

TX05: Applied method for toxic arsenic (III) and mercury determination in biological samples of worker by occupational health laboratory

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Abstract

For investigating toxic effect of arsenic (As) and mercury (Hg) in health and safety of petrochemical workers, a method based on dispersive ionic liquid-liquid microextraction (DILLME) procedure for pre-concentration of Hg and As has been developed prior to determine by cold vapor/hydride generation atomic absorption spectrometry (CV/HG-AAS). In this method, 0.3 g of an ionic liquid (1-butyl-3-methylimidazolium hexafluorophosphate) as the extracting solvent and 0.2 g of 1-butyl-3-methylimidazolium tetrafluoroborate as dispersant solvent were rapidly added into the aqueous sample containing As (III) and Hg cations, which were already complexed by ammonium pyrrolidine dithiocarbamate (APDC) at pH 4 to 6. Total amount of arsenic was determined by reducing As (V) to As (III) with potassium iodide (KI) and ascorbic acid in HCl solution and then, As (V) was calculated by the subtracting the total arsenic and As (III) content. The parameters affecting on extraction efficiency were optimized. Under the optimum conditions, pre-concentration factor was 15 and the limit of detection 10 ngL^{-1} and 20 ngL^{-1} were achieved for 20 mL of arsenic and mercury in human blood samples respectively ($\text{RSD} < 8\%$). The developed method was applied successfully to determination As and Hg in blood samples.

Keywords: Arsenic (III), Mercury, Biological samples, Worker, Ionic Liquid-Liquid Micro-Extraction, Hydride generation atomic absorption spectrometry.

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