Nitrogen, Ammonia

For water, wastewater and seawater **Nessler Method and Salicylate Method**

Introduction

Ammonia is a product of the microbiological decay of animal and plant protein. It can be directly reused by plants to produce protein. Ammonia and ammonia compounds are applied directly as fertilizers.

The presence of ammonia nitrogen in surface water usually indicates domestic pollution. Ammonia in ground water is normal and is due to microbiological processes. Two methods for determining ammonia, the Nessler method and the Salicylate method, are used in Hach products and procedures.

Chemical reactions

Nessler method

In the ammonia test, Nessler Reagent (K_2HgI_4) reacts with the ammonia present in the sample (under strongly alkaline conditions) to produce a yellow-colored species. The intensity of the color is in direct proportion to the ammonia concentration.

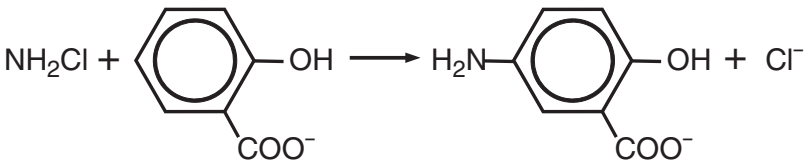
$$2K_2HgI_4 + NH_3 + 3KOH \rightarrow Hg_2OINH_2 + 7KI + 2H_2O$$

Salicylate method

The Salicylate method is a variation of the well-known Phenate Method, but it has an advantage of being free from mercury salts and phenol. This method is most useful for low range ammonia nitrogen determinations. Although the procedure involves multiple reactions before a final green color is developed, all reagents are contained in convenient powder pillows (Salicylate Reagent Powder Pillows and Alkaline Cyanurate Powder Pillows) or a combination of powder pillows and TNT vials.

Ammonia compounds are initially combined with hypochlorite to form monochloramine (1), which then reacts with salicylate to form 5-aminosalicylate (2).

(1) $NH_3 + OCl^- \longrightarrow NH_2Cl + OH^-$

(2) 

Oxidation of 5-aminosalicylate is carried out in the presence of a catalyst, nitroprusside or $Fe(CN)_5NO^{2-}$ (also called nitroferricyanide), which results in the formation of indosalicylate, a blue-colored compound. The blue color is masked by the yellow color (from excess nitroprusside) causing a green-colored solution. The intensity of the color is directly proportional to the ammonia concentration in the sample.

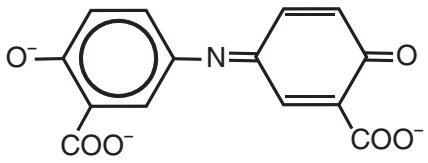


Figure 1 Chemical structure of Indosalicylate