

## Flow Solution™ FS 3700 Automated Chemistry Analyzer

Ammonia Nitrogen, USEPA by Flow Injection Analysis  
USEPA 350.1  
Cartridge Part Number 330354CT

### Scope and Application

This method is used for the determination of ammonia in drinking water, surface water, and domestic and industrial wastes according to **USEPA Method 350.1** and **Standard Methods 4500-NH<sub>3</sub>H**. This method can also be used for the determination of ammonia nitrogen in potassium chloride (KCl) extracts of soils and plants.

### Method Performance

|                                     |                                  |
|-------------------------------------|----------------------------------|
| <b>Range</b>                        | 0.01-20 mg/L ammonia as nitrogen |
| <b>Rate</b>                         | 51 samples/hour                  |
| <b>Precision</b>                    | 1% RSD at mid-point of range     |
| <b>Method Detection Limit (MDL)</b> | 0.002 mg/L                       |

The range may be extended to analyze other concentrations by changing the size of the sample loop.

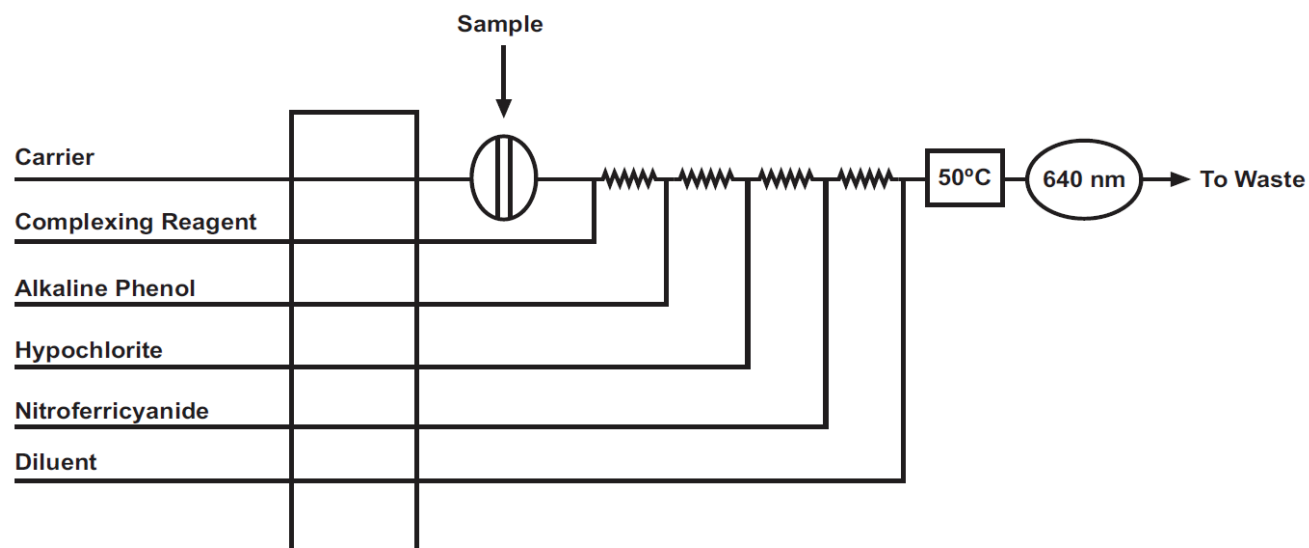


Figure 1. General flow diagram for Ammonia Nitrogen by USEPA 350.1.

## Reagents and Calibrants

| Chemical Name   | CAS #      | Chemical Formula  | Part Number |
|---|------------|---|-------------|
| Ammonium sulfate  | 7783-20-2  | $(\text{NH}_4)_2\text{SO}_4$  |             |
| Chloroform  | 67-66-3    | $\text{CHCl}_3$   |             |
| Ethylenediaminetetraacetic acid, disodium salt dihydrate (EDTA)                                 | 6381-92-6  | $\text{C}_{10}\text{H}_{16}\text{N}_2\text{Na}_2\text{O}_8 \cdot 2\text{H}_2\text{O}$ |             |
| Kleenflow™ acidic   |            |   | A002295     |
| Kleenflow™ basic  |            |   | A002294     |
| Phenol  | 108-95-2   | $\text{C}_6\text{H}_5\text{OH}$   |             |
| Sodium hydroxide  | 1310-73-2  | $\text{NaOH}$   |             |
| Sodium hypochlorite   | 7681-52-9  | $\text{NaOCl}$  |             |
| Sodium citrate dihydrate  | 6132-04-3  | $\text{C}_6\text{H}_8\text{O}_7\text{Na}_3 \cdot 2\text{H}_2\text{O}$                 |             |
| Sodium nitroferricyanide dihydrate  | 13755-38-9 | $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] \cdot 2\text{H}_2\text{O}$              |             |
| Water, deionized  |            | $\text{H}_2\text{O}$  |             |
| <b>Additionally, the following chemicals may be needed for sample preservation or treatment</b> |            |   |             |
| Potassium chloride  | 7447-40-7  | $\text{KCl}$  |             |
| Sodium tetraborate decahydrate (Borax)  | 1303-96-4  | $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$                          |             |
| Sulfuric acid, concentrated   | 7664-93-9  | $\text{H}_2\text{SO}_4$   |             |
| Silver nitrate  | 7761-88-8  | $\text{AgNO}_3$   |             |
| Sodium arsenite   | 7784-46-5  | $\text{NaAsO}$  |             |

## Summary of USEPA Method 350.1

### Method

1. Prior to analysis, the ammonia is buffered at a pH of 9.5 and distilled into a solution of boric acid. 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.
2. Distillation is required for regulatory compliance.

### Interferences

1. Samples with background absorbance at the analytical wavelength may interfere with the analysis.
2. Filter turbid samples and digests prior to analysis.
3. Avoid the hydrolysis of cyanates and organic nitrogen compounds during distillation by buffering the sample at a pH of 9.5 with borate solution.

4. Precipitation following addition of the complexing reagent or phenolate (alkaline phenol) may occur if the samples contain calcium or magnesium in amounts that exceed the complexing capacity of the EDTA:
  - a. To address precipitation after the addition of phenolate, increase the amount of EDTA in the complexing reagent, or use the alternate citrate complexing reagent.
  - b. To address precipitation after the addition of the complexing agent, increase the sodium hydroxide concentration in the complexing agent.
5. Reduce background noise and eliminate precipitates by pumping Kleenflow™ Acidic and Kleenflow™ Basic through the sample and reagent lines. Refer to the Operating Notes for the cleaning procedure.
6. Method interferences can be caused by contaminants in the reagents, reagent water, and glassware, which may bias the results. Take care to keep all such items free of contaminants.

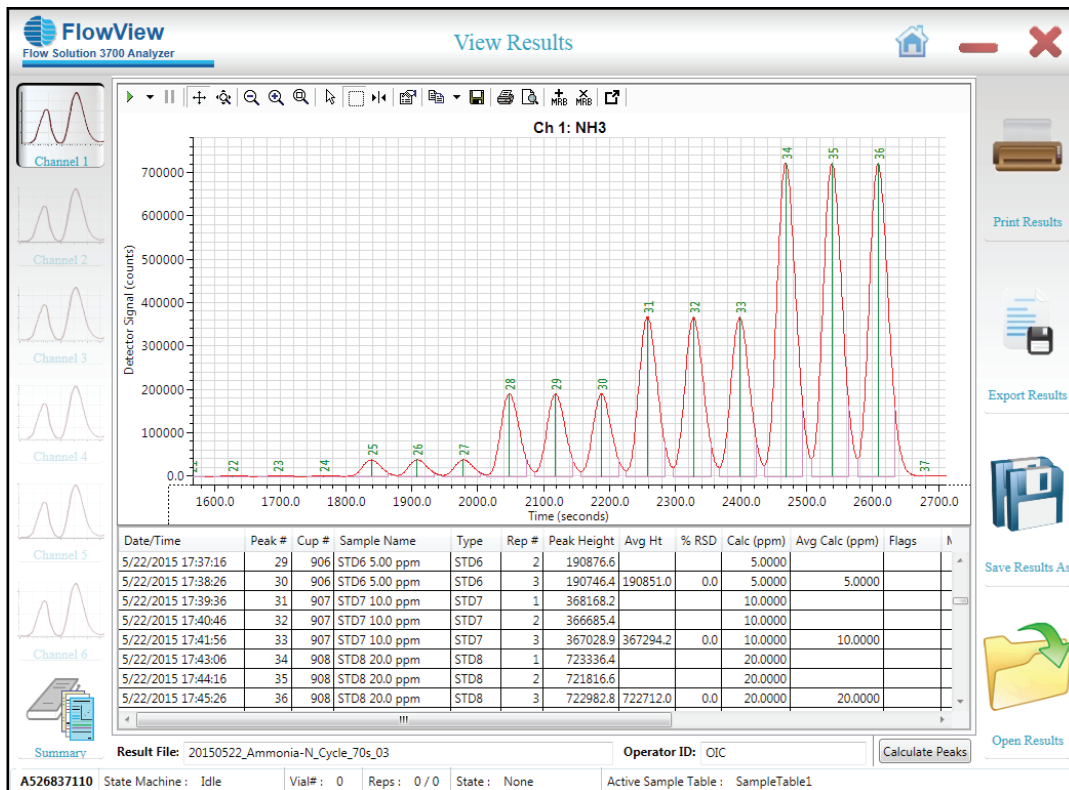


Figure 2. Ammonia Nitrogen Calibration Series

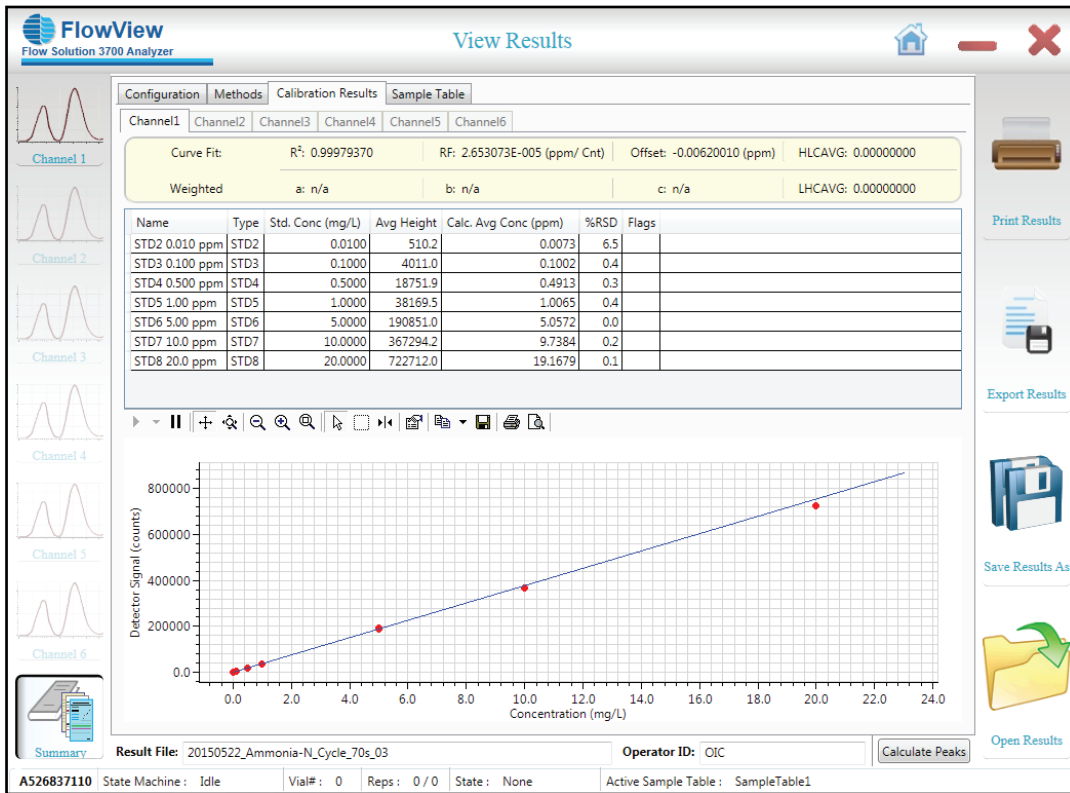


Figure 3. Calibration curve and statistics



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