Method Abstract

Scope

This method is used for determining ammonia in drinking water, surface water, and domestic and industrial wastes according to USEPA Method 350.1 and Standard Methods 4500–NH_3 H. This method can also be used for the determination of ammonia nitrogen in potassium chloride (KCl) extracts of soils and plants.

Summary

Ammonia reacts with alkaline phenol and hypochlorite to form indophenol blue in an amount proportional to the ammonia concentration. The blue color is intensified with sodium nitroferricyanide, and the absorbance is measured at 640 nm.

Interferences

Eliminate precipitation of calcium and magnesium hydroxides by adding Ethylenediaminetetraacetic acid (EDTA). Filter turbid samples prior to analysis. Samples with background absorbances at the analytical wavelength may interfere with the analysis.

Performance Specifications

Range:	0.01–20 mg/L
Throughput:	51 samples/hour
Precision (at 0.5 mg/L):	<1% RSD
Precision (at 1.0 mg/L):	<1% RSD
Method Detection Limit (MDL):	0.002 mg/L

Chemicals

Ammonium Sulfate, $(NH_4)_2SO_4$

Chloroform, $CHCl_3$

Deionized (DI) Water (ASTM Type I or II)

Ethylenediaminetetraacetic Acid, disodium salt dihydrate (EDTA), $C_{10}H_{16}N_2Na_2O_8 \bullet 2H_2O$

Kleenflow™ Acidic (OI Analytical Part #A001251)

Kleenflow™ Basic (OI Analytical part number A001252)

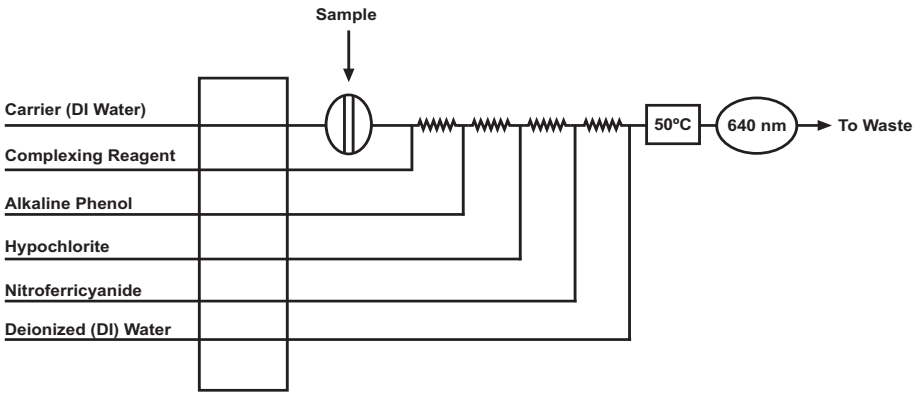
Phenol, solid or liquefied, 88%, C_6H_5OH

Sodium Hydroxide, NaOH

Sodium Hypochlorite, 5.25% available chlorine (OI Analytical does not recommend household bleach), NaOCl

Sodium Mitroferricyanide Dihydrate, $Na_2Fe(CN)_5NO \bullet 2H_2O$

Basic Flow Diagram



Selected References

Methods for Chemical Analysis of Water and Wastewater; EPA–600/4–79–020; U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory: Cincinnati, OH, 1984; Method 350.1.

Patton, C.J.; Crouch, S.R. Spectrophotometric and Kinetics Investigation of the Berthelot Reaction for the Determination of Ammonia. *Analytical Chemistry* **1977**, *49* (3), 464–469.

Standard Methods for the Examination of Water and Wastewater, 21st ed.; American Public Health Association: Washington, D.C., 2005.

Figures

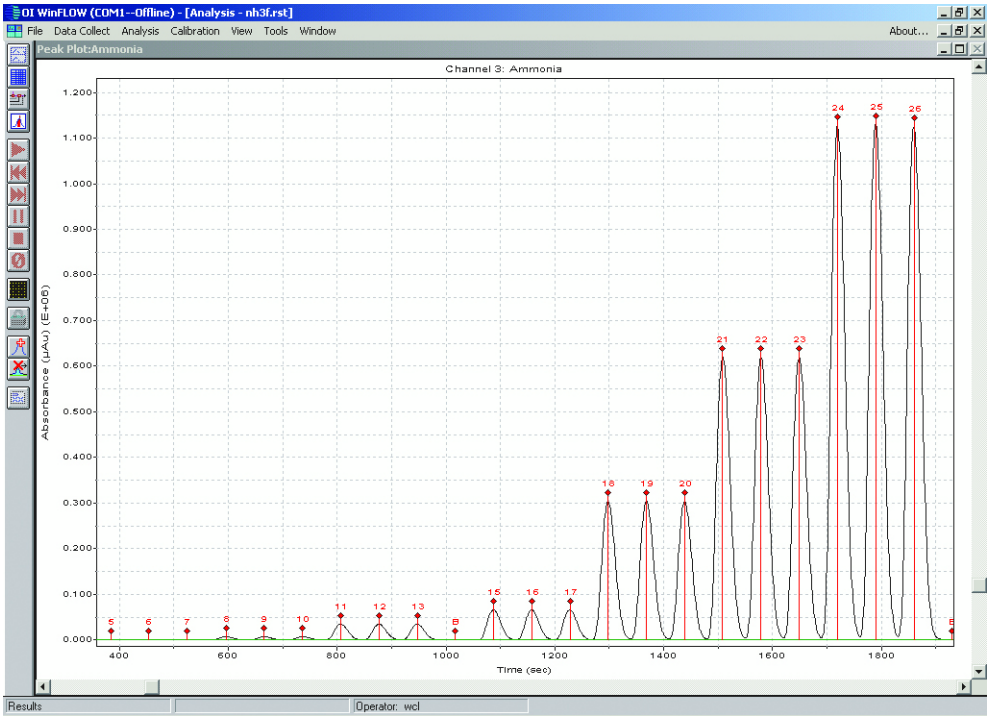


Figure 1. Ammonia Calibration (0.01–20 ppm)

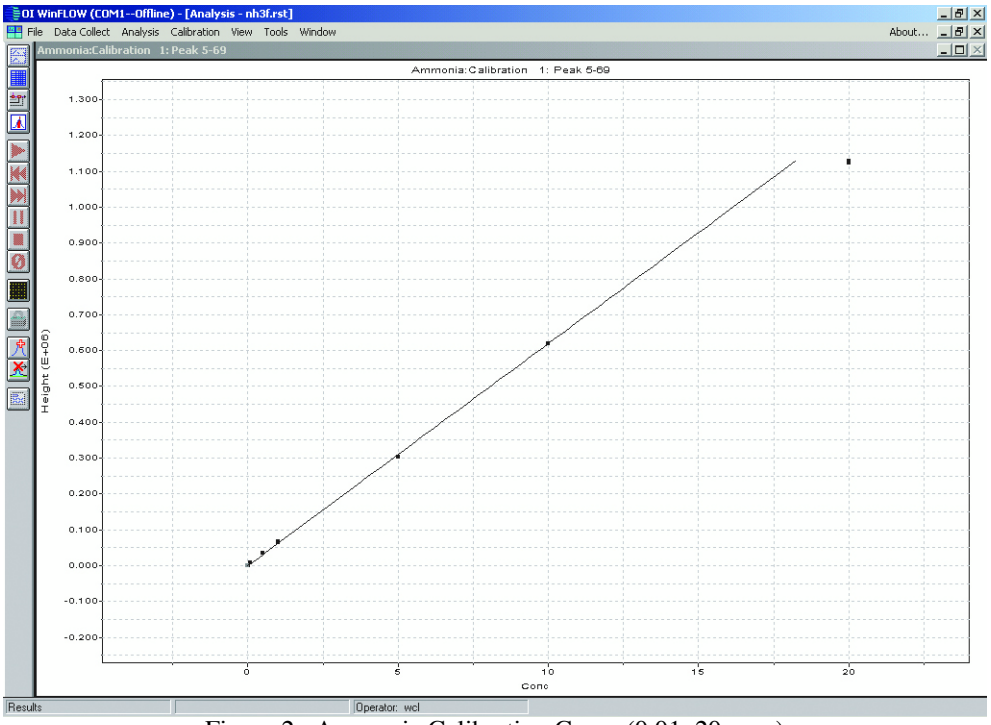


Figure 2. Ammonia Calibration Curve (0.01–20 ppm)

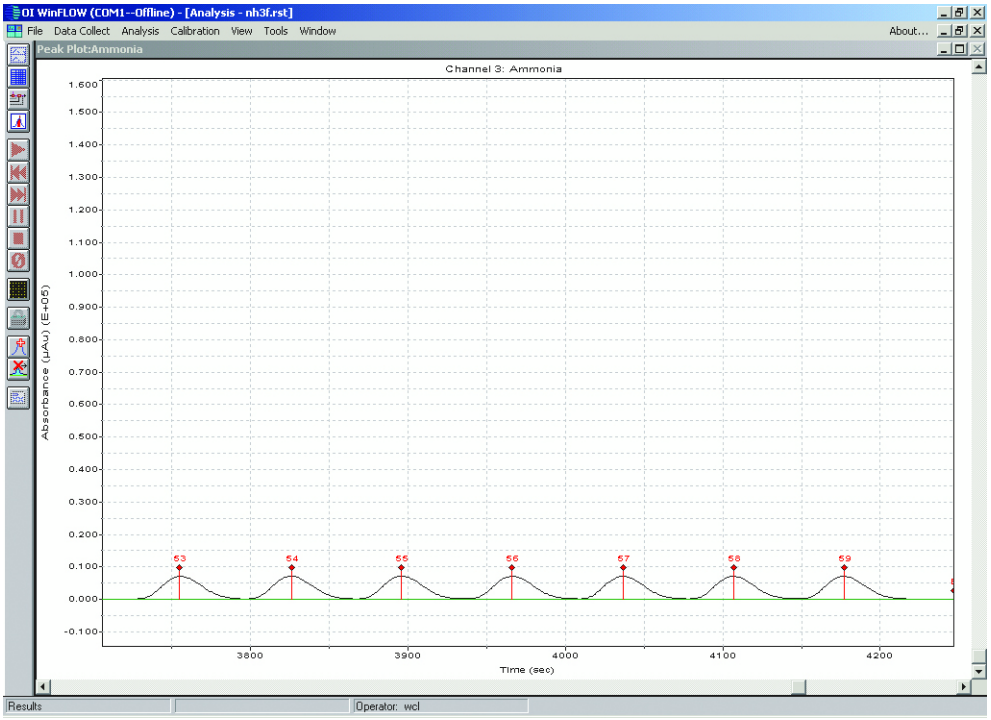


Figure 3. Ammonia Method Detection Limit (at 0.01 ppm)

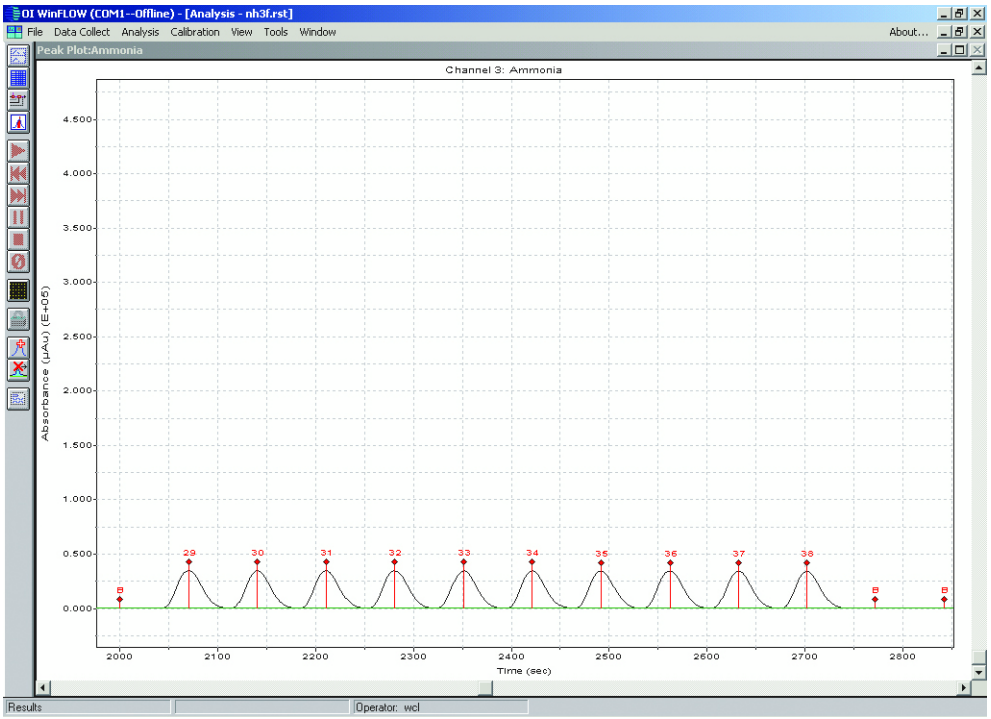


Figure 4. Ammonia Precision (at 0.5 ppm)

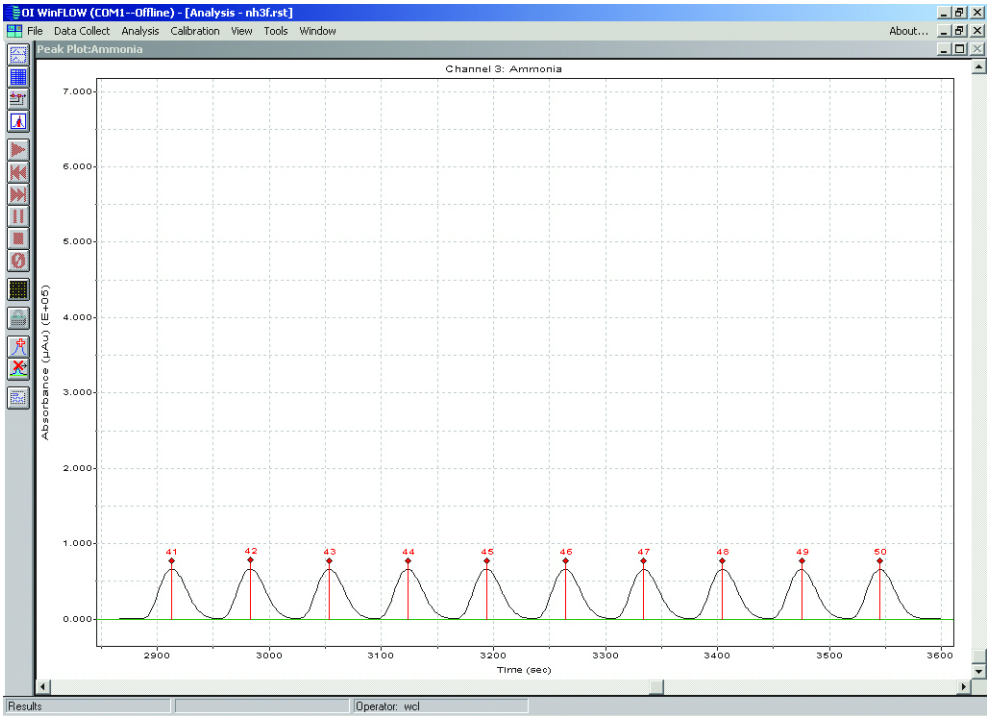


Figure 5. Ammonia Precision (at 1.0 ppm)

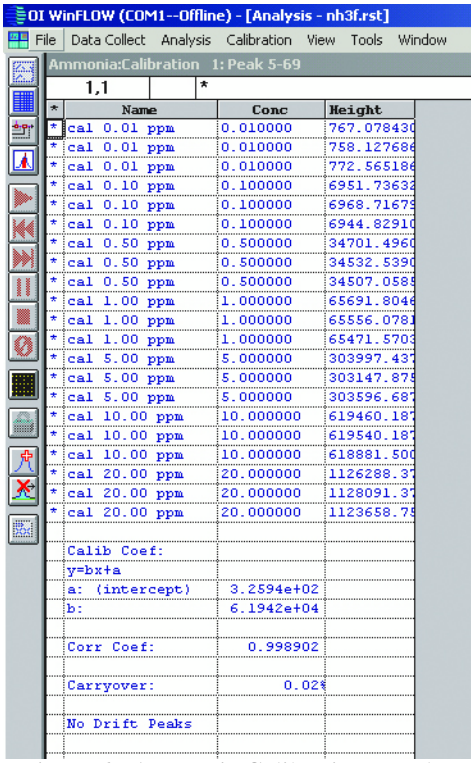


Figure 6. Ammonia Calibration Results

Table 1. Ammonia Nitrogen Precision Calculations

	0.500 mg N/L	1.00 mg N/L	0.10 mg N/L	0.01 mg N/L	ERA P127-739B
Rep 1	0.541	1.06	0.0885	0.0083	13.1
Rep 2	0.542	1.07	0.0879	0.0077	13.1
Rep 3	0.540	1.06	0.0883	0.0078	13.0
Rep 4	0.541	1.06	0.0874	0.0084	13.0
Rep 5	0.542	1.06	0.0879	0.0083	—
Rep 6	0.543	1.06	0.0871	0.0078	—
Rep 7	0.542	1.07	0.0879	0.0075	—
Rep 8	0.544	1.06	—	—	—
Rep 9	0.545	1.06	—	—	—
Rep 10	0.543	1.06	—	—	—
Mean	0.542	1.06	0.088	0.0080	13.0
Standard Deviation	0.001647	0.001636	0.000484	0.00035456	0.035422
% RSD	0.30	0.15	0.55	4.45	0.27
% Recovery	108	106	88	80	99
MDL	—	—	—	**0.001**	—

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