

Estimation of quantities, metal concentrations in components and management of waste rechargeable lighting devices in Nigeria

Gilbert U. ADIE^{*1} and Izubundu Brown ONYEBUENYI^{1,2}

¹*Department of Chemistry, Faculty of Science, University of Ibadan, Ibadan, Nigeria*

²*Department of Pure and Applied Chemistry, Faculty of Science, University of Calabar, Calabar, Nigeria*

Abstract. Rechargeable lighting devices are used in Nigeria as alternative source of lighting due to epileptic power supply. They contain printed wiring board, battery and plastic casings containing heavy metals. This waste category is often neglected and disposed of with household garbage with concomitant deleterious consequences on environment. We estimated quantities, disposal methods and concentrations of selected metals in some components of 34 waste rechargeable lighting devices in Nigeria. Estimated quantities and disposal methods were carried out through online survey. Leached metals were prepared and analyzed using standard methods. Approximately 6000 tons/year of waste rechargeable lighting devices were estimated. An average life span of 9 months and 4 rechargeable lighting devices were estimated to be used per household in Nigeria. The commonest disposal method was with household garbage. Lead and copper contents on the boards and Pb in battery electrodes were far higher than permissible limits. All metals determined in plastic casings were within permissible limits. High lead and copper contents in some components makes waste rechargeable lighting devices to be regarded as hazardous materials and should be handled with care at disposal.

Keywords: rechargeable lighting device; heavy metals; printed wiring board; battery; plastic casing.

^{*} Corresponding author. *E-mail address:* gildie1975@gmail.com (Gilbert U. Adie)