

**DEVELOPMENT OF FLOW INJECTION-HYDRIDE GENERATION-PHASE
SEPARATION INTERFACES FOR THE DETERMINATION OF ARSENIC IN
NATURAL WATERS AND RICE USING ATOMIC ABSORPTION
SPECTROMETRY.**

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ABSTRACT

High levels of arsenic (As) in drinking water supplies and some foods have been reported to cause health problems in some parts of the world. This has resulted in review of the regulatory maximum permissible levels by WHO and other national bodies to be reviewed downwards. There is therefore a need to develop new methods for analysis of arsenic in water and foods that will be accurate and reproducible for routine analysis of large number of samples. Flow injection analysis (FIA) coupled with Atomic Absorption Spectrometry (AAS) was investigated for determination of arsenic in water and rice samples after hydride generation. The optimized basic FIA manifold gave a detection limit (LOD) of $0.74 \mu\text{gL}^{-1}$ ($<1.0\text{ppb}$) above the 3σ of the blank.

Further increased mass flux of the gaseous hydride reaching the atomizer was improved by use of a modified gas-liquid phase separator and better detection limit was achieved.

Retention capacity of various cartridges for As was investigated and a flow injection manifold for pre-concentration of As was employed with on-line solid-phase extraction cartridges. Alumina N (plus) and alumina B(plus) cartridges showed retention of arsenic with Alumina B showing slightly higher retention capacity for As than Alumina-N (Al-B = 74% and Al-N = 72%). Breakthrough volumes for Al -B was 160mls for 10ppb As solution at a flow rate of 6.7ml min^{-1} .

The new method was applied for the analysis of water and rice samples. Water samples analyzed showed no significant arsenic contamination or less than $10\mu\text{gL}^{-1}$, below the WHO guidelines value.

Bottled water samples showed no As contamination and locally produced Kenyan rice showed no detectable arsenic as it was below the instrumental detectable limits. However, rice from Asian countries was found to contain As, Vietnam rice had $3.7 \mu\text{g Kg}^{-1}$, Pakistan rice $7.9 \mu\text{g Kg}^{-1}$

and Singapore rice $5.6 \mu\text{g Kg}^{-1}$. The concentration of As obtained in rice were lower than the maximum contaminant levels ($10\mu\text{g Kg}^{-1}$) set by WHO and other world bodies.

Close monitoring of imported rice is therefore crucial. It is recommended that preconcentration of As be done *in situ* using alumina cartridges as it was found to have the highest retention capability of As and this method will be suitable for routine environmental monitoring.