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Analysis of children modelling clay (toy) using inductively coupled plasma-based methods

Dayara Virgínia Lino Ávila[1], Sidnei Oliveira Souza[1], Maria das Graças A. Korn[1,2], Amália G. G. Pessoa[1], Rennan G. O. Araujo[1,2*]

[1]*Universidade Federal da Bahia, Instituto de Química, Departamento de Química Analítica, Salvador, Bahia, Brazil, 40170-115.*

[2]*Instituto Nacional de Ciência e Tecnologia do CNPq – INCT de Energia e Meio Ambiente, Universidade Federal da Bahia, Salvador, BA, Brazil.*

[*]Corresponding author. Tel/fax: + 55-71 3283-6831. E-mail: rgoa01@terra.com.br or rennan@ufba.br. Grupo de Pesquisa para Estudos em Química Analítica e Ambiental. Departamento de Química Analítica, Instituto de Química, Universidade Federal da Bahia (UFBA), 40170-115, Salvador (BA), Brazil.

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Abstract

This work proposes the application of a Doehlert design to optimize dilute HNO_3 and H_2O_2 concentrations employed for the digestion of samples of modelling clay for children (used as toy). Inductively coupled plasma-based (ICP) methods were employed to determine 21 inorganic constituents (Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, P, Pb, S, Sb, Se, Sr and Zn) in children's modelling clay samples. The accuracy and precision of the methods were evaluated by analysing the certified reference materials (CRMs) oyster tissue (NIST 1566b), rice flour (NIST 1568b), peach leaves (NIST 1547) and tomato leaves (NIST 1573a), along with addition and recovery tests. The children's modelling clay samples presented concentrations of As, Ba, Cd, Cr, Pb, Sb and Se in agreement with the maximum values established by National Institute of Metrology, Quality and Technology (INMETRO). However, for other elements it were obtained concentrations within the following ranges: Al (0.83±0.12 – 2.91±0.04 mg g^{-1}), Ca (16.09±0.20 – 24.56±1.00 mg g^{-1}), Cu (<0.29 – 30.01±2.11 mg kg^{-1}), Fe (<5.55 – 13.21±3.94 mg kg^{-1}), K (1.31±0.33 – 33.47±0.75 mg g^{-1}), Mg (0.90±0.04 – 1.36±0.05 mg g^{-1}), Mn (3.32±0.10 – 121.05±1.88 mg kg^{-1}), Na (12.07±0.88 – 36.77±0.50 mg g^{-1}), Sr

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