

ENVIRONMENTAL EXPRESS

SimpleDist for Ammonia

Determination of ammonia nitrogen is typically performed in the laboratory by colorimetry, titration or ion selective electrode. The referenced methods for analysis by colorimetry or titration require the sample be distilled prior to analysis. The two methods use different solutions to trap the distilled ammonia as well as different methods of final determination and both are flexible on the design of the distillation apparatus. EPA 350.1 and Standard Methods 4500-NH₃ allow different apparatus' to be used as long as satisfactory quality control performance is confirmed.

Current glass distillation systems provide adequate performance but have a number of drawbacks, especially for high volume laboratories. Breakage is common, and accidents that result from that breakage. Five different glass components must be washed after each use resulting in higher labor costs and also the potential for contamination. In addition, current systems rely solely on vapor pressure to "get the ammonia over" from the boiling tube to the collection solution. Some laboratories have reported problems in keeping the distillation path warm enough for the ammonia to distill over and other labs have reported difficulty in achieving enough vapor pressure to allow the ammonia to bubble into the trapping solution.

The SimpleDist provides a system to combat these shortcomings. Instead of five pieces of glass that must be washed, the only glass is one heavy walled boiling tube. The rest of the components are plastic and disposable, thus reducing labor, breakage and safety concerns. Also, instead of relying solely on vapor pressure to effect distillation, the SimpleDist employs vacuum to pull, rather than push, the ammonia from the boiling tube to the receiving trap. These two changes, both within the scope of EPA 350.1 and SM4500-NH₃ provide a simpler, effective method of distilling ammonia samples.

The SimpleDist was recently tested by an independent certified laboratory to determine its ability to meet or exceed the QC parameters outlined in EPA 350.1. Analysis was performed on a Lachat Flow Injection instrument. The results of those tests are summarized below.

The data shows superior results in all phases of the challenge. As one would expect with the disposable traps used by the SimpleDist, no blank values above the MDL were observed (see Table I). Six laboratory control samples of 1mg/L were performed and all showed excellent recoveries within a tight range(see Table II). The laboratory's reporting detection limit of 0.05mg/L was challenged and the results were well within the acceptance criteria of 65%-135%. Table III shows very good recoveries at the 0.05 mg/L level. In addition, their MDL of 0.017mg/L, established by the traditional glassware, was tested and the SimpleDist was able to report positive values for both the 1X MDL and the 3X MDL. Finally, unknown samples for an audit, from an outside source were tested. Once again recoveries were well within the acceptable limits (see Table IV).

In summary, the SimpleDist offers an elegant, labor-saving alternative to traditional glassware systems for the distillation of ammonia samples prior to analysis by EPA 350.1 and

SM 4500-NH3. The experimental results demonstrate performance data that meet or exceed method requirements.

Table I

	Dilution	Final result	Reporting limit	MDL
MB 1	1	-0.009	0.05 mg/L	0.017 mg/L
MB 2	1	-0.011	0.05 mg/L	0.017 mg/L
MB 3	1	0.005	0.05 mg/L	0.017 mg/L
MB 4	1	-0.006	0.05 mg/L	0.017 mg/L
MB 5	1	-0.009	0.05 mg/L	0.017 mg/L
MB 6	1	-0.009	0.05 mg/L	0.017 mg/L
MB 7	1	0.008	0.05 mg/L	0.017 mg/L
MB 8	1	0.008	0.05 mg/L	0.017 mg/L

MDL= Method Detection Limit

MB= Method Blank

Table II

	Dilution	Final result	True Value	% Recovery
LCS 1	1	0.925	1.00	92.5%
LCS 2	1	0.911	1.00	91.1%
LCS 3	1	1.023	1.00	102%
LCS 4	1	0.979	1.00	97.9%
LCS 5	1	0.900	1.00	90.0%
LCS 6	1	0.949	1.00	94.9%
Avg.				94.8%

LCS= Lab Control Sample

Table III

	Dilution	Final result	Reporting limit	% Recovery
RDL 1	1	0.051	0.05	102%
RDL 2	1	0.059	0.05	118%
RDL 3	1	0.067	0.05	134%
RDL 4	1	0.047	0.05	94.0%
Avg				112%

RDL= Reporting Detection Limit

0.050 mg/L Analyzed

Table IV

	Result	Dilution	Final result	% Recovery
Unknown 1	0.972	10	9.720	97.2%
Unknown 2	0.988	10	9.880	98.8%

From Audit Samples

All results in mg/L

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