

## DETERMINATION OF CADMIUM, COPPER AND LEAD IN HAIR BY SLURRY SAMPLING GF-AAS

Marcos Y. Kamogawa<sup>a, b</sup>, Ana Rita A. Nogueira<sup>b</sup>, Joaquim A. Nóbrega<sup>a</sup>,  
Letícia M. Costa<sup>a</sup>, Edivaldo E. Garcia<sup>a</sup>.

a. Departamento de Química, Universidade Federal de São Carlos, São Carlos, SP, Brasil.

b. Embrapa Pecuária Sudeste, Caixa Postal 339, São Carlos, SP,  
13560-970, Brasil (anarita@cnpse.embrapa.br)

Levels of toxic metals in occupational exposed and unexposed people can be evaluated by studying trace element concentration in blood, serum, urine, hair and tissues. Metal contents in hair have been used as an index of exposure to toxic elements such as Cd, Cu, and Pb. A Varian Model SPECTRAA-800 atomic absorption spectrometer with Zeeman background corrector was used for Cd, Cu, and Pb direct determination in slurries of hair samples. A stainless-steel scissors was used to cut the hair samples in pieces of 0.5 – 1.0 cm. It was adopted the washing procedure proposed by the International Atomic Energy Agency. The washed hair samples were pulverized in a freezer mill during 20 min. The powdered hair samples were used to prepare 0.1% m/v hair slurries for Cu and Pb measurements, and 0.5% m/v to Cd. A volume of 20  $\mu\text{l}$  hair slurries plus 5  $\mu\text{l}$  of 1000  $\text{mg L}^{-1}$  Pd as chemical modifier was introduced into the graphite furnace. The hair sample slurries were prepared in three different media: 0.1% v/v Triton X-100, 1% v/v  $\text{HNO}_3$  and 0.1% v/v CFA-C (Spectrasol, USA). The best stabilization and rsd values were obtained using the CFA-C solution, this solution also avoided the hair deposition in the autosampler capillary wall. Experiments to determinate the optima pyrolysis and atomization temperatures were carried out with hair sample slurries doped with 10  $\mu\text{g l}^{-1}$   $\text{Cd}^{2+}$ , 30  $\mu\text{g l}^{-1}$   $\text{Pb}^{2+}$  using Pd as chemical modifier and 10  $\mu\text{g l}^{-1}$   $\text{Cu}^{2+}$  without any modifier. The results are showed in the Table. The detection limits, and the results obtained for a standard reference material are also included in this Table. The quantification of Cd, Cu, and Pb in slurries of hair samples was performed by standard addition method. The cryogenic grinding was an effective strategy to efficiently comminute hair samples without spending long time. The particle sizes are suitable for suspension and the obtained slurries were agitated by air introduction before autosampler action.

Table. Pyrolysis and atomization temperatures; certified and determined values for a hair reference material (GBW07601); and detection limits

	Cd	Cu	Pb
Pyrolysis ( $^{\circ}\text{C}$ )	1000	1300	1400
Atomization ( $^{\circ}\text{C}$ )	1500	2400	1900
Certified values ( $\mu\text{g g}^{-1}$ )	$0.11 \pm 0.02$	$10.6 \pm 0.7$	$8.8 \pm 0.9$
Determined values ( $\mu\text{g g}^{-1}$ )	$0.14 \pm 0.02$	$10.6 \pm 0.1$	$9.6 \pm 0.1$
Detection limit ( $\mu\text{g g}^{-1}$ )	0.02	0.08	0.003