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Determination of Some Anions and Cations by Home-made Ion Chromatography System

A Thesis
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Summary

The work in this study consists of three chapters. The first one described a literature review about theoretical and development of ion chromatography .

The experimental part, which includes optimum conditions for analysis of anions and cations were presented in the second chapter. Also, a part of this chapter focused on the build - up and construction of the home – made Ultra Violate (UV)- Flow Injection (FI) and UV - IC system.

Chapter three includes four parts. The first part, was designed to develop a simple, selective, fast and validated UV – FI method for the analyzing of NO_3^- , Br^- , and NO_2^- ions in different water samples.

The linearity was $0.5 – 6$, $2 – 8$, and $0.5 – 8$ $\mu g\ ml^{-1}$ for NO_3^- , Br^- , and NO_2^- respectively. The detection limits were 0.1, 0.5, 0.25 $\mu g\ ml^{-1}$ for NO_2^- , Br^- , and NO_3^- respectively with correlation coefficient which were 0.9970 , 0.9980 and 0.9965 for NO_2^- , Br^- , and NO_3^- also respectively.

Total nitrogen in the range $0.1 – 6$ $\mu g\ ml^{-1}$ and $0.5 – 6$ $\mu g\ ml^{-1}$ can be easily determined by incorporating a 6 W UV – Lamp in the UV –

system and using digestion method with persulphite respectively. The sample through put was 15 sample/h .

The second part includes a validated UV – IC method for simultaneous determination of NO_3^- , Br^- , and NO_2^- ions. The retention times for each ion, separately , and in mixtures were determined , which are used to identify each, and the peak height corresponding the concentration of each ion in standards and water samples solutions .The range of linearity , detection of limit and correlation coefficient were 1.5 – 120 μg ml^{-1} , 0.07 – 1 μg ml^{-1} and 0.9980 – 0.9970 respectively.

IC system equipped with conductivity detector was used to the analysis of anions (NO_3^- , Br^- , and NO_2^-) and cations (Na^+ , NH_4^+ , and K^+) were described in the second part.

The third part includes the main aim of this study to simultaneous analysis of anions and cations by single injection with isocratic home – made IC with conductivity detector.

Six ions (NO_3^- , Br^- , and NO_2^- , Na^+ , NH_4^+ , and K^+) can be easily analyzed by using saulphosalycilic acid and crown ether as eluent and using IC home – made equipped with conductivity detector.

The ranges of linearity were 5 – 150 μg ml^{-1} and 5 – 140 μg ml^{-1} for anions and cations respectively, detection of limit 0.07 - 1 μg ml^{-1} and 0.1 – 0.25 μg ml^{-1} for anions and cations respectively. Also, the sample through put was 21 sample / h.

Finally, recovery studies were conducted in orders to a evaluated the home – made system by using the standard additions methods. The results were in the range 99.90 – 100.40 % for anions and 100.22 – 100.50 % for cations which is satisfactory. Many water samples and pharmaceutical preparations were run for analyzing some anions and cations by the Home – made ion chromatograph system.