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## A low-cost method for determining five arsenic species in urine using liquid chromatography coupled to hydride generation atomic fluorescence spectrometry

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Arsenic (As) is a toxic element that can cause adverse health effects in many parts of the body. However, As forms various chemical compounds (species) and their toxicity varies. In general, inorganic As species ( $\text{As}^{3+}$ ,  $\text{As}^{5+}$ ) are highly toxic but dietary forms are much less toxic. Dietary As species such as arsenobetaine (AsB) and arsenocholine (AsC) are found in some seafoods. Monitoring human exposure to As is accomplished by measuring total As in urine.

The goal here was to develop a low-cost analytical method to separate and quantitate select As species in urine. We focused on five As species that are typically present in human urine. They include  $\text{As}^{3+}$ ;  $\text{As}^{5+}$ ; monomethylarsonic acid (MMA); dimethylarsinic acid (DMA); and AsB. High performance liquid chromatography (HPLC) was used to separate As species. We used hydride generation atomic fluorescence spectrometry (HG-AFS) as the low-cost detector. However, AsB does not form hydride. Thus, to measure AsB using a HG system requires an additional step in which the As-C bond is cleaved prior to forming the hydride. For this purpose, we compared several on-line oxidation arrangements such as (a) microwave assisted heating and (b) UV-photooxidation, with/without an assisted heating system.

The method has been successfully developed for five As species, and will be evaluated for use in biomonitoring studies.