

Water Quality Research Laboratory Method Price List (2022-2023)

Laboratory Supervisor: Dr. Michelle Soupir
Email: msoupir@iastate.edu | Phone: (515)-294-2307

Laboratory Manager: Leigh Ann Long
Email: lalong@iastate.edu | Phone: (515)-294-4241

Water Analysis

Instrument: AQ2 or AQ400 Discrete Autoanalyzer (Seal Analytical; Mequon, WI)

Listed prices are for internal clients (Iowa State University PIs).
An indirect rate of 50% will be applied to all external clients.



Analyte	Detection Limit	Method Range	Method Description	AQx Method number	Method reference [†]	Sample Size (minimum)	Cost (per sample) [‡]
Nitrogen							
Ammonia/Ammonium	0.004 mg N/L	0.02-2.0 mg N/L	Alkaline phenate with hypochlorite and sodium nitroprusside (indophenol blue).	EPA-103-A Rev. 10	EPA 350.1, rev. 2.0 (1993) SM 4500-NH ₃ -G	25 mL	\$7.00
	0.05 mg N/L	0.2-10 mg N/L		EPA-129-A Rev. 8			

Nitrate+nitrite ¹	0.003 mg N/L	0.012-2.0 mg N/L	Cadmium reduction.	EPA-127-A Rev. 7	EPA 353.2, rev. 2.0	25 mL	\$7.00
	0.03 mg N/L	0.25-15 mg N/L		EPA-114-A Rev. 7	SM 4500-NO ₃ ⁻ -F	25 mL	\$7.00
Nitrite	0.0006 mg N/L	0.015-1.5 mg N/L	Colorimetric (sulfanilamide).	EPA-112-A Rev. 0	EPA 354.1, rev. 2.0 (1993)	25 mL	\$7.00
Total Kjeldahl nitrogen (TKN) ²	0.07 mg N/L	0.2-4.0 mg N/L	Kjeldahl digests (copper catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside.	EPA-111-A Rev. 5	EPA 351.2, rev. 2.0 (1993) SM 4500-N(org)-D	250 mL	\$14.00
Total Kjeldahl nitrogen (TKN) ²	0.12 mg N/L	0.5-25.0 mg N/L	Kjeldahl digests (copper catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside.	EPA-136-A Rev. 4	EPA 351.2, rev. 2.0 (1993) SM 4500-N(org)-D	250 mL	\$14.00

†EPA = *Methods for the Determination of Metals and Inorganic Chemicals in Environmental Samples* (U.S. Environmental Protection Agency). Edition is referenced.

SM = *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association *et al.*). Current edition (23rd ed.) is referenced unless otherwise specified.

‡Per sample charges are for unknown samples only. These charges cover all consumables and reagents, and standard and quality control samples.

¹Nitrate alone can be determined by difference when analysis for both nitrate+nitrite and nitrite are performed.

²Total Kjeldahl nitrogen (TKN) measures ammonia+organic N, but not nitrate. It is not appropriate for samples >10 ppm nitrate. TKN may be performed simultaneously with total Kjeldahl phosphorus. If so, the per sample charge is \$21.00, which covers both analytes.

Analyte	Detection Limit	Method Range	Method Description	AQx Method number	Method reference [†]	Sample Size (minimum)	Cost (per sample) [‡]
Phosphorus							
Reactive phosphate (aka orthophosphate), dissolved ³ or total	0.002 mg P/L	0.01-1.0 mg P/L	Ascorbic acid reduction, measured photometrically at 880 nm.	EPA-118-A Rev. 5	EPA 365.1, rev. 2.0 (1993)	25 mL	\$7.00
	0.005 mg P/L	0.05-5.0 mg P/L		EPA-145-A Rev. 1	SM 4500-P-F		
Total phosphorus (persulfate oxidation) ⁴	0.003 mg P/L	0.01-1.0 mg P/L	Hydrolysis of some organic P compounds and polyphosphates to orthophosphate via acid persulfate autoclave digestion.	EPA-119-A Rev. 6	EPA 365.1, rev. 2.0 (1993)	250 mL	\$14.00
	0.006 mg P/L	0.05-5.0 mg P/L		EPA-134-A Rev. 4	SM 4500-P-B.5, -F		
Total dissolved phosphorus (persulfate oxidation) ³	0.003 mg P/L	0.01-1.0 mg P/L	Hydrolysis of some organic P compounds and polyphosphates to orthophosphate via acid persulfate autoclave digestion.	EPA-119-A Rev. 6	EPA 365.1, rev. 2.0 (1993)	250 mL	\$14.00
	0.006 mg P/L	0.05-5.0 mg P/L		EPA-134-A Rev. 4	SM 4500-P-B.5, -F		
Total Kjeldahl phosphorus (TKP) ⁵	0.009 mg P/L	0.04-3.2 mg P/L	Kjeldahl digests (Cu catalyst) are reacted with acidic molybdate and antimony with ascorbic acid reduction.	EPA-135-A Rev. 5	EPA 365.4 (1983)	250 mL	\$14.00
³ Samples may be filtered (0.45 µm) for dissolved analysis prior to submission to the WQRL, or we can filter for you at an additional \$3.00/sample.							
⁴ Total phosphorus via persulfate digestion is not appropriate for samples containing high amounts of sediment. TKP may be more appropriate for these samples.							
⁵ May be performed simultaneously with total Kjeldahl nitrogen (TKN). If so, the sample charge is \$21.00, which covers both analytes.							

Other Parameters							
Analyte	Detection Limit	Method Range	Method Description	AQx Method number	Method reference [†]	Sample Size (minimum)	Cost (per sample) [‡]
Chloride	0.56 mg/L	2 to 100 mg/L	Mercuric thiocyanate reaction in the presence of ferric nitrate.	EPA-105-A Rev 5	SM 4500-Cl-E	25 mL	\$7.00
Silica (molybdate-reactive)	0.1 mg silica/L	0.25-25 mg silica/L	Acidic molybdate, no reduction (molybdo-silicic acid)	EPA-121-A Rev. 2	EPA 370.1 (1983) SM 4500-SiO ₂ -C	25 mL	\$7.00
Sulfate	1.0 mg SO ₄ /L	5-40 mg SO ₄ /L	Turbidimetric method with barium sulfate.	EPA-123-A Rev. 5	EPA 375.4 (1983)	25 mL	\$7.00

Microbiological Testing



Analyte	Detection Limit	Method Description	Method Reference [†]	Sample Size (minimum)	Cost
<i>E. coli</i> , <i>Enterococcus</i> , <i>Salmonella</i>	20 CFU/100 mL	Membrane filtration	SM 9222-B	100 mL	\$7.00/plate
Total coliforms/ <i>E. coli</i> via IDEXX Colisure kit	1 CFU/100 mL	Most probable number (MPN)	SM 9221-F	100 mL	\$11.00/sample
Total <i>Enterococcus</i> via IDEXX Enterolert kit	1 CFU/100 mL	Most probable number (MPN)	SM 9230-D	100 mL	\$14.00/sample

Miscellaneous Water Test Methods

Analyte	Instrument	Detection Limit	Method Description	Method Reference [†]	Sample Size (minimum)	Cost (per sample)
Conductivity	Accumet AB 30 conductivity meter	±1 µmho/cm	Potentiometric	SM 2510-B	50 mL	\$3.00
pH	Orion 290A pH meter	±0.01 pH unit	Potentiometric	SM 4500-H ⁺ -B	50 mL	\$3.00
Total suspended solids	Mettler Analytical Balance	1 mg/L	Dried at 105°C	SM 2540-D	500 mL	\$7.00
Fixed and volatile solids	Mettler Analytical Balance	1 mg/L	Ignited at 550°C	SM 2540-E	500 mL	\$3.50
Staff time (for extended consultations, method development, data interpretation, report preparation, creation of watershed management plans, etc.)						\$48.48/hr

Instrument: Cary 8454 UV/Vis Diode Array Spectrophotometer (Agilent Technologies, Santa Clara, CA)



Analyte	Detection Limit	Method Description	Method Reference [†]	Sample Size (minimum)	Cost
Chlorophyll- <i>a</i> , <i>b</i> , <i>c</i> and pheophytin	TBD	Extraction with 90% acetone followed by spectrophotometric analysis.	SM 10200-H.2	500 mL	\$20.00/sample
Nitrate	0.03 mg N/L	UV spectroscopy – absorbance measured at 235 nm with a second-derivative spectrum equation computed.	SM 4500-NO3 C	20 mL	\$7.00/sample
Total nitrogen (alkaline persulfate digestion)	0.5 mg N/L	Organic nitrogen is oxidized to nitrate during alkaline persulfate digestion; nitrate is then analyzed at 235 nm with a second-derivative spectrum equation computed.	SM 4500-P J (digestion); SM 4500-NO3-C (analysis).	100 mL	\$14.00/sample
Self-use (to annotate spectrum peaks, acquire absorption data, etc.). Training by WQRL staff is required.	Varies by analyte. Spectrum range: 190-1100 nm.	1 cm quartz and plastic cuvettes available.	-	Varies by analyte.	\$10.30/hour (billable by the half-hour).

Soil Analysis Methods

Analyte	Instrument	Detection Limit	Method Description	Method Reference [†]	Sample Size (minimum)	Cost (per sample)
Extraction with 2 M potassium chloride (KCl)	-	-	Preparation for nitrate and ammonium analysis	Mulvaney, R.L. 1996.	50 g	\$3.00
Soil extractable/plant available nitrate+nitrite	Seal Analytical AQ400	Range = 0.06-5.0 mg N/L (MDL = 0.015 mg N/L)	2 M KCl extract, analyzed colorimetrically via cadmium reduction.	Mulvaney, R.L. 1996. AQx method AGR-231-A Rev. 0.	See above.	\$7.00
Soil extractable/plant available ammonium	Seal Analytical AQ400	Range = 0.2-10 mg N/L (MDL = 0.04 mg N/L)	2 M KCl extract analyzed colorimetrically via alkaline phenate.	Mulvaney, R.L. 1996. AQx method AGR-210-A Rev. 1	See above.	\$7.00
Total phosphorus	BD 50 digestion block	TBD	Alkaline hypobromite digestion, then colorimetric analysis via ascorbic acid method.	Dick, W.A. and Tabatabai, M.A. 1977.	20 g, ground to <100 mesh	\$14.00
pH	Orion 290A pH meter	±0.01 pH unit	Potentiometric, 1:1 measurement in DI water	Thomas, G.W. 1996.	20 g	\$3.00
Soil moisture	Drying oven	0.05%	Gravimetric, dried at 105°C	Black, C.A. 1965.	20 g	\$3.50
Total Organic Matter (via loss-on-ignition)	Muffle furnace	0.05%	Ignited at 450°C for 4 hours. Must be done in conjunction with moisture analysis.	Nelson, D.W. and Sommer, L.E. 1996.	50 g	\$3.50
Aggregate stability and size distribution	Wet sieving apparatus, based on a Kansas State design	-	Wet sieving (2, 1, 0.21, and 0.053 mm sieve sizes; 10-minute agitation time. Corrected for sand content.	Nimmo, J.R. and Perkins, K.S. 2002.	100 g	\$26.00