

Occurrence and risk assessment of phenolic endocrine disrupting chemicals in shallow groundwater resource from selected Nigerian rural settlements

Onyekachi ONYEKWERE,¹ Chioma Joy OKONKWO*,² Azubuike Bright OKOROAFOR,³ and Chinedu Joseph OKONKWO²

¹National Biotechnology Development Agency, Abuja, Nigeria

²Department of Biochemistry, University of Port Harcourt, Rivers state, Nigeria

³Department of Pure and Industrial Chemistry, University of Port Harcourt, Rivers state, Nigeria

Abstract. To date, limited information exists on the distribution of endocrine disrupting compounds in groundwater resources from African rural settlements. In view of this knowledge gap, the present study investigated the concentrations and potential health risks of phenolic endocrine disrupting chemicals (EDCs) in underground water samples obtained from eight rural settlements in Nigeria, West Africa. The water samples were obtained from domestic drinkable communal wells at Anambra (Mgbaukwu and Umudioka), Lagos (Bariga, Itire and Mushin), and Delta (Agbarho, Ikweghwu and Orhokpokpor) states representing the South-East, South-West and South-South Nigeria respectively. Samples were analyzed for 10 selected chlorinated, nitrogen-containing and alkyl phenolic compounds using gas chromatography coupled with flame ionization detector technique. At all understudied sites, selected phenolic compounds with the exception of 2-chlorophenol which was below detectable limits at 4 sites (Agbarho, Mgbaukwu, Umudioka site 1 and Mushin) were detected. The concentrations of the phenolic compounds in the samples from the different sites ranged between below detectable limits to 0.0904 ppm. Nonylphenol, 2,4-dinitrophenol and 2,4,6-trichlorophenol were predominant at EDCs in most sites when compared with the other phenolic contaminants. The calculated chronic daily intake (CDI) results for the exposed populations at the communities implies that the level of occurrence and daily intake of 2-nitrophenol, 2,4-dimethylphenol, 4-nitrophenol, 2-chlorophenol and bisphenol A were still below their respective oral reference doses. Nonylphenol and 2,4,6-trichlorophenol (risk quotient, RQ > 1) were identified as the major EDC contributors to potential health risk for exposed populations at the communities.

Keywords: endocrine disrupting chemicals, phenolic compounds, water, risk assessment.

* Corresponding author. *E-mail address:* chioma.okereke@uniport.edu.ng (Chioma Joy Okonkwo)