

# Borehole Water Quality within the Federal University of Technology, Akure, Nigeria

Samuel B. Akeju<sup>1</sup>, Ochuko M. Ojo<sup>2</sup> and James R. Adewumi<sup>3</sup>

<sup>1</sup>Department of Works and Services, Federal University of Technology, Akure, Nigeria,

<sup>2</sup>Department of Civil Engineering, Federal University of Technology, Akure, Nigeria,

<sup>3</sup>Department of Civil Engineering, Federal University of Technology, Akure, Nigeria,

Corresponding Authors Email: [akejusam@yahoo.com](mailto:akejusam@yahoo.com)

Received 10 June 2021; revised 6 July 2021; accepted 20 August 2021

**Abstract**— The aim of this study is to determine the quality of borehole water supplied within the Federal University of Technology, Akure, Nigeria in order to ascertain its suitability for drinking purpose. Water samples were procured from 16 boreholes within the Federal University of Technology, Akure. The physico-chemical parameters determined include turbidity, pH, total dissolved solids, chloride, nitrate, total hardness, magnesium and alkalinity while the bacteriological parameters include Total Coliform Bacteria, and *E.coli* (Faecal Coliform). pH values ranged from 6.2 to 7.7, only BH10 did not fall within the WHO recommended range of 6.5 to 8.5. The chloride content of BH10 exceeded the WHO maximum permissible limit by 0.6 mg/l. BH01 and BH13 exceeded the WHO maximum permissible limit of 100 mg/l for total hardness with values of 119.7 and 128.1 mg /l respectively. Magnesium content of the water samples ranged from 0.98 to 3.3 mg/l with BH02, BH03, BH05, BH10, BH13, BH14 and BH15 exceeding the WHO maximum permissible limit of 2 mg/l with values of 2.1, 2.7, 2.9, 2.7, 3.3, 2.3 and 2.9 respectively. Most of the borehole water samples analyzed fell within WHO standards for potable water. However, because of pH, chloride, total hardness and magnesium contamination reported in some of the water samples analyzed, it is recommended that the water be subjected to treatment before distribution to the consumers in order to make it safe for drinking purpose.

**Keywords** – Quality, borehole, permissible limit, treatment, drinking

## I. INTRODUCTION

Increase in human population has exerted enormous pressure on the provision of safe drinking water especially in developing countries (Umeh *et al.*, 2005). Freshwater quality remain one of the most critical environmental and sustainability issues of the twenty-first century (UNEP, 2002). Unwholesome water is a global public health threat, placing persons at risk for a host of diarrheal and other diseases (Hughes and Koplan, 2005; WHO, 2011a). Annually, more than 2 million persons, mostly children less than 5 years of age, die of diarrheal disease (Kosek *et al.*, 2003). Approximately 90% of diarrheal-related deaths have been attributed to unsafe supplies and sanitation conditions (WHO, 2004).

Groundwater is a remarkably important source of water and sole input to coastal waters (Kim *et al.*, 2003). Groundwater contains a variety of constituents such as microorganisms, gases, inorganic and organic materials at different concentrations (Sundaram *et al.*, 2009). Water contamination with trace metals can be related to polluted water infiltrating through soil, the rock and eventually reaching the groundwater (Oladipo *et al.*, 2011). The aim of municipal water supply is the production and the distribution of safe water that is fit for human consumption (Okonko *et al.*, 2008).

The Department of Works and Services of the Federal University of Technology Akure is in charge of supplying water for various use in the institution's hostels, administrative offices, academic buildings, staff quarters and other buildings. FUTA witnessed an increase in population of 4,127 staff and students from 24,292 in 2013 to 28,419 in 2019 (FUTA Directorate of Works, 2017). This study aims at determining the quality of the borehole water supplied within the Federal University of Technology, Akure in order to determine its suitability for drinking purpose.

## II. METHODOLOGY

### A. Study Area

The study was carried out in the Federal University of Technology, Akure (FUTA). FUTA is located Ondo State, Nigeria. It lies between longitude 5°06'E to 5°38'E and between latitude 7°07'N to 7°37'N. The climate is characterized by distinct wet and dry seasons. The onset of rainfall is usually during the month of March with decline during the month of November. The annual rainfall varies between 1500 mm and 3500 mm with mean

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