Title: STATISTICAL ANALYSES AND RISK ASSESSMENT OF SOME POTENTIALLY TOXIC METALS (PTMS) IN CHILDREN's TOYS

Authors: A.O Oyeyiola, M.I Akinyemi, I.E Chiedu, O.T Adetunde, K.O Olayinka

PII: S1658-3655(17)30028-6
DOI: http://dx.doi.org/doi:10.1016/j.jtusci.2017.02.005
Reference: JTUSCI 365

To appear in:

Received date: 30-10-2016
Revised date: 30-12-2016
Accepted date: 9-2-2017

Please cite this article as: A.O Oyeyiola, M.I Akinyemi, I.E Chiedu, O.T Adetunde, K.O Olayinka, STATISTICAL ANALYSES AND RISK ASSESSMENT OF SOME POTENTIALLY TOXIC METALS (PTMS) IN CHILDREN's TOYS (2010), http://dx.doi.org/10.1016/j.jtusci.2017.02.005

STATISTICAL ANALYSES AND RISK ASSESSMENT OF SOME POTENTIALLY TOXIC METALS (PTMS) IN CHILDREN'S TOYS

Oyeyiola A.O*[a]., Akinyemi, M. I[b]., Chiedu I. E[c]., Adetunde O.T[a]., Olayinka K.O[a].,

[a]Department of Chemistry, University of Lagos, Nigeria
[b]Department of Mathematics, University of Lagos, Nigeria
[c]Federal Institute of Industrial Research Oshodi, Lagos, Nigeria

*aoyeyiola@unilag.edu.ng; aaderonke8@yahoo.com

ABSTRACT

Chemical exposure to children, especially from toys is an engineering concern. The concentration and availability of some potentially toxic metals (PTM) in children's toys were determined in order to assess the risk posed by these metals to children. Samples of 25 toys imported from China to Nigeria were purchased. Ternary acid digestion followed by Atomic Absorption Spectrophotometry was used to determine the concentration of the PTM in the sample. Simulation of the saline and stomach acid extraction conditions were carried out to determine the concentrations of the PTM that could leach out from the toys during mouthing behaviour of children (available PTM) which involves chewing, sucking and swallowing. Total concentration of PTM in the toy ranged from 3.55 - 40.7, 3.21-38.2, 9.78-159, 3.55-11.2, and 36.1-106 mg/kg for Cd, Cr, Cu, and Pb respectively. Availability studies showed concentration range from 2.60- 5.60 mg/kg for Pb, 0.53-2.03 mg/kg for Cd and 0.15-2.88 mg/kg for Ni after saline extraction and the concentration after stomach acid extractions range from 3.33- 7.10 mg/kg, 1.15-3.15 mg/kg and 1.33-1.81 mg/kg for Pb, Cd and Ni respectively. Statistical analysis showed a positive correlation between the total concentration of PTM and toys made with PVC materials. Risk assessment study showed that Cd posed the highest risk, with its Hazard index (HI) as high as 4.50 for saline extraction. The study revealed that more precaution needs to be taken in the manufacture of children's toys.