

Method Number: TM 099

Updated: 03/11/2023

Issue Number: 29



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Method Summary

Determination of Ammoniacal Nitrogen in Aqueous Samples

Scope and Range

This method can be used to determine ammoniacal nitrogen in water samples using a discrete colorimetric analyser.

Ammoniacal Nitrogen is both the free ammonia (NH₃) and ammonium (NH₄) present in a sample.

The method is applicable to natural waters, waste water, sewage and trade effluents, groundwater and potable water.

The low range is only suitable for clean fresh waters, i.e. ground water or surface water

Detection limit: High 0.2mg/l
Low 0.01mg/l

Range: High 0.2 – 50mg/l
Low 0.01 – 1.0mg/l

References

HMSO Methods for the Examination of Waters and Associated Materials, Ammonia in Waters 1981. ISBN 011 751 6139

Principle

Preparation and Extraction:

All samples are filtered through a 0.45µm membrane filter before analysis.

Analysis:

The reaction is carried out under alkali conditions, which ensures that any ammonium ions (NH₄) are converted to ammonia (NH₃) and are measured in the following reaction.

Ammonia reacts with hypochlorite ions, generated in situ by the alkaline hydrolysis of sodium dichloroisocyanurate, to produce monochloramine. Monochloramine then reacts with salicylate in the presence of sodium nitroprusside, to form the blue indosalicylate, this is measured by the analyser.

The method detects ammoniacal nitrogen (NH₃ + NH₄) in mg/l and the result can be expressed in as N, NH₃ or NH₄ depending on customer requirements.

The ratio of free ammonia to ammonium (NH₃ : NH₄) in a sample is dependent on pH.

In acidic conditions more ammonia will convert to ammonium (NH₃ + H⁺ → NH₄⁺)

If the pH is increased more ammonium will convert to ammonia (NH₄⁺ + OH⁻ → NH₃ + H₂O)

Free/unionised ammonia and ammonium/ionised ammonia may be calculated from the ammoniacal nitrogen depending on the pH of the sample.

Interferences

Samples over 100mg/l cause carry-over in the samples immediately preceding and following them, and must be diluted below 100mg/l before analysis.

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Highly coloured samples cannot be analysed by this method (unless the colour is diluted out first) as the determination relies on the measurement of the colour produced in the analytical reaction.

The presence of monochloramine, which may be present in chlorinated water and waste water, may interfere.

The Low Level method is not suitable for Sea Water, the chloride levels in sea water prevent the development of the colour reaction in the low level method.

However, in the high level method this effect is removed due to the smaller ratio of sample to reagent effectively diluting out the chloride.