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## **EFFICIENCY OF A GLASS FIBER-REINFORCED POLYMER (GFRP) TANK IN PURSUIT OF RELIABLE WATER RESOURCES THROUGH RAINWATER HARVESTING**

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### **Abstract**

To limit the anthropogenic pressure on natural water sources and improve water sustainability primarily in semi-arid rural regions, the effectiveness of glass fiber-reinforced polymer (GFRP) composites was evaluated for their fitness as a household Rainwater harvesting (RWH) structure. GFRP samples (2, 3, and 5 layers) were fabricated and evaluated for qualitative and strength responses. Parameters were ascertained for the tank-stored water, including pH, Total Dissolved Solids (TDS), Total Hardness (TH), Bisphenol-A (BPA) concentrations, plastic migration, moisture absorption, tensile and compressive strength. The average recorded pH, TDS, and TH ranged from 8.37 to 8.78, 709.94 to 881.43 mg/L, and 134.64 to 187.79 mg/L during the specimens' test duration (180 days). With an 86.1% detection rate, the BPA concentration in the samples varied from ND (not detected) to 56.6 µg/L. The recorded median values of BPA for GFRP specimens ranged from 28.5 to 45.28 µg/L on day 180, and the calculated ingestion hazard quotients (IHQ) and Margin of safety (MOS) were <1 and >1, respectively. The BPA results attained were agreeable for the commission of the GFRP tank based on the European Food Safety Authority (EFSA) tolerable daily intake. While the migration of plastics for two simulants was below the permissible range, the increasing immersion period observed a progressive increase in the tensile and compressive strength of GFRP. Lastly, the field installation of a proposed 20×10<sup>3</sup> liter RWH tank and the Non-destructive tests performed is discussed.

*Key words:* Average Daily Dose (ADD), Bisphenol-A (BPA), Glass Fiber Reinforced Polymer (GFRP) tanks, Ingestion Hazard Quotient (IHQ), Rainwater Harvesting (RWH)

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