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thermo scientific

Water analysis

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Chloride

Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

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Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)

Total Oxidized Nitrogen
(TON Vanadium)

Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers



Automated nutrient analysis and water quality monitoring

Fast and accurate Thermo Scientific Gallery discrete industrial analyzers

ThermoFisher
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Alkalinity

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Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Ease-of-use into water analysis



Clean water in sufficient amounts is an ongoing global challenge. Water resources are experiencing increasing pressure in many parts of the world, requiring countries to improve the management and protection of water ecosystems.

Thermo Scientific™ Gallery™ analyzers are sophisticated discrete photometric systems for the precise and easily adaptable analysis

of water and environmental samples. Gallery and Gallery Plus provide repeatable results while full automation improves quality and efficiency. Bar-coded traceable system reagents save technician time and reduce errors, thus ensuring confidence in the quality of the results.



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(TON Enzymatic)

Gallery analyzers

Alkalinity is a measure of the capacity of water to neutralize acids. Measuring alkalinity is important also in determining, e.g., a lake's ability to neutralize acidic pollution from rainfall or waste water.

Chemistry: Bromophenol Blue and phthalate buffer pH 3.5

References: N/A

Reagents	Kit size	Preparation	Max. nbr of tests
984623 Alkalinity R1	4 × 20 mL	Ready to use	975
984624 Alkalinity R2	4 × 20 mL	Ready to use	780

Sample matrix

Drinking, ground, and surface water

Measuring range

Application	Name of the application and range	Extended measuring range
Alkalinity	*- 400 mg CaCO ₃ /L	—

Calibration

Calibration is 2nd order using 1200 mg CaCO₃/L standard in automatic dilution. Calibration standard is prepared from Na₂CO₃.

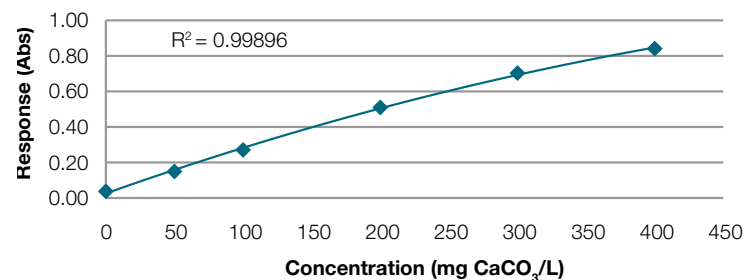


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Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg CaCO ₃ /L)	SD	MDL (mg CaCO ₃ /L)
Alkalinity	blank	7	3.07	1.077	3.4 ¹
	blank	50	3.16	0.735	5.4 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 3 batches for each sample.

	Lake Water (mg CaCO ₃ /L)		Tap Water (mg CaCO ₃ /L)		Lake water (mg CaCO ₃ /L)	
	N		N		N	
	Mean	28.8	Mean	32.5	Mean	177.7
	SD	CV %	SD	CV %	SD	CV %
Within	0.725	2.5 %	0.849	2.6 %	1.287	0.7 %
Between	0.626	2.2 %	0.196	0.6 %	4.462	2.5 %
Total	0.958	3.3 %	0.871	2.7 %	4.644	2.6 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 0–400 mg CaCO₃/L.

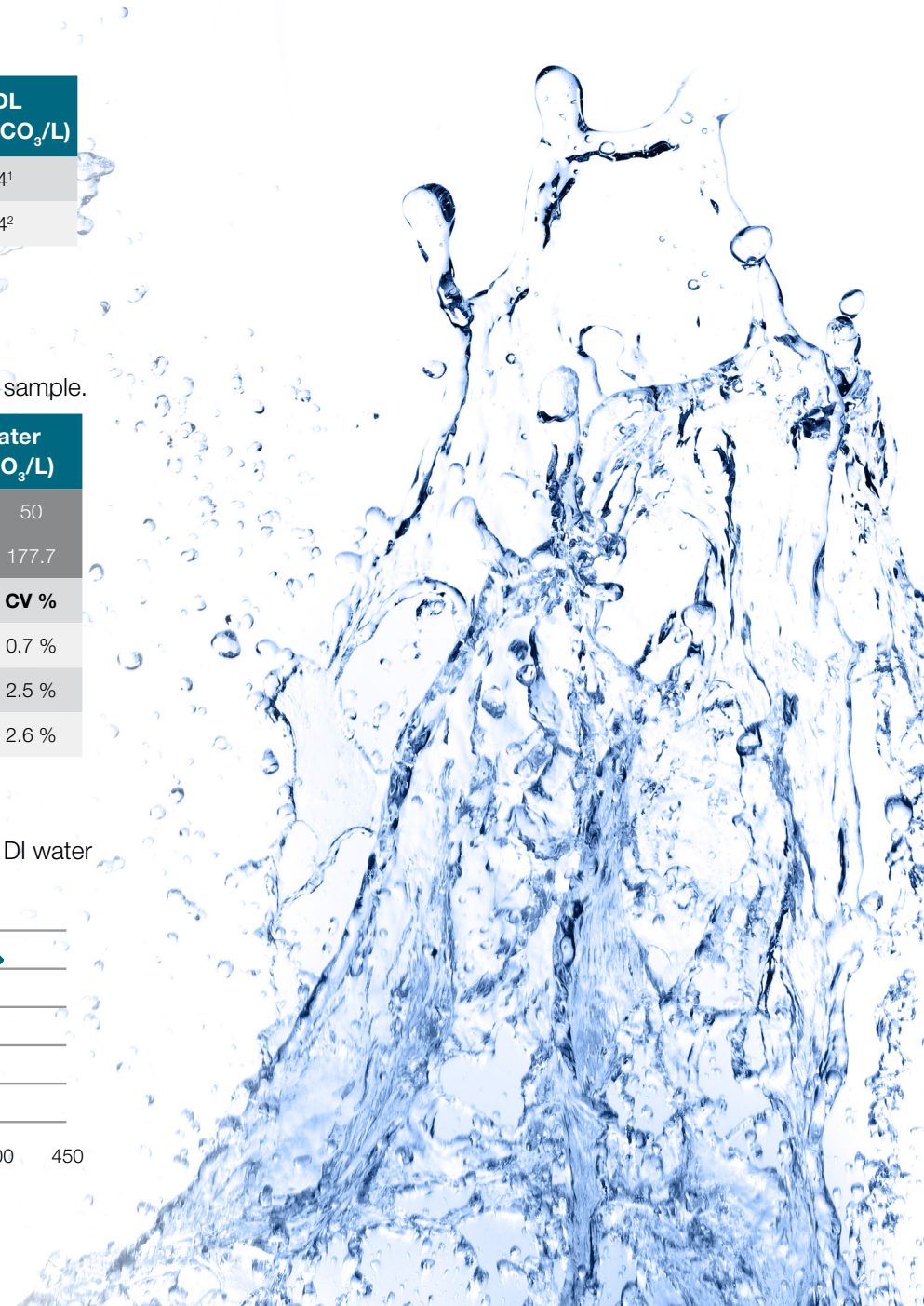
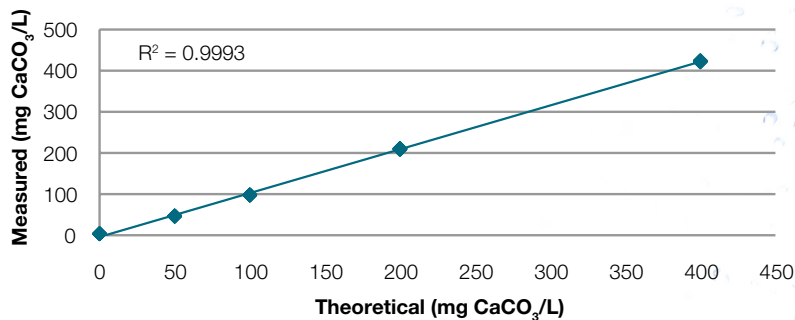


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(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Ammonia (NH₃) is a common toxicant derived from wastes, fertilizers, and natural processes. Ammonia is a common cause of fish kills.

Chemistry: Sodium dichloroisocyanurate, sodium salicylate and sodium nitroprusside

References: NISBN 0117516139, ISO 7150, DIN 38 406, ISO 15923-1

Reagents	Kit size	Preparation	Max. nbr of tests
984362 Ammonia R1	1 × 125 mL	Ready to use	2000
984363 Ammonia R2	4 × 20 mL	Ready to use	1300

Sample matrix

Drinking, ground, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Ammonia Low	*- 200 µg N/L	Up to 1000 µg N/L
Ammonia High	0.2–2 mg N/L	Up to 10 mg N/L

Calibration

Calibration is linear or 2nd order depending on the range selected using 1000 µg/L as N standard for low range and 10 mg N/L for high range in automatic dilution.

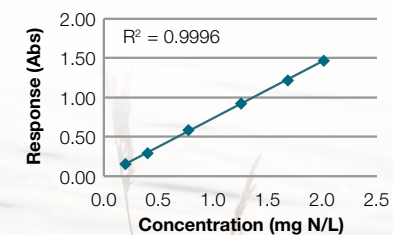
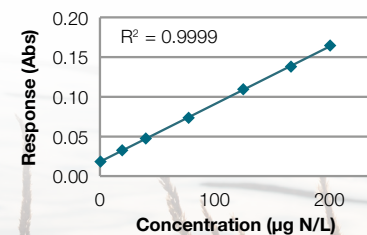


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Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (µg N/L)	SD	MDL (µg N/L)
Ammonia L	blank	7	0.52	0.164	0.5 ¹
	blank	50	0.55	0.358	1.6 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 5 batches, n=50)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Pond water (µg N/L)		Tap water (µg N/L)	
	N	50	N	50
	Mean	17	Mean	189
	SD	CV %	SD	CV %
Within	0.340	1.9 %	0.849	0.4 %
Between	0.786	4.5 %	0.871	0.5 %
Total	0.856	4.9 %	1.216	0.6 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 5–2000 µg N/L.

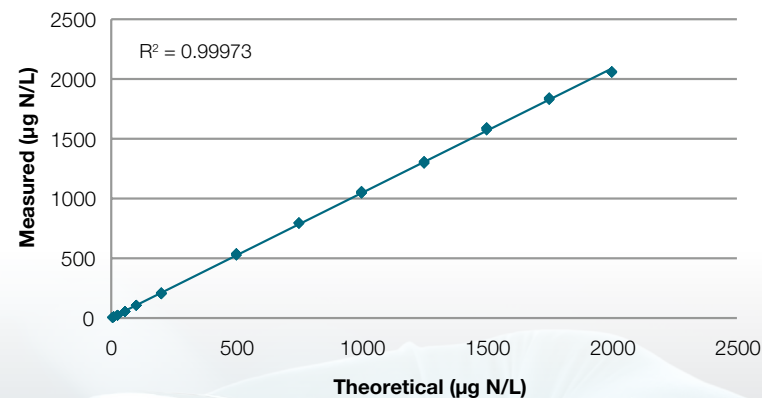


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Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Calcium is source of hard water but is not harmful. It can cause calcification which causes breakdowns of, e.g. boilers or coolers.

Chemistry: Arsenazo III

References: Tietz Fundamentals of Clinical Chemistry, 5th edition

Reagents	Kit size	Preparation	Max. nbr of tests
984361 Calcium R1	3 × 20 mL	Ready to use	350

Sample matrix

Drinking, ground, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Calcium	*- 200 mg N/L	Up to 1000 mg/L

Calibration

Calibration is 2nd order using 2000 mg/L standard in automatic dilution.

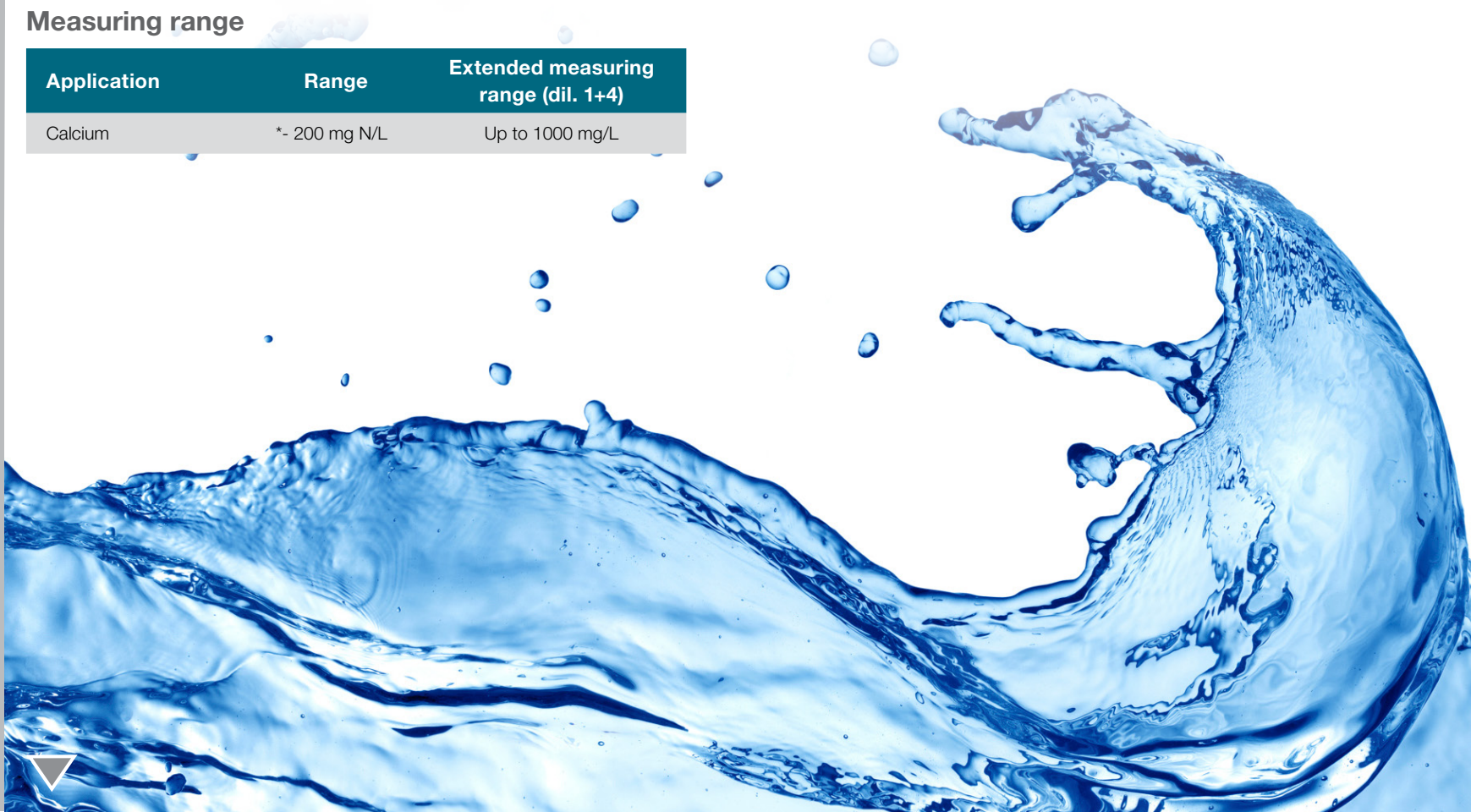
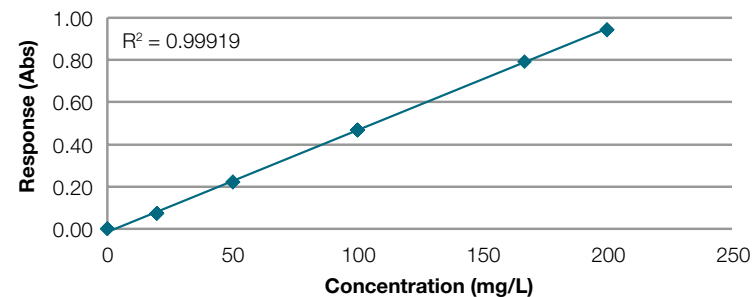


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Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Calcium	blank	7	1.99	0.369	1.16 ¹

¹MDL = 3.14 × SD (blank sample, n=7)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Tap water (mg/L)		Soda water (mg/L)		Bottle water (mg/L)	
	N	50	N	50	N	50
	Mean	17	Mean	82	Mean	30
	SD	CV %	SD	CV %	SD	CV %
Within	0.218	1.3 %	0.449	0.5 %	0.223	0.7 %
Between	0.273	1.6 %	2.153	2.6 %	0.694	2.3 %
Total	0.350	2.0 %	2.200	2.7 %	0.729	2.4 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 10–1000 mg/L.

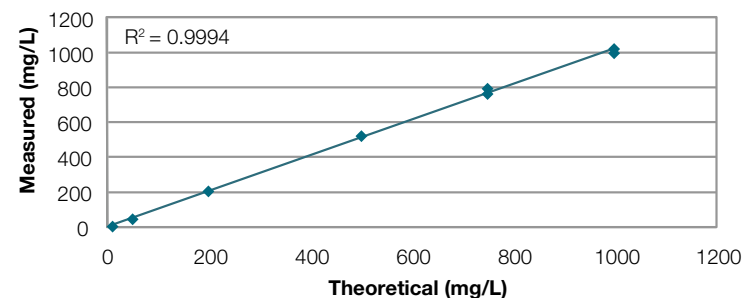


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Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Chloride in water may be considerably increased by treatment processes in which chlorine or chloride is used.

Chemistry: Mercury (II) thiocyanate

References: ISBN 0117516260, EPA 325.2, SM 4500 Cl-E, EN ISO 15682, ISO 15923-1

Reagents	Kit size	Preparation	Max. nbr of tests
984364 Chloride R1	4 × 20 mL	Ready to use	500
984365 Chloride R1 L	20 × 20 mL	Ready to use	2500

Sample matrix

Drinking, ground, surface, waste and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Chloride Low	*- 20 mg N/L	Up to 100 mg/L
Chloride High	20–100 mg/L	Up to 500 mg/L

Calibration

Calibration is 2nd order using 100 mg/L standard for low range and 500 mg/L for high range in automatic dilution.

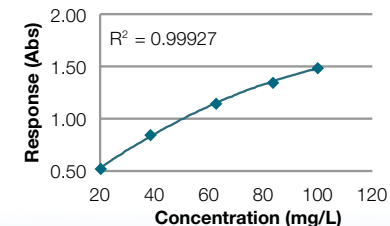
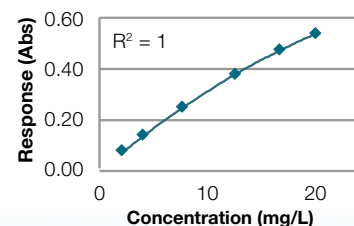


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Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Chloride L	blank	7	0.23	0.011	0.035 ¹
	blank	50	0.22	0.042	0.349 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 5 batches, n=50)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Pond water (mg/L)		Tap water (mg/L)		Pond water (mg/L)	
	N	50	N	50	N	50
	Mean	2.5	Mean	4.9	Mean	16.5
	SD	CV %	SD	CV %	SD	CV %
Within	0.075	0.5 %	0.031	1.2 %	0.030	0.6 %
Between	0.224	1.4 %	0.011	0.4 %	0.020	0.4 %
Total	0.236	1.4 %	0.033	1.3 %	0.036	0.7 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 2–500 mg/L.

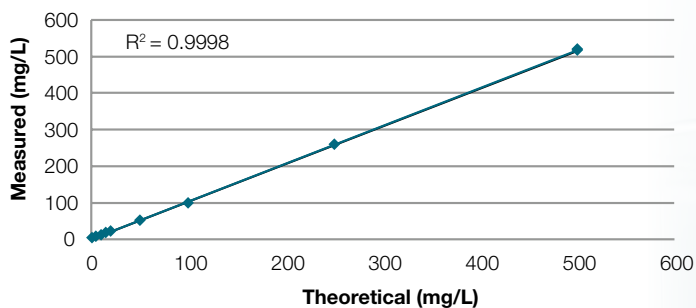


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Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Hexavalent chromium is used for the production of stainless steel, textile dyes, wood preservation, leather tanning, and as anti-corrosion and conversion coatings as well as a variety of niche uses. Hexavalent chromium compounds are genotoxic carcinogens.

Chemistry: Diphenylcarbide

References: SM 3500 Cr-B, SW 7196 A, DIN EN ISO 23913:2009, ISO 11083

Reagents	Kit size	Preparation	Max. nbr of tests
984357 Chromium(VI)	4 × 20 mL	Ready to use	480

Sample matrix

Drinking, ground, surface, and waste water

Chromium (VI)

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Chromium Low	*- 100 µg/L	—
Chromium High	100–500 µg/L	Up to 1000 µg/L

Calibration

Calibration is 2nd order using 300 µg/L standard for low range and 5000 µg/L high range in automatic dilution.

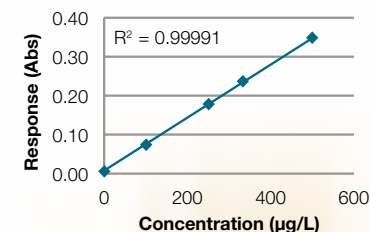
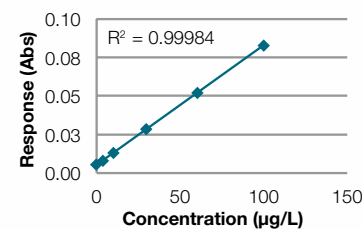


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Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (µg/L)	SD	MDL (µg/L)
Chromium (VI) L	blank	7	0.41	0.824	2.6 ¹

¹MDL = 3.14 × SD (blank sample, n=7)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Waste water (µg/L)		Clean water (µg/L)		Spiked waste water (µg/L)	
	N	50	N	50	N	50
	Mean	42.6	Mean	79.0	Mean	456.0
	SD	CV %	SD	CV %	SD	CV %
Within	0.931	2.2 %	1.063	1.3 %	1.532	0.3 %
Between	0.831	2.0 %	0.879	1.1 %	2.822	0.6 %
Total	1.248	2.9 %	1.379	1.7 %	3.211	0.7 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 8–1100 µg/L.

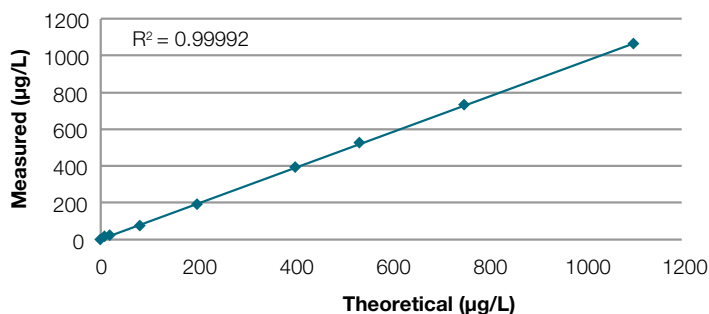


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(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Fluoride exists naturally in water sources and helps prevent the tooth decay. If present in amounts greater than 4 mg/L in the drinking water, it may cause health problems. Possible contamination sources are erosion of natural deposits and discharge from fertilizer or aluminum factories.

Chemistry: Alizarine fluorine blue and cerous nitrate

References: EPA 340.3, SM 4500 F-E

Reagents	Kit size	Preparation	Max. nbr of tests
984629 Fluoride R1	4 × 20 mL	Ready to use	2200
984630 Fluoride R2	4 × 20 mL	Ready to use	4800
984631 Fluoride R3	4 × 20 mL	Ready to use	2200

Sample matrix

Drinking, ground, surface, waste, and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Fluoride	0.05-1 mg/L	up to 5 mg/L

Calibration

Calibration is 2nd order using 3 mg/L standard in automatic dilution.

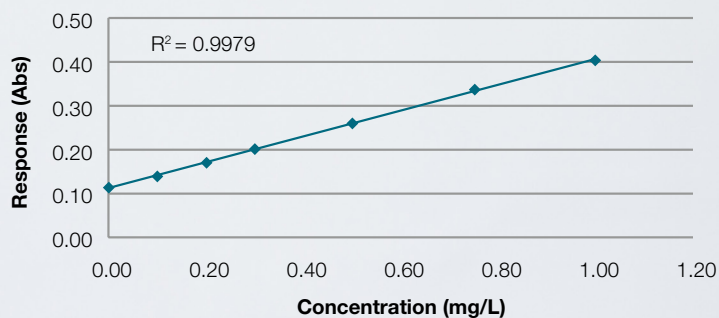


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Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Fluoride	blank	7	0.03	0.002	0.007 ¹
	blank	50	0.03	0.021	0.089 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 5 batches, n=50)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Tap water (mg/L)		Surface water (mg/L)		Ground water (mg/L)	
	N	50	N	50	N	50
	Mean	0.88	Mean	0.22	Mean	0.41
	SD	CV %	SD	CV %	SD	CV %
Within	0.008	0.9 %	0.004	2.0 %	0.006	1.5 %
Between	0.008	0.9 %	0.001	0.4 %	0.007	1.6 %
Total	0.011	1.3 %	0.004	2.0 %	0.009	2.2 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 0.2–5.0 mg/L.

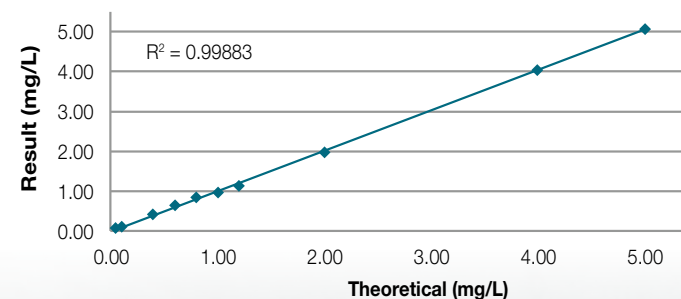


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Gallery analyzers

Iron (Ferrous)

Iron naturally occurs in ground and surface waters and is also a byproduct of production baths at steel mills, foundries, and chemical plants. Ferrous iron (Fe²⁺) acts as a strong reducing agent in high pH conditions. It can also be used as an alloy to decrease the corrosiveness of metals.

Chemistry: Phenanthroline

References: ISO 6332-1988, SM 3500 Fe-B

Reagents	Kit size	Preparation	Max. nbr of tests
984706 Iron (Ferrous) R1	4 × 20 mL	Ready to use	1900
984707 Iron (Ferrous) R2	4 × 20 mL	Ready to use	1080

Sample matrix

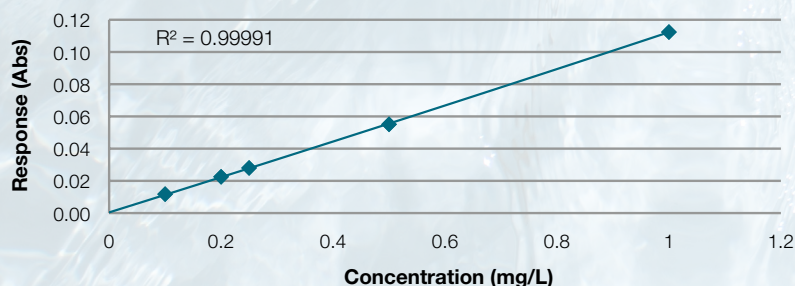
Drinking, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Fe ²⁺	0.2–1.0 g/L	Up to 5 g/L

Calibration

Calibration is 2nd order using 1 mg/L standard in automatic dilution.



Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Fe ²⁺	blank	7	0.01	0.017	0.05 ¹
	blank	30	0.01	0.009	0.04 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 3 batches for each sample.

	QC-0.4 (mg/L)		QC-0.8 (mg/L)	
	N	30	N	30
	Mean	0.41	Mean	0.81
	SD	CV %	SD	CV %
Within	0.005	1.3 %	0.011	1.3 %
Between	0.004	0.9 %	0.002	0.3 %
Total	0.006	1.6 %	0.011	1.3 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 0.2–5.0 mg/L.

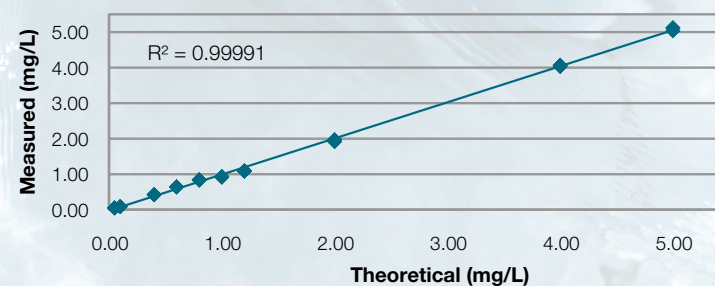


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Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Hard water has high concentrations of Mg^{2+} and Ca^{2+} ions. This is generally not harmful to one's health but can pose serious problems in industrial settings.

Chemistry: Xylidyl Blue I

References: Tietz Fundamentals of Clinical Chemistry, 5th edition

Reagents	Kit size	Preparation	Max. nbr of tests
984358 Magnesium R1	8 x 11 mL	Ready to use	350

Sample matrix

Drinking, ground, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+3)
Magnesium	10–100 mg/L	Up to 400 mg/L

Calibration

Calibration is 2nd order using 1000 mg/L standard in automatic dilution.

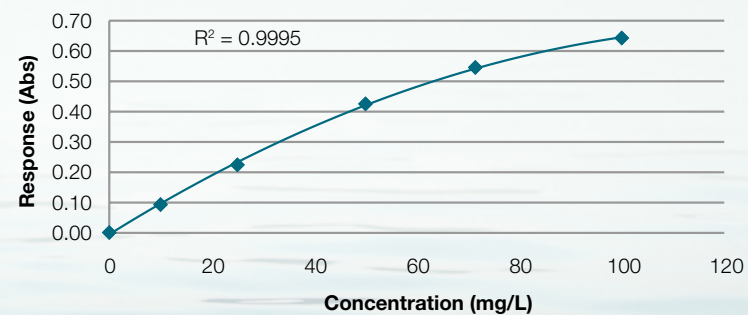


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Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Magnesium	blank	7	0.25	0.034	0.1 ¹
		50	0.41	0.139	0.8 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 3 batches for each sample.

	Tap water (mg/L)		Surface water (mg/L)		Waste water (mg/L)	
	N	50	N	50	N	50
	Mean	24	Mean	67	Mean	27
	SD	CV %	SD	CV %	SD	CV %
Within	0.247	1.0 %	0.427	0.6 %	0.182	0.7 %
Between	0.603	2.5 %	1.560	2.3 %	0.438	1.6 %
Total	0.651	2.7 %	1.617	2.4 %	0.474	1.8 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 10–400 mg/L.

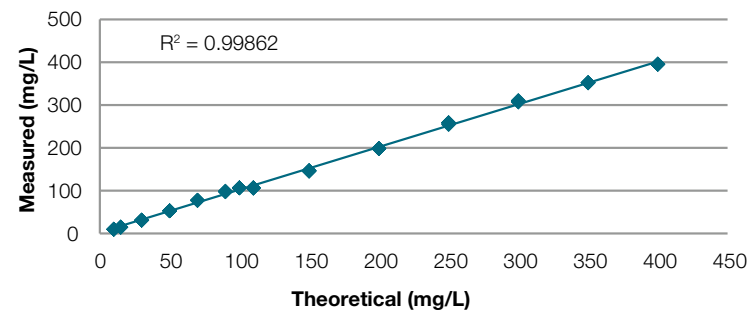


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Alkalinity

Ammonia

Calcium

Chloride

Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

The major sources of nitrite are runoff from fertilizer use, sewage and erosion of natural deposits. Nitrite may cause health problems if present in drinking water greater than 1 mg/L.

Chemistry: Sulfanilamide coupling with N-(1-naphthyl)-ethylenediamine dihydrochloride

References: ISBN 0117515930, EPA 353.1, SM 4500 NO2-B, ISO 13395:1996, DIN EN 26777, ISO 15923-1

Reagents	Kit size	Preparation	Max. nbr of tests
984371 TON R3	4 × 20 mL	Ready to use	1000
984371 TONR3L	20 × 20 mL	Ready to use	5000

Sample matrix

Drinking, ground, surface, waste, and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Nitrite	*- 500 µg N/L	Up to 2500 µg N/L

Calibration

Calibration is linear using 2000 µg N/L standard in automatic dilution.

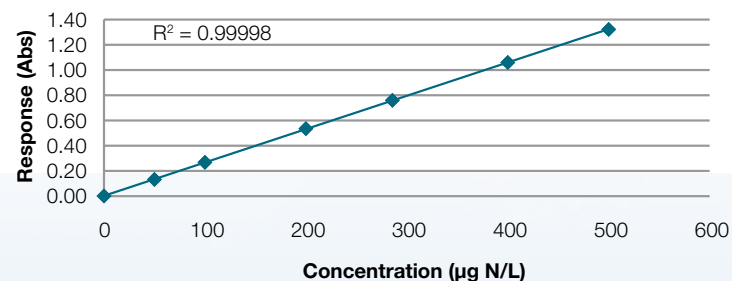


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Ammonia

Calcium

Chloride

Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (µg N/L)	SD	MDL (µg N/L)
Nitrite	blank	7	0.33	0.126	0.4 ¹
		30	0.16	0.337	1.2 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 3 batches for each sample.

	Tap Water (µg N/L)		Lake Water (µg N/L)	
	N	30	N	30
	Mean	56	Mean	308
	SD	CV %	SD	CV %
Within	0.177	0.3 %	1.041	0.3 %
Between	0.849	1.5 %	4.096	1.3 %
Total	0.867	1.5 %	4.227	1.4 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 4–2000 µg N/L.

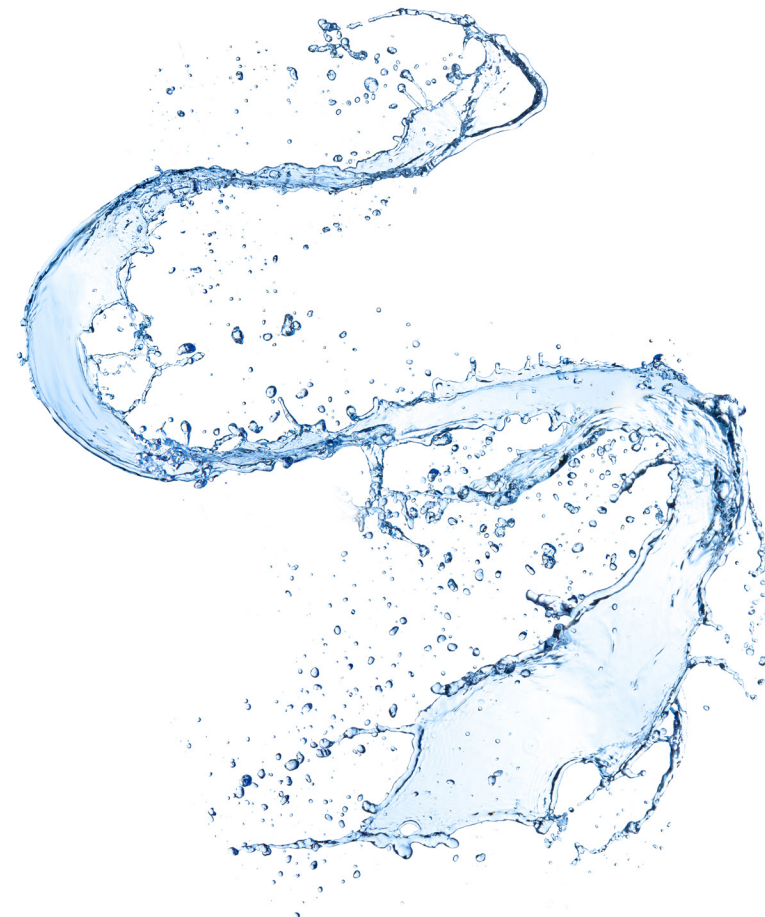
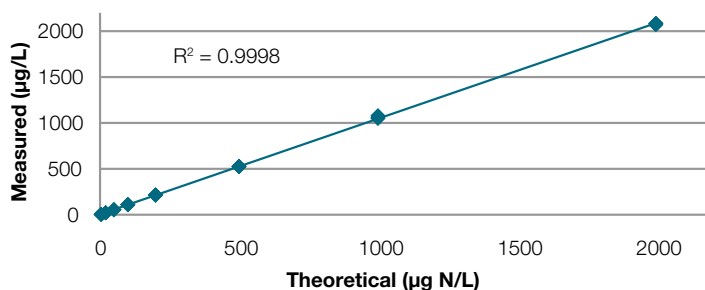


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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Used in farming fertilization, can cause excess aquatic plant growth and oxygen depletion. It causes many water quality problems including increased purification costs, decreased recreational and conservation value of an impoundments, loss of livestock and the possible lethal effect of algal toxins on drinking water.

Chemistry: Antimony potassium tartrate, Ammonium molybdate, Ascorbic acid

References: ISBN 0117515825, EPA 365.1 SM 4500 P-E., EN ISO 6878, ISO 15923-1

Reagents	Kit size	Preparation	Max. nbr of tests
984366 Phosphate R1	4 × 20 mL	Ready to use	2300
984367 Phosphate R1L	20 × 20 mL	Ready to use	11700
984368 Phosphate R1	4 × 20 mL	Ready to use	3000

Sample matrix

Drinking, ground, surface, waste, and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Phosphate Low	*- 200 µg P/L	Up to 1000 µg P/L
Phosphate High	0.2–2 mg P/L	Up to 10 mg P/L

Calibration

Calibration is linear using 1000 µg P/L standard for low range and 10 mg P/L for high range in automatic dilution.

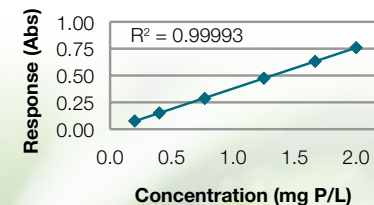
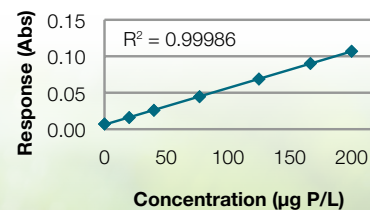


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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (µg P/L)	SD	MDL (µg P/L)
Phos Low	blank	7	0.19	0.130	0.4 ¹
	blank	40	0.82	0.921	3.6 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 3 batches for each sample.

	Pond Water (µg P/L)		Spiked Lake Water (µg P/L)		Spiked Tap Water (µg P/L)	
	N	40	N	40	N	40
	Mean	9.5	Mean	59.0	Mean	167.6
	SD	CV %	SD	CV %	SD	CV %
Within	0.362	3.8 %	0.991	1.7 %	2.667	1.6 %
Between	0.103	1.1 %	3.554	6.0 %	2.746	1.6 %
Total	0.376	4.0 %	3.690	6.3 %	3.828	2.3 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 10–2000 µg P/L.

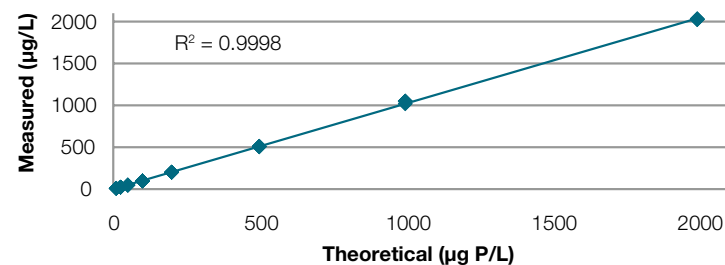


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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

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Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Silica is an unwanted mineral since it deposit on the surfaces and form colloidal suspension. Water is typically analyzed for silica as part of normal water quality analysis procedures.

Chemistry: Ammonium molybdate

References: ISO 15923-1, USGS I-2700-85, EPA 370.1, SM 4500 SiO₂-D

Reagents	Kit size	Preparation	Max. nbr of tests
984625 Silica R1	4 × 20 mL	Ready to use	970
984626 Silica R2	4 × 20 mL	Ready to use	1950
984627 Silica R3	4 × 20 mL	Ready to use	1950

Sample matrix

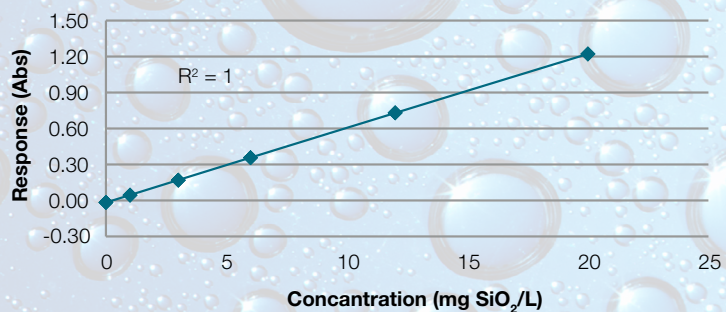
Drinking, ground, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Silica	*- 20 mg SiO ₂ /L	Up to 80 mg SiO ₂ /L

Calibration

Calibration is 2nd order using 60 mg/L standard in automatic dilution.



Method Detection Limit (MDL)

Application	Sample	n	Average (mg SiO ₂ /L)	SD	MDL (mg SiO ₂ /L)
Silica	blank	7	0.005	0.002	0.01 ¹
	blank	50	0.008	0.015	0.05 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 3 batches, n=30)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Tap water (mg SiO ₂ /L)		Natural water (mg SiO ₂ /L)		Well water (mg SiO ₂ /L)	
	N	50	N	50	N	50
	Mean	5.52	Mean	7.91	Mean	12.61
	SD	CV %	SD	CV %	SD	CV %
Within	0.007	0.3 %	0.016	0.2 %	0.033	0.3 %
Between	0.007	0.3 %	0.022	0.3 %	0.074	0.6 %
Total	0.010	0.4 %	0.027	0.3 %	0.081	0.6 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 2.5–80 mg SiO₂/L.

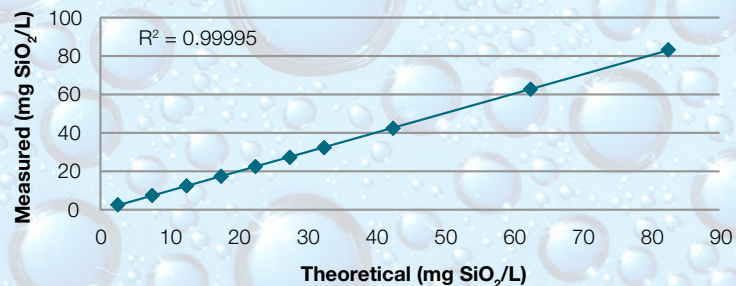


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Calcium

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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Sulfate is commonly found in air, soil and water. Since sulfate is easily dissolved, it is found at high concentrations in many surface water. Sulfate has laxative effects and imparts an unpleasant taste to water.

Chemistry: Barium chloride

References: ISBN 0117533406, EPA 375.4, DIN 38405-D, SM 4500 SO4- E, ISO 15923-1

Reagents	Kit size	Preparation	Max. nbr of tests
984648 Sulphate R1	4 x 20 mL	Ready to use	1100
984649 Sulphate R1 XL*	4 x 60 mL	Ready to use	5100

*60 mL vial for Aquakem analyzers only

Sample matrix

Drinking, ground, surface, and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Sulphate Low	*- 20 mg/L	Up to 100 mg/L
Sulphate High	20–100 mg/L	Up to 500 mg/L

Calibration

Calibration is 2nd order using 100 mg/L standard for low range and 500 mg/L for high range in automatic dilution.

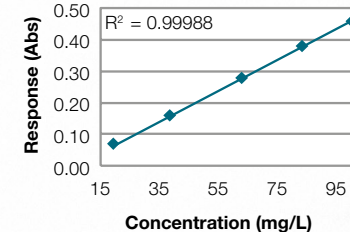
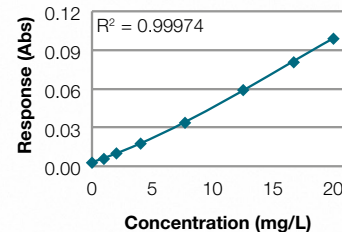


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Fluoride

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Magnesium

Nitrite

Phosphate

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Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L)	SD	MDL (mg/L)
Sulphate L	Std 0.2 mg/L	7	1.05	0.084	1.26 ¹

¹MDL = 3.14 × SD (blank sample, n=7)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Tap water (mg/L)		Pond water (mg/L)	
	N	50	N	50
	Mean	24.0	Mean	72.0
	SD	CV %	SD	CV %
Within	0.254	1.1 %	0.320	0.4 %
Between	0.063	0.3 %	0.282	0.4 %
Total	0.262	1.1 %	0.427	0.6 %

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 2–500 mg/L.

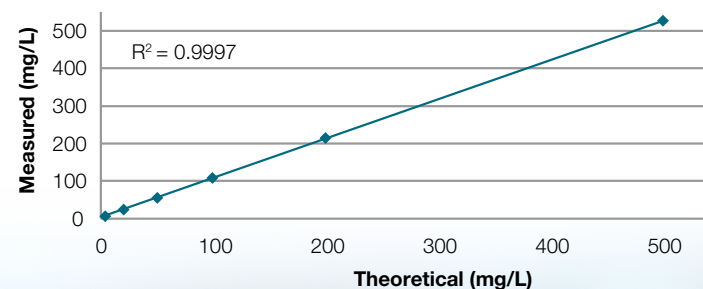


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Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Total Hardness

High levels of hard-water ions such as Ca^{2+} and Mg^{2+} can cause deposits in plumbing. These two ions also combine chemically with soap molecules, resulting in decreased cleansing action.

Chemistry: Calmagite

References: EPA 130.1

Reagents	Kit size	Preparation	Max. nbr of tests
984620 Total Hardness R1	4 × 20 mL	Ready to use	1100
984621 Total Hardness R2	4 × 20 mL	Ready to use	975
984622 Total Hardness R3	4 × 20 mL	Ready to use	4300

Sample matrix

Drinking, ground and surface water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
Total Hardness	20–200 mg CaCO_3/L	Up to 500 mg CaCO_3/L

Calibration

Calibration is spline using 1000 mg/L as CaCO_3 standard in automatic dilution.

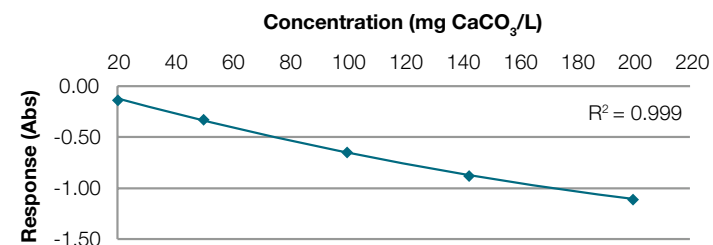


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Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Method Detection Limit (MDL)

Application	Sample	n	Average (mg/L CaCO ₃)	SD	MDL (mg/L CaCO ₃)
THardness	blank	7	7.6	0.637	2 ¹
	blank	50	7.7	0.612	10 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 5 batches, n=50)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Tap water (mg CaCO ₃ /L)		Spiked tap water (mg CaCO ₃ /L)		Ground water (mg CaCO ₃ /L)	
	N	50	N	50	N	50
	Mean	52	Mean	157	Mean	82
	SD	CV %	SD	CV %	SD	CV %
Within	0.762	1.5 %	1.668	1.1 %	0.835	1.0 %
Between	0.620	1.2 %	2.494	1.6 %	1.348	1.6 %
Total	0.983	1.9 %	3.001	1.9 %	1.586	1.9 %

Total Hardness

Linearity

Method linearity was tested with pure chemicals dissolved in DI water between 20–500 mg CaCO₃/L.

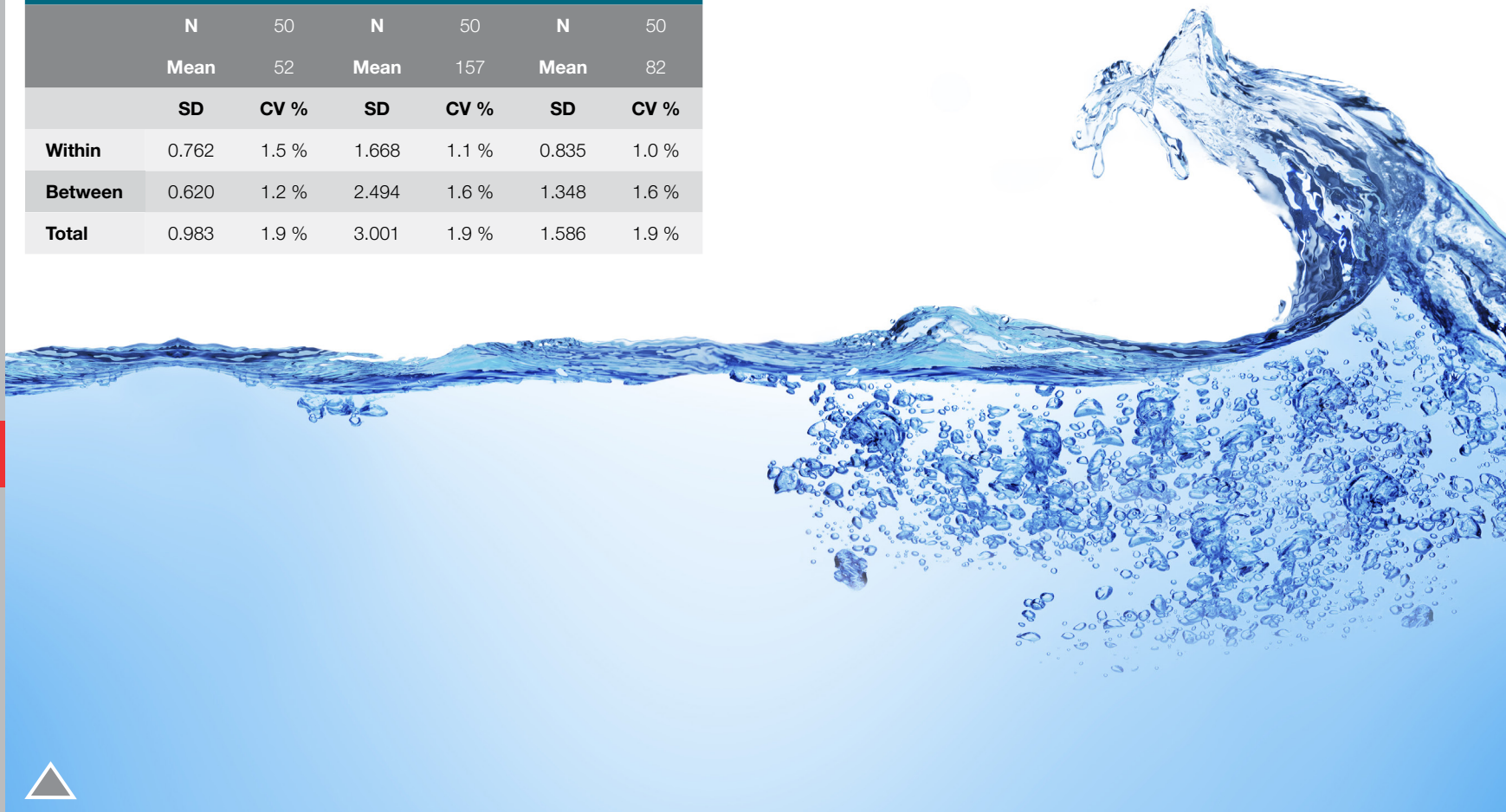
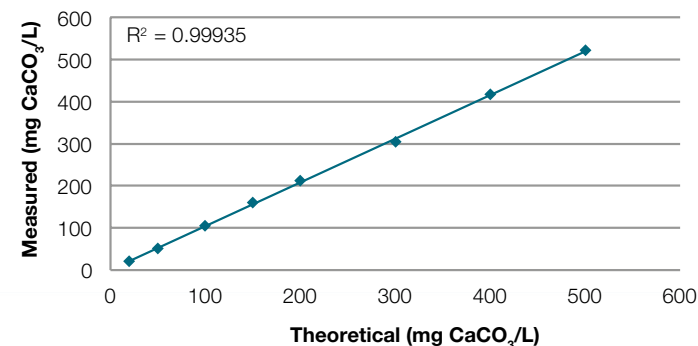


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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)Total Oxidized Nitrogen
(TON Vanadium)Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

A plant nutrient and inorganic fertilizer, nitrate is found in septic systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps. Nitrate is determined by subtracting Nitrite result from TON result with an automated calculation. For Gallery analyzers, three system reagent kits for TON/Nitrate are available.

TON (Hydrazine)

Chemistry: Hydrazine

References: ISBN 0117515930, EPA 353.1, SM 4500-NO₃-H, ISO 15923-1

Total Oxidized Nitrogen (TON)/Nitrate

Reagents	Kit size	Preparation	Max. nbr of tests
984369 TON R1	125 mL	Ready to use	1300
984370 TON R2	4 × 20 mL	Ready to use	750
984652 TON R2 XL	6 × 60 mL	Ready to us	3400
984371 TON R3	4 × 20 mL	Ready to us	1000
984372 TON R3 L	20 × 20 mL	Ready to us	5000

Sample matrix

Drinking, ground, surface and waste water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
TON Low	*-500 µg N/L	Up to 2500 µg N/L
TON High	0.5–5 mg N/L	Up to 25 mg N/L



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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

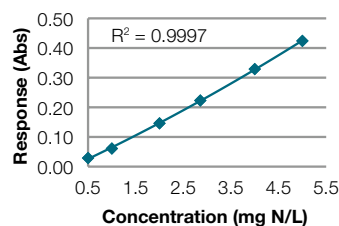
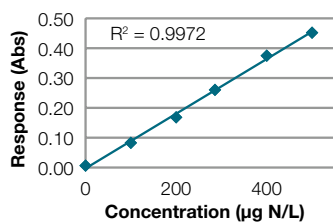
Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Total Oxidized Nitrogen (TON)/Nitrate

Calibration

Calibration is linear using 2000 µg N/L standard for low range and 2nd order using 20 mg N/L for high range in automatic dilution.



Method Detection Limit (MDL)

Application	Sample	n	Average (µg N/L)	SD	MDL (µg N/L)
TON Low	blank	7	1.2	0.197	0.6 ¹
	blank	50	3.4	2.700	11.5 ²

¹MDL = 3.14 × SD (blank sample, n=7)

²MDL = 3 × SD + average (blank sample, 5 batches, n=50)

Precision

Precision was tested in 10 replicates and 5 batches for each sample.

	Lake water (µg N/L)		Pond water (µg N/L)		Tap water (µg N/L)	
	N	50	N	50	N	50
	Mean	61	Mean	292	Mean	404
	SD	CV %	SD	CV %	SD	CV %
Within	1.557	2.6 %	5.531	1.9 %	7.968	2.0 %
Between	4.581	7.5 %	13.071	4.5 %	4.779	1.2 %
Total	4.838	7.9 %	14.193	4.9 %	9.291	2.3 %

Linearity

Method linearity was tested with matrix samples comparing against TON Vanadium method (see section TON (Vanadium)).



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Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)

Total Oxidized Nitrogen
(TON Vanadium)

Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Total Oxidized Nitrogen (TON Vanadium)

Chemistry: Vanadium Chloride

References: Automated Nitrate (TON) Assay Method Using Vanadium as Reductant - Correlation to Cadmium and Hydrazine Reductant Methods in Sea, Natural and Waste Waters, January 2013

Reagents	Kit size	Preparation	Max. nbr of tests
984350 TON-V R1	4 × 10 mL	Ready to use*	360
984351 TON-V R2	4 × 10 mL	Ready to use*	500

*Possibility to run 2-reagent or single (mix) reagent methods

Sample matrix

Drinking, ground, surface, waste and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
TON-V High (surface and waste water)	*-5 mg N/L	Up to 50 mg N/L
TON-V SW (saline water)	*-100 µg N/L	Up to 500 µg N/L
TON-V Low (drinking and ground water)	*-400 µg N/L	N/A

Calibration

Calibrations are using manually diluted standards as N. Calibration is linear for TON-V SW and TON-V Low and 2nd order for TON-V High.

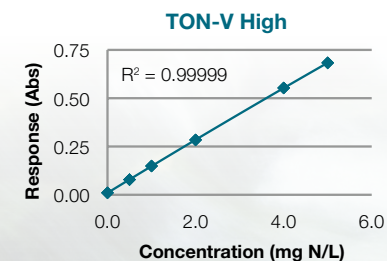
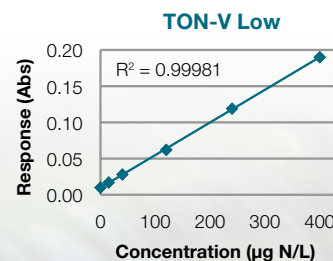
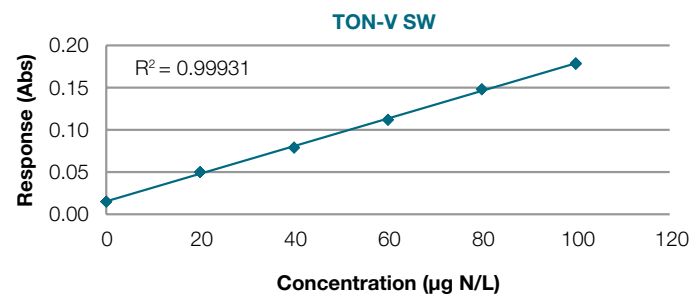


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Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen
(TON Hydrazine)

Total Oxidized Nitrogen
(TON Vanadium)

Total Oxidized Nitrogen
(TON Enzymatic)

Gallery analyzers

Total Oxidized Nitrogen (TON Vanadium)

Method Detection Limit (MDL)

Application	Sample	n	Average (µg/L)	SD	MDL (µg/L)
TON-V SW	Saline water	7	2.35	0.215	0.68 ¹
TON-V Low	Blank	7	2.35	0.224	0.68 ¹

Linearity and method comparison

Method linearity was tested with matrix samples comparing against TON Hydrazine method. Method comparison was performed against Ton Cd method.

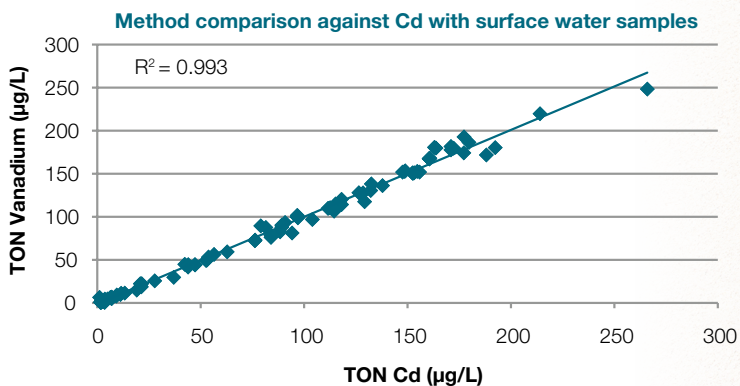
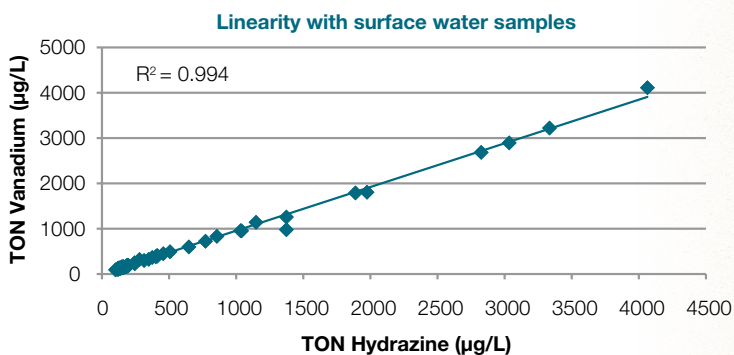


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Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers

Total Oxidized Nitrogen (TON Enzymatic)

Chemistry: Nitrate reductase

References: ASTM D7781-14, EPA 40 CFR Part 141

Reagents	Kit size	Preparation	Max. nbr of tests
984187 contains:			
AtNaR	3 U/vial	See package insert for details	275
Enzyme diluent bulb	1 vial		
NADH	2 mg/vial		
984371 TON R3	4 x 20 mL	Ready to use	1000

Sample matrix

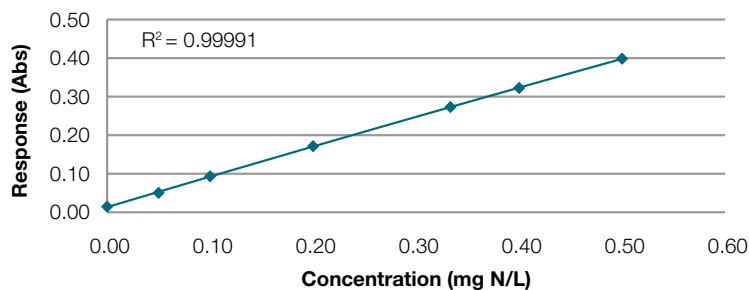
Drinking, ground, surface, waste and saline water

Measuring range

Application	Range	Extended measuring range (dil. 1+4)
TON Enz	*- 0.5 mg N/L	Up to 2.5 mg N/L

Calibration

Calibration is 2nd order using 2 mg N/L standard in automatic dilution.



Method Detection Limit (MDL)

Application	Sample	n	Average (µg/L)	SD	MDL (µg/L)
TON Enz	Blank	7	0.075	0.112	0.351 ¹

¹MDL = 3.14 x SD (blank sample, n=7)

Linearity and method comparison

Method linearity was tested with pure chemicals dissolved in DI water and matrix samples comparing against TON Hydrazine method.

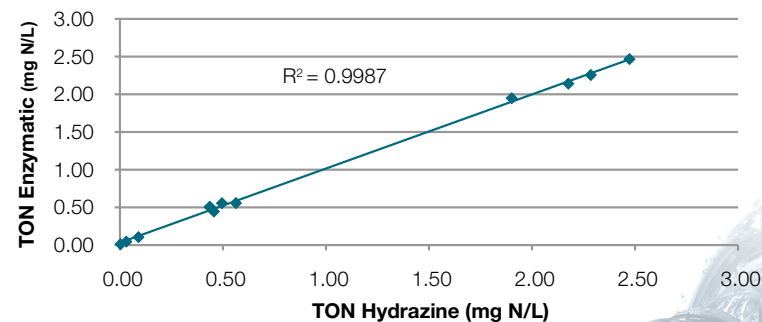


Table of Contents

Water analysis

Alkalinity

Ammonia

Calcium

Chloride

Chromium (VI)

Fluoride

Iron (Ferrous)

Magnesium

Nitrite

Phosphate

Silica

Sulfate

Total Hardness

Total Oxidized Nitrogen (TON Hydrazine)

Total Oxidized Nitrogen (TON Vanadium)

Total Oxidized Nitrogen (TON Enzymatic)

Gallery analyzers



	Gallery	Gallery Plus
Capacity	Up to 200 photometric tests per hour	Up to 350 photometric tests per hour
On-Board Sample Capacity	Maximum of 90 using five 9- or 18-position sample racks and one 6-position reagent rack	Maximum of 108 using six 9- or 18-position sample racks
On-Board Reagent Capacity	Maximum of 30 using one 9- or 18-position sample rack and five 6-position reagent racks	Maximum of 42 reagent positions
Walk-away Time	Up to 2 hours	Up to 3 hours
Water Consumption	1.5 liters per hour	2.5 liters per hour
Dimensions and Weight	75 cm W x 70 cm D x 62 cm H/130 cm H (with the open cover) and 85 kg 27.5 in W x 27.6 in D x 24.4 in H/57 in H (with the open cover) and 187 lbs	94 cm W x 70 cm D x 62 cm H/130 cm H (with the open cover) and 110 kg 37 in W x 27.6 in D x 24 in H/51 in H (with the open cover) and 242 lbs
Additional Features	Continuous access to samples, reagents, and cuvettes without interrupting the test cycle. Spectral range from 340–880 nm with different filter configurations available. Bi-directional LIMS connection available. Optional electrochemical unit available for conductivity and pH measurements.	

Gallery analyzers with system reagents, a complete solution for water analysis

Thermo Scientific System Reagents are ready to go, saving the technician's time and reducing errors. The unique low volume cuvette design guarantees small reagent volumes, minimizes reagent waste, and as a result reduces reagent costs. Optimized kit sizes and on-board stability further minimize the amount of waste produced and increase cost efficiency.

Benefits of automated discrete analysis

- Fast – ready for immediate analysis: no reagent priming, no method changeover time
- Flexible – various tests can be performed on each sample; there is no limitation to the number of tests
- Precise – specific measurements with high reproducibility

Find out more at thermofisher.com/discreteanalysis

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