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SAOWAPHA MUANGKAEW : FLOW INJECTION SYSTEM FOR URINARY IODINE DETERMINATION. THESIS ADVISORS : DUANGJAI NACAPRICHA Ph.D., JUWADEE SHIOWATANA Ph.D., CHATVALEE KALAMBAHETI, Ph.D., 108 p. ISBN 974-662-238-2

Content of urinary iodine (UI) has long been used as a marker for iodine deficiency. In this work, a flow injection system for urinary iodine determination was developed. The determination was based on catalytic effect of iodide in redox reaction between Ce (IV) and As (III). The course of the reaction could be followed by the disappearance of yellow color as the Ce (IV) was reduced. The rate of this color disappearance, measured as changes in absorbance of Ce (IV) was directly proportional to the amount of iodide catalyst.

Before the analysis, urine samples and iodine standards (potassium iodate) were digested. The digestion condition was modified from the widely use chloric acid method. The new condition employed a smaller volume of chloric acid. For this work, the volume ratio of 28% (w/v) chloric acid to urine was 1.2:1. The digestion was performed at 100°C and completed within 1 hour. The digested urine was directly injected into the FI system.

Within the FI system, the injected sample zone was merged with a merging stream of the redox pair before the mixing in a 200 cm glass reaction coil. To enhance sensitivity, the reaction coil was immersed in a thermostatic water bath at 43°C. The changes in Ce (IV) concentration, related to the concentration of iodide, were detected spectrometrically at 420 nm. Optimum condition such as flow rate, length of reaction coil, bath temperature, sample volume and reagent concentrations were investigated. For low concentration range (10-100 µg I/L), the signal was directly proportional to iodine concentration. For high concentration range (100-500 µg I/L), the signal was directly proportional to the logarithm of iodide concentration. The detection limit (3σ) was 3 µg I/L. Average total recovery was 99% (n=8). The method gave satisfactorily low %RSD (n=10) of 1.4 for the whole procedure of analysis. Method comparison, performed on 13 samples, showed no significant difference between the proposed method and the conventional batch analysis. This implies that the FI method can be used as an alternative to the conventional method. There are some advantages to the FI method over the conventional method such as higher sample throughput and better precision. Furthermore, the FI method can be fully automated.