

CA25: Determination and Pre-concentration of ultra- trace mercury in air and environmental samples based on pilot multiwall carbon nanotubes trap / cold vapor atomic absorption spectrometry (PCNT-CVAAS)

H. Shirkhanloo¹, A. Abrahimi², F. Golbabaie³, M.J. Kian¹, F. Eftekhari¹, M. A. Fallah Mehrjerdi¹

Abstract

In this work, a new, simple and sensitive method for pre-concentration of ultra trace mercury in air, river and drinking water samples was developed prior to determine by cold vapor atomic absorption spectrometry (CV-AAS). Pilot multiwall carbon nanotubes trap / cold vapor atomic absorption spectrometry (PCNT-CVAAS) was designed. The air of workplaces flow through Personal sampling pump to Sorbent tube (MWCNTs) and completely desorption by electric heater accessory at 340^oC and then directly determined by CV-AAS. In environment samples such as, river and drinking water mercury vapor flows to Sorbent tube (MWCNTs) and then completely desorption by 1M nitric acid solution and mixed with reduction reagents solution for analysis. This method has been developed based on 10 mg of multiwall carbon nanotubes (MWCNTs) for pre-concentration of ultra trace mercury. The experimental parameters such as, amount of sorbent, argon flow rate and volume of sample have been optimized. The detection limit of this method was 2 ng L⁻¹. A wide linear range varying from 6 up to 54 ng L⁻¹ ($r^2 = 0.9988$) and the relative standard deviations (RSD) at 40 ng L⁻¹ level were found to be less than 5% . The developed method was applied successfully to determination of mercury in air and environmental samples.

Keywords: Mercury, Air and environmental samples, Multiwall carbon nanotubes, Preconcentration, Cold vapor atomic absorption spectrometry

¹- Iranian Petroleum Industry Health Research Institute (IPIHRI), Occupational and Environmental Health Research Center (OEHRC), Tehran, Iran. (hamidshirkhanloo@yahoo.ca)

² Occupational Health Engineering Department, School of Public Health, Tehran University of Medical Sciences. (Fgolbabaie@yahoo.com)

³ Occupational Health Engineering, School of Public Health, Kerman University of Medical Sciences