DEVELOPMENT OF A SIMPLE COLORIMETRIC METHOD TO DETERMINE NITRATE

BY

GNANATILAKA JAYASUMANA HAPUTHANTHRI

Dissertation submitted in partial fulfilment of the requirements for the degree of M.Sc. (Analytical Chemistry) of the University of Colombo Sri Lanka

March 2007

Abstract

Most procedures used for determination of nitrates through the conversion of nitrates to nitrite by a cadmium column are time consuming and is a tedious task also. The reduced product, nitrite is then determined by diazotizing with sulphanilamide and coupling with N-(1-naphthyl) ethylenediamine dihydrochloride to form a colored azo dye. The absorbance measured at 540 nm is linearly proportional to the concentration of nitrate + nitrite in the sample.

In this project, repeatability of a method developed earlier was considered. In this method oxidizing property of nitrate and the reducing property of hydroquinone was used to determine nitrate in the sample concerned. Nitrate is reduced to nitrite in the presence of hydroquinone in the acidic media. The nitrite produced is used to couple to form an azo dye and absorbance is measured at 540 nm. The system obeys Beer – Lambert law.

Minimum detection limit of nitrate in this method is 100 mg dm^{-3} of NO_3^-. The system does not give favorable response if the concentration of nitrate is below 100 mg dm^{-3} and to form nitrite the concentration of hydroquinone has to be high. The favorable concentration of hydroquinone is 1000 mg dm^{-3}. To reduce 5 ml of 100 mg dm^{-3} nitrate 1 ml of 1000 mg dm^{-3} hydroquinone is required in the presence of 4 ml of conc. H_2S0_4. The molar ratio of NO_3^- to hydroquinone under optimum condition is 1: 1.83.

In this system, interferences from cations were found to be negligible. Among anions fluoride shows significant interference at 50 mg dm^{-3} level by lowering the value of absorbance.

The proposed method has been applied in the determination of nitrate in samples of fertilizer.