

Title of Article: Determination of Levels of Regulated and Emerging Trihalomethanes (THMs) Disinfection By-Products (DBPs) in a Community Drinking Water Supply.

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Abstract: Ahmadu Bello University (ABU) drinking water treatment plant (ABUDWTP) uses calcium hypochlorite to supply chlorine in disinfecting drinking water supply to the university community. Between 2008 and 2010, 252 water samples were taken in duplicates along the treatment and distribution systems of ABUDWTP with ammonium chloride as de-chlorinating agent in accordance with United States Environmental Protection Agency (USEPA) Method 551.1. This was aimed at determining the concentrations of trihalomethanes (THMs) disinfection by-products (THM-DBPs) and the degree of wholesomeness of the drinking water supplied. The THM concentrations in the samples were analysed using Agilent Gas Chromatograph after preliminary extraction with methyl *tert-butyl* ether (MTBE). Samples' analyses identified six THMs - two additional to the regulated four. These are Dichlorobromomethane and 1,2-Dibromomethane here classified as emerging THM disinfection by-products (EmerTHM-DBPs). Measured total mean concentration of the regulated THMs (TRegTHM-DBPs) at house level was $1.0601\text{E-}02 \pm 1.6625\text{E-}05$ mg/L as against $9.9704\text{E-}02 \pm 6.4706\text{E-}05$ mg/L for total mean emerging THM-DBPs (TEmergTHM-DBPs). This TRegTHMs concentration indicates house level water is within acceptable limits of international standards despite being above the national permissible limit of 0.001 mg/L. Though not considered under exiting drinking water quality index TEmergTHM-DBPs were found to account for over 90% of gross THM-DBPs (GTTHM-DBPs) at each sampling stage. These TEmergTHM-DBPs could create health complications on consumers as they are either suspected carcinogens or recognised to increase the risk of carcinogenicity and mutagenicity in humans. Both are irritants of several body tissues and are implicated in several health abnormalities including reproductive and fertility disorders as well as liver and kidney damage. In view of these likely supplementary health burdens, this paper advocates additional stricter monitoring and control of these emerging THM-DBPs as they will most probably compound and increase the frontline of health challenges from chlorine disinfected ABU drinking water supply to its consumers.

Keywords: Trihalomethanes, Emerging disinfection by-products, drinking water, ABU Community