sciendo

DOI: 10.2478/auoc-2019-0015

Ovidius University Annals of Chemistry Volume 30, Number 2, pp. 81 - 87, 2019

Assessing lead mobility rate from spent corroded and non-corroded bullets fragments on different soil types of tropical ecosystems

Effiong Ukorebi ETIM*

Department of Chemistry, University of Ibadan, Ibadan, Southwestern Nigeria

Abstract. Lead ions mobility from spent metallic Pb bullets is under increasing scrutiny as a potential significant source of soil contamination. This study investigates effect of soil-properties types on Pb(II) mobility from spent corroded and non-corroded bullets and associated environmental risk using water, toxicity characteristic leaching procedure and synthetic precipitation leaching procedure as leaching techniques. From results, loamy soil properties (pH and organic matter-specific) apparently favored high mobility rate of Pb(II) (0.004 - 1.166 % Pb contamination) from spent bullets compared to sandy and clay soil types. Consequently, Pb(II) mobility from corroded bullet (0.035 - 1.166 %) was significant ($p < 0.05$) compared to non-corroded bullet (0.004 - 0.873 %) due largely to surface area differences. Percentage Pb contamination increased proportionally with bullet retention time in the different soils types. The experiment reported average decomposition rate of 6.9 g Pb/kg within a 28 weeks retention time. Leaching potential of Pb from spent bullet arising from water, toxicity characteristic leaching procedure and synthetic precipitation leaching procedure was quite significant ($p < 0.05$) in order of over 100 mg/L. Both toxicity characteristic leaching procedure-Pb and synthetic precipitation leaching procedure-Pb exceeded the 5 mg/L and 15 µg/L critical levels suggested by United State Environmental Protection Agency for Pb (II) mobility and hazardous classification. A significant positive correlation existed between corroded and non-corroded Pb (II) levels within each leaching solutions. Continued dissolution of metallic Pb (II) from spent Pb-bullets may be a mechanism for natural attenuation of Pb in soils. An important result of this study is the clear influence of soil properties on Pb mobility.

Keywords: mobility rate; lead; percentage contamination; soil; bullet; leaching.

* *E-mail address:* etim242@yahoo.com