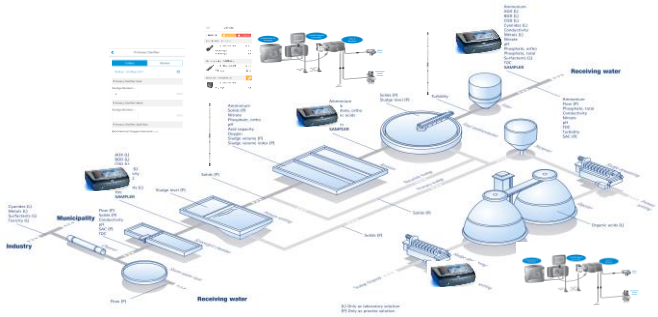
Claros™ **DATA MANAGEMENT 2/3**



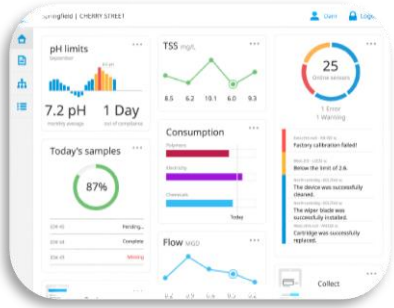
HACH
Be Right™

WHAT IS NEXT FOR HACH?

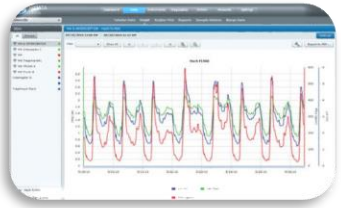
Integrated Process Control



Process Dashboard



fsData



Flow instruments

Field instruments

Lab

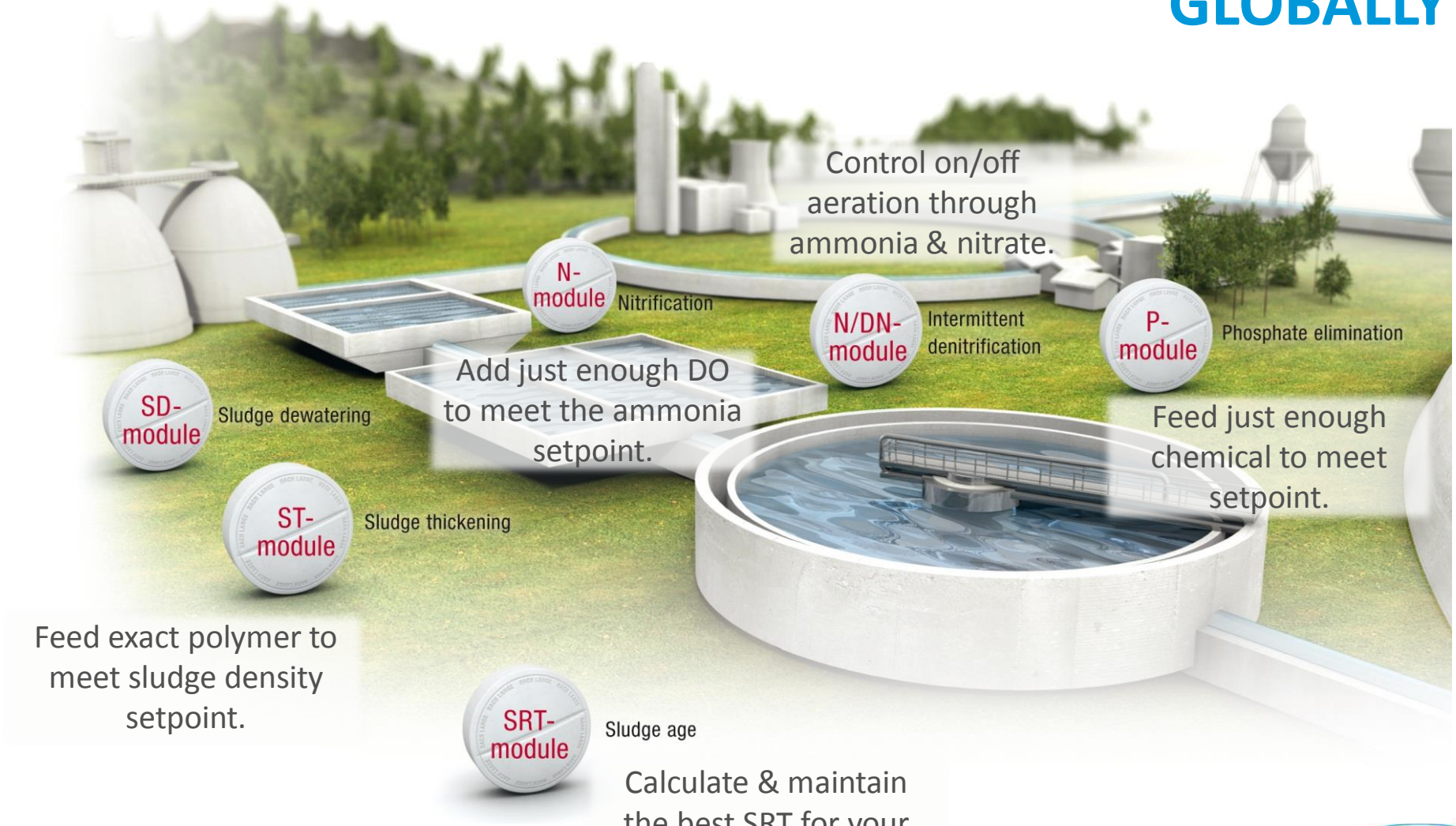
DW instruments

Lab sample management

HACH
Be Right™

YOUR PROCESS. UNDER CONTROL.

1500+ INSTALLATIONS GLOBALLY



HACH
Be Right™

APPLITEK

EZ SERIES ANALYZERS

SYSTEM INTEGRATION

Original Mission:

- Deliver high end technical solutions that support the safety and production in process plants
- Offer AppliTek's expertise and knowledge of similar systems successfully installed, started and serviced in the chlorine production worldwide

The EZ Series: on-line water analysis made easy

TITRATION

COLORIMETRY

VOLTAMMETRY

ION-SELECTIVE E.

CHEMILUMINESCENCE

100+ PARAMETERS

EZ SERIES: AppliTek's advanced analyzer platform for on-line water analysis.

TECHNOLOGY PORTFOLIO

HACH® Be Right™

The EZ Series: on-line water analysis made easy

ORGANIC LOAD ANALYZERS

Total Organic Carbon
Chemical Oxygen Demand

NUTRIENT ANALYZERS

Nitrate, phosphate, ammonia
Total N, Total P

TRACE METAL ANALYZERS

12 heavy / trace metals
Ag, As, Cr, Hg, Pb, Se

NICHE WASTE WATER ANALYZERS

Volatile fatty acids, FOS/TAC
Influent Toxicity

Matrix: WATER

EZ SERIES:

AppliTek's advanced analyzer platform for on-line water analysis.

MICROBIOLOGY ANALYZERS

Adenosine Triphosphate
(ATP)

GENERAL WATER ANALYZERS

Chemical parameters
From A tot Z

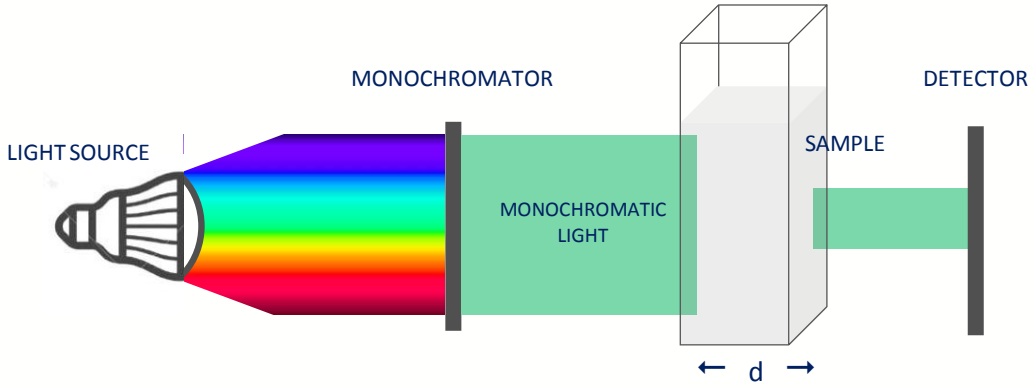
ANALYZER PORTFOLIO

HACH® Be Right™

Colorimetry – What?

In analytical chemistry, colorimetry is a technique used to determine the concentration of colored compounds in solution. A colorimeter is a device used to test the concentration of a solution by measuring its absorbance of a specific wavelength of light.

The **Beer-Lambert law** defines the relationship between the concentration of a solution and the amount of light absorbed by the solution: $A = \varepsilon dC$



Where
A = Absorbance
ε = Molar absorptivity
d = Path length of the cuvette
C = Concentration of the compound

Colorimeters: from portable to lab to on-line

Hach legacy of DR 1900 & 3900 spectrophotometers;

The new EZ 1000 / 2000 Series are on-line, automatic colorimetric analyzers, harnessing technology based on similar optical measuring techniques.

HACH®
Be Right™

Basics of titration

Types of titration

Type	Titrant	Examples
Acid-base	NaOH	HCl, H_2SO_4, HNO_3, H_3PO_4
	HCl	Carbonate, ammonia, amines
Precipitation	$AgNO_3$	Bromide, chloride, iodide, sulphide
Complexometric	EDTA	Calcium, magnesium
	EDTA	Copper, nickel, zinc
Redox	Iodine	Sulphite
	$K_2Cr_2O_7$	Iron (II)
	Cerium (IV)	Iron (II), chromium (III)

Titrators: from lab to on-line

Hach's AT1000 family of automatic lab titrators;

Both the EZ 4000 and EZ 5000 Series run on-line, automatic titrations on an industrial analyzer platform: acid-base, redox, precipitation titration, or photocolorimetric titration…

HACH® Be Right™

Manganese

Relevance and importance in groundwater and surface water

Analytical specifications - Manganese

Manganese as Mn (II) or total Mn

ANALYTICAL SPECS	
Standard range	0 - 1 ppm
Method	Colorimetric formaldoxime method at 450 nm
Precision	< 2% full scale range on standard test solutions
LOQ	< 2 ppb
Analysis time	10 minutes for Mn (II); 20 minutes for Total Mn

Iron

Relevance and importance in ground water and surface water

Importance in the power industry and steam production

Local monitoring in waste water in the UK

Iron Relevance and Importance in ground and surface Water

Ground Water

- The element iron occurs in ground and surface waters both in dissolved and in solid phase.
- In most cases, total contents are determined after chemical digestion and conversion into Fe (III) ions.
- Typical concentrations of iron in groundwater are between **1 and 3 ppm**, but concentrations above 10 ppm are also measured in mineral waters.

Surface Water

- In rivers and in lakes the concentrations are significantly lower
  - for example in the Rhine 1988: 0,04 ppm to 1,6 ppm or in Lake Constance 2 to 43 ppb
  - The solubility of iron compounds is pH and temperature dependent. At a pH of 7,8 for Fe (III) in aerobic waters, a concentration of about 0,3 ppb results.

Analytical specifications - Iron

Iron as Fe (II), Fe (III), dissolved Fe or total Fe

ANALYTICAL SPECS

Standard range	0 - 1 ppm
Method	Colorimetric TPTZ method at 578 nm
Precision	< 2% full scale range on standard test solutions
LOQ	< 5 ppb
Analysis time	10 minutes for Fe (II), (III); 20 minutes for Total Fe

Aluminium

Relevance in drinking water sources and treatment process

Aluminium relevance in drinking water

Water Sources

The concentration of aluminum in natural waters can vary significantly depending on various physicochemical and mineralogical factors.

- Dissolved aluminum concentrations in waters with near-neutral pH values usually range from **0.001 to 0.05 ppm** but rise to **0.5 – 1 ppm** in more acidic waters or water rich in organic matter.
- At the extreme acidity of waters affected by acid mine drainage, dissolved aluminum concentrations of up to 90 ppm have been measured (WHO, 1997).

Analytical specifications - Aluminium

Aluminium as Al (III) or total Al

ANALYTICAL SPECS	
Standard range	0 - 150 ppb
Method	Colorimetric Pyrocatechol Violet at 578 nm
Precision	< 2% full scale range on standard test solutions
LOQ	< 10 ppb
Analysis time	15 minutes for Al (III); 30 minutes for Total Al

Phosphate - Phosphorus

Relevance and importance in EU water framework directive

Importance in the power industry and steam production

Analytical specifications - Phosphate

Phosphate as $P\text{-}PO_4$ **Low range**

ANALYTICAL SPECS

Standard range	0 - 1 ppm $P\text{-}PO_4$
Method	molybdate blue method (630 nm)
Precision	< 1% full scale range on standard test solutions
LOQ	< 1 ppb
Analysis time	10 minutes

Analytical specifications - Phosphate

Phosphate as $P\text{-}PO_4$ **High range**

ANALYTICAL SPECS	
Standard range	0 - 10 ppm $P\text{-}PO_4$
Method	vanadate yellow method (450 nm)
Precision	< 3% full scale range on standard test solutions
LOQ	< 10 ppb
Analysis time	10 minutes

EZ 7800 – General – Total P

The **EZ 7800** is a water analyzer that runs a chemical analysis based on standard method 4500-P for determination of Total P values in water and waste water streams:

- Compact and robust analyzer mainframe
- Combination with PO_4 possible
- Standard smart automatic features
- Standard 4 – 20 mA output with alarm processing
- Optionally multiple stream analysis

Phosphorus in water

Types of P species

Dissolved inorganic phosphorous:

Salts of phosphoric acid (H_3PO_4), polyphosphate (2 or more phosphate groups, like ATP), orthophosphate (PO_4^{3-}) **EZ1031/EZ1032 Series**

Organic phosphorous:

Phosphorous esters, phosphonates: derive from breakdown of vegetable and animal matter

→ Inorganic + organic P = Total P **EZ7800 Series**

Analytical specifications Total P

ANALYTICAL SPECS

Standard range	0 – 2 mg/L *
Method	Colorimetry
	Ascorbic acid reduction and molybdate color solution after digestion
Precision	< 2% full scale range on standard test solutions
LOQ	< 5 ppb
Analysis time	30 minutes incl. digestion of 10 min

* See technical datasheets for all measuring ranges

Total hardness + alkalinity

Relevance and importance in drinking water

Importance in the power industry and steam production

Alkalinity relevance in waste water

Hardness and alkalinity importance in drinking water

Alkalinity and pH controls during enhanced coagulation processes

- When aluminum or iron salt is used, measurement and management of pH and alkalinity are critical.
- Alkalinity is consumed when these compounds are used. There is an ideal pH for each of these compounds.

Coagulant	Empirical Formula	pH Range(s)	Alkalinity Consumed ($CaCO_3$)
Aluminum Sulfate	$Al_2(SO_4)_3.14\ H_20$	Theory 5.5 - 7.8 Typical 6.0 - 7.4	0,48 mg/l for each per mg/l of alun
Ferric Chloride	$FeCl_3$	4.0 – 11.0	0,92 mg/l for each per mg/l of Ferric Chloride

Hardness and alkalinity importance in drinking water

Alkalinity and pH controls during enhanced coagulation processes (continued)

- TOC (NOM) removal percentages are dependent on alkalinity, as TOC removal is generally more difficult in higher alkalinity waters, and source water with low TOC levels
- Adjustments to pH and/or alkalinity must be made prior to coagulant addition to be most effective.

Source Water TOC (mg/l)	Water source alkalinity (mg/l $CaCO_3$)		
	0 to 60	>60 to 120	>120
>2,0 to 4,0>	35%	25%	15%
>4,0 to 8,0	45%	35%	25%
>8,0	50%	40%	30%

HACH® Be Right™

Alkalinity relevance in waste water

Why is alkalinity important in waste water?

Nitrogen and phosphorus removal are important processes within advanced wastewater treatment.

For the optimization of ammonium removal (nitrification) the parameter "acid capacity" (also referred to as alkalinity) is of real importance, since the nitrifying bacteria produce acid. **If the treated water does not have a sufficiently high acid capacity, the pH can fall below 7.0.** In this pH range, the nitrification, the oxygen utilization rate and the sludge floc formation are severely impaired.

Read more:

Hach doc: *Controlling the acid capacity on wastewater treatment plants* ref. DOC042.52.20220.Oct16

By Philippe Pons, EU ADM Electrochemistry

Analytical specifications - Total hardness + alkalinity

Total hardness + p/m alkalinity as $CaCO_3$

ANALYTICAL SPECS

Standard range	50 - 1000 ppm $CaCO_3$
Method	pH titration (Alk)
	Color titration EDTA – Calmagite (TH)
Precision	< 2% full scale range on standard test solutions
LOQ	< 10 ppm
Analysis time	20 - 30 minutes

THE EZ SERIES: ON-LINE WATER ANALYSIS MADE EASY

TITRATION

COLORIMETRY

VOLTAMMETRY

ION-SELECTIVE E.

CHEMILUMINESCENCE

100+ PARAMETERS

EZ SERIES: AppliTek's advanced analyzer platform for on-line water analysis.

TECHNOLOGY PORTFOLIO

HACH® HACH® Be Right™

THE “EZ-ATP” 7300 SERIES:
ANALYTICAL SPECS AND HYDRAULICS

HACH
Be Right™

EZ 7300 SERIES – GENERAL – ATP ANALYZER

What?

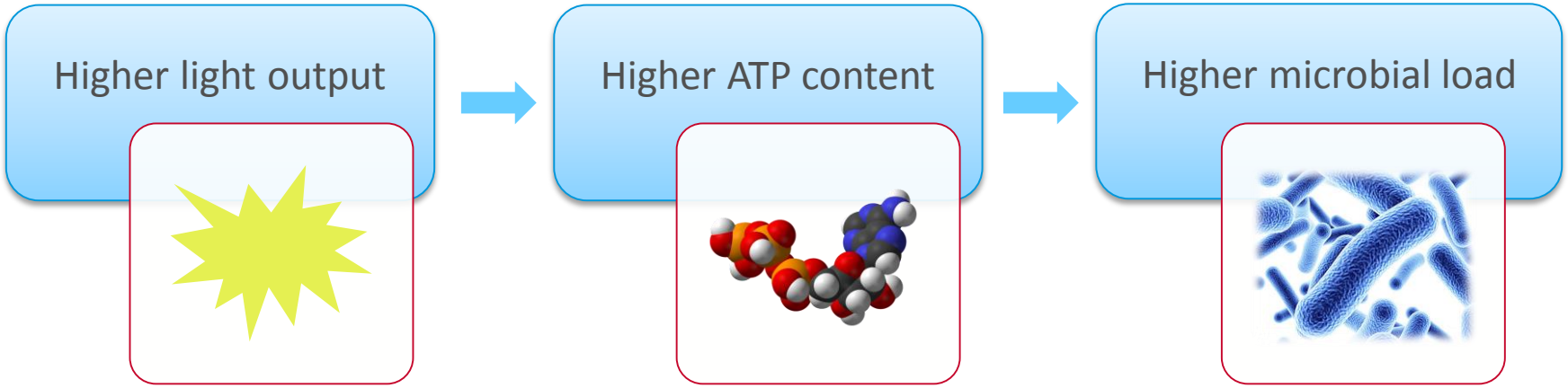
The first microbiology analyzer using the ATP firefly assay and complying with international standard method **ASTM D4012-81**

The on-line microbiology analyzer brings operators

- Fast results (few minutes ≈ real-time data)
- Automation
- Analytical performance
- Reliability

ATP CHEMILUMINESCENCE REACTION

ATP assays using luciferin/luciferase reactions allow to assess microbial load in water sources. The ASTM D4012 (Standard Test Method for Adenosine Triphosphate Content of Microorganisms in Water) was developed as a quick and sensitive alternative to plate counting.



WHY MEASURE ATP?

Bacterial contamination is traditionally detected by heterotrophic plate counting (HPC) or dip-slides (traditional lab methods)

These cultivation-based methods are limited or influenced by various factors:

- Sampling frequency (contaminations between samplings is not detected)
- Species selective culture media (higher costs)
- Cultivability of different bacteria (0.1 - 1% of all bacterial species)
- Availability and accuracy of laboratory personnel

Sampling time + incubation time + handling time = slow response time

EZ 7300 - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS	
Standard range	0.05 – 200 pg/mL
Method	Standard method ASTM D4012-81 Determination of adenosine triphosphate (ATP) by means of chemiluminescent reaction using luciferin and luciferase
Precision	< 4% full scale range on standard test solutions
LOQ	0.05 pg/mL (0.1 pM) ATP
Analysis time	7 - 10 minutes incl. lysis

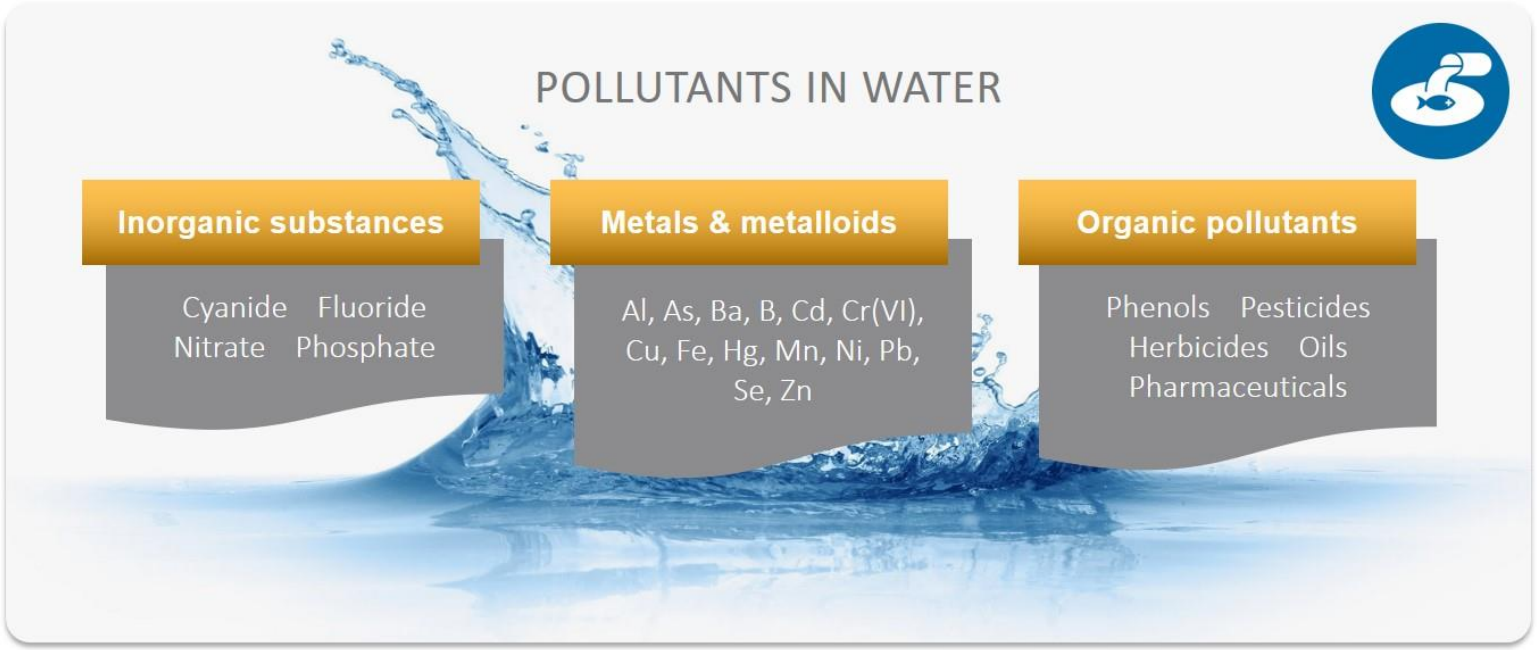
ANALYSIS OF CYANIDE, COPPER, ZINC, CHROMIUM AND PHENOL:

RELEVANCE, ANALYTICAL SPECS, CHEMISTRY, HYDRAULICS

HACH
Be Right™

WATER POLLUTANTS AND TOXICITY

The simultaneous presence of phenols, cyanide and heavy metals such as copper, zinc, chromium is dangerous to aquatic life and humans in general. Together they show a cumulative toxicity effect on metabolism and nervous system.



CYANIDE (FREE) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 200 µg/L
Method	Colorimetry
	Chloramine-T method conform APHA 4500-CN (E)
Precision	< 5% full scale range on standard test solutions
LOQ	< 1 ppb
Analysis time	20 minutes

CYANIDE (TOTAL) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 100 µg/L
Method	Colorimetry
	Chloramine-T method conform APHA 4500-CN (E) after digestion
Precision	< 5% full scale range on standard test solutions
LOQ	< 1 ppb
Analysis time	45 minutes

COPPER AND ZINC: IMPORTANCE FOR MONITORING

Although transition metals copper and zinc are vital to mammalian physiology, too much of these elements can be toxic when exposures exceed required concentrations, especially to aquatic organisms. Also, annual production of Cu and Zn in the world ranked in the top 3 metals compared to other metals such as Pb, Cd, Cr, Ni, As and Hg (source: USGS 1995-2013).

Solution

The EZ 1000 Series have specific configurations for measuring free copper and free zinc within 10 minutes. The Total Copper configuration of the EZ 2000 Series uses the familiar built-in digestion unit to oxidize complexed copper.

COPPER(II) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 3 mg/L
Method	Colorimetry
	Bicinchoninate method
Precision	< 2% full scale range on standard test solutions
LOQ	< 5 ppb
Analysis time	10 minutes

COPPER(TOTAL) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 3 mg/L
Method	Colorimetry
	Bicinchoninate method after digestion
Precision	< 2% full scale range on standard test solutions
LOQ	< 5 ppb
Analysis time	20 minutes

ZINC(II) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 1 mg/L
Method	Colorimetry
	Zincon method conform with APHA 3500-Zn (B)
Precision	< 2% full scale range on standard test solutions
LOQ	< 10 ppb
Analysis time	10 minutes

CHROMIUM: IMPORTANCE FOR MONITORING

Chromium is found primarily in two forms: as trivalent chromium, which is biologically active and found in food, and hexavalent chromium, a toxic form that results from industrial discharge to water. In distribution and collection water systems both chromium forms may occur by oxidation of Cr(III) caused by the presence of an oxidant such as chlorine.

Solution

With a detection limit of < 1 ppb, the Total Cr configuration of the EZ 2000 Series has been developed in order to set new standards in automatic, compliant, on-line monitoring of Cr(VI) and complexed forms of these. The EZ 1000 Series run analysis of free hexavalent chromium on water samples.

CHROMIUM(VI) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 500 µg/L as Cr(VI)
Method	Colorimetry
	Diphenyl carbazide method conform with APHA 3500-Cr (B)
Precision	< 2% full scale range on standard test solutions
LOQ	< 1 ppb
Analysis time	10 minutes

CHROMIUM(TOTAL) - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS	
Standard range	0 – 500 µg/L as Cr(VI) *
Method	Colorimetry Diphenyl carbazide method conform with APHA 3500-Cr (B) after digestion; Cr(III) by calculation [Cr Tot – Cr(VI)]
Precision	< 2% full scale range on standard test solutions
LOQ	< 1 ppb
Analysis time	20 minutes

*See technical datasheets for all possible combinations

PHENOL: IMPORTANCE FOR MONITORING

Phenol or carbolic acid is the hydroxyl derivative of benzene. It is an important industrial commodity as a precursor to many materials and useful compounds, occurring in domestic and industrial wastewater, natural waters, and potable water supplies. Phenols exist in the environment due to the activity of the chemical, petrochemical or pharmaceutical industries.

Solution

The phenol configuration of the EZ 1000 Series assures automatic, on-line monitoring of phenol levels in effluent and natural waters.

PHENOL - ANALYTICAL SPECIFICATIONS

ANALYTICAL SPECS

Standard range	0 – 2 mg/L
Method	Colorimetry
	4-Aminoantipyrine method conform with APHA 5530
Precision	< 3% full scale range on standard test solutions
LOQ	< 5 ppb
Analysis time	10 minutes

EZ 6000 SERIES - GENERAL

The EZ 6000 Series are on-line voltammetry analyzers developed for companies and authorities wishing a cost-effective solution for trace metal monitoring in surface water, effluent and ground water:

- Based on stripping voltammetry technology
- Built-in sample digestion unit possible
- Standard smart automatic features
- Standard 4 – 20 mA output with alarm processing
- Higher measuring ranges by micropump dilution
- Optionally multiple stream analysis

ANALYTICAL SPECIFICATIONS

Parameter	Range	Cycle time, No digestion	Cycle time, Digestion incl.	LOQ
Arsenic as As (III), As total (III + V)	0 – 20 µg/L	10 minutes	20 minutes	< 1 ppb
Cadmium as Cd (II)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Chromium as Cr (VI)	0 – 25 µg/L	10 minutes	20 minutes	< 1 ppb
Copper as Cu (II)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Lead as Pb (II)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Manganese as Mn (II)	0 – 50 µg/L	10 minutes	20 minutes	< 1 ppb
Nickel as Ni (II)	0 – 50 µg/L	10 minutes	20 minutes	< 1 ppb
Silver as Ag (I)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Mercury as Hg (II)	0 – 20 µg/L	10 minutes	20 minutes	< 1 ppb
Zinc as Zn (II)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Antimony as Sb total (III + V)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Tin as Sn (II)	0 – 100 µg/L	10 minutes	20 minutes	< 1 ppb
Selenium as total Se	0 – 20 µg/L	N.A.	60 minutes	< 1 ppb

EZ 7000 SERIES – COD ANALYZER

ORGANIC LOAD ANALYZER	NICHE WASTE WATER ANALYZER	NUTRIENT ANALYZER
Total Organic Carbon Chemical Oxygen Demand	Volatile fatty acids, FOS/TAC Influent Toxicity	Nitrate, phosphate, ammonia Total N, Total P

Original brand name: AppliCOD®

Type: On-line colorimetric

Application fields: surface water, industrial & municipal wastewater

Compliance with international standard methods: wet chemical oxidation conform with ISO 6060 (potassium dichromate method); or ISO 8467 / JIS K0806 (potassium permanganate method

HACH
Be Right™

EZ 7000 SERIES – COD ANALYZER SPECIFICATIONS

Standard measuring ranges (Cr method) One single range, factory set:

5 – 100 mg/L O2, 40 - 500 mg/L O2, 80 - 1,500 mg/L O2, 60 - 1,000 mg/L O2, 100 - 10,000 mg/L O2

Standard measuring ranges (Mn method) One single range, factory set:

0 – 20 mg/L O2 0 - 200 mg/L O2

< 130 minutes incl. oxidation of 120 minutes (Cr method)

< 40 minutes incl. oxidation of 30 minutes (Mn method)

Sample Preconditioning

Automatic filtration, dilution

and settling for EZ-Series

HACH

Be Right™

CONCISE OVERVIEW

EZ 9000

= “EZ-Size”

EZ 9100

= “EZ-Size HD”

EZ 9200

= “MicroSize”

EZ 9700

= “EZ-Dilute”

HACH
Be Right™

THANKS YOU!!

QUESTIONS?

TED SIMMONS (970) 531-4322
TSIMMONS@HACH.COM