Effect of Piping and Storage on the Quality of Tap Water Supplied to Tororo Municipality

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Declaration

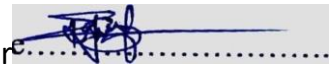
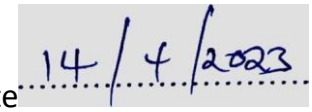
I, Kisakye Keziah Priscilla, declare that this research work is my original work otherwise cited, and where such has been the case reference has been stated and that the same work has not been submitted for any academic award in any other university or tertiary institute of higher education.

Signature....  ..... Date…... APRIL,2025

Approval

This research work has been submitted for examination and has been approved by my supervisor.

Dr Egor Moses

Signature  Date 

Dedication

I dedicate this research work to my mother Namusisi Keziah for her endless and selfless effort, spiritual and moral support towards my success in education.

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Table of Contents

List of Tables

List of Figures

List of Acronyms and Abbreviation

EDTA - Ethylene diamine tetra acid

NWSC - National Water and Sewerage Corporation

TDS - Total Dissolved Solids

WHO - World Health Organization

Abstract

Most town centers today are supplied with tap water by the National Water and Sewerage Cooperation. Water is made up of 2 hydrogen atoms and one oxygen atom joined by a covalent bond. Water is exposed to contamination from industrial and agricultural activities. Water can be classified as ground and surface water. Water has both physical properties such as boiling point, melting point, density and chemical properties such as acidic and alkaline behavior. Before distribution, water undergoes a purification process with the steps; coagulation, sedimentation, filtration and chlorination. The system of supply used is intermittent instead of continuous. Water is purified, supplied to reservoirs and later distributed to the taps and this water is assumed to be safe for drinking after purification. This research study assessed the efficiency of the water supply system in Tororo Municipality by comparing the physio-chemical parameters at the purification plant before supply, with the parameters tested were pH, Total Dissolved Solids, total hardness and electrical conductivity. The pH of the samples ranged from 6.86-7.34 which varied from the one at the treatment plant, 6.66. The electrical conductivity of the samples ranged from 171.9-190. Total hardness ranged from 85-140. All the tested parameters deviated from the ones of the water picked from the treatment plant before supply.

CHAPTER 1: INTRODUCTION

1.1 Background

Water is a chemical substance made up of 2 hydrogen atoms and one oxygen atom joined by covalent bonds. The chemical formula is H_2O, it is formed from a reaction between hydrogen and oxygen. Water exists as a liquid mainly, but also as a gas in form of vapor or steam and solid in form of ice (Mani, 2016).

The water molecule has a bent shape with oxygen as the central atom. Oxygen is attached to hydrogen on both sides with bond angle 105°. Water is tasteless, odorless and a turquoise color that becomes deeper according to the water body. Thus water in lakes, oceans and seas appears blue. Water covers 70.9% of the surface in lakes, rivers, oceans and seas, 1.6% ground water. Some percentage of water is in form of water vapor (Al-Safady, 2010).

Safe and affordable water was deemed a human right by the United Nations general assembly of 2010. However, this is not the case more so in the Ugandan rural areas. Most of the population in villages rely on boreholes, shallow open wells, lakes and rivers. Such water is hazardous if not treated. Owing to the rapid population growth, the population stands a risk of contaminated water (Kim, 2022).

Water is exposed to contamination from industrial and agricultural activities. Dumping industrial wastes into water sources and especially rivers and streams deteriorates water quality. Downstream, this water is used for washing clothes, cars and in some societies for cooking. Such societies are at a health risk (Walakira & Okot-okumu, 2011).

In Uganda, Uganda National Water and Sewerage Cooperation is responsible for distribution of safe tap water. Uganda National Bureau of Standards is responsible for the quality of water supplied by the different bottling companies. Tap water is purified from gazette plants and disinfected before distribution. Such water is sent to reservoirs in some places before final distribution to the taps (Kasozi et al., 2019).

In Uganda, the water supply system in intermittent. In such systems water is provided for only limited durations. The pressure at which the water moves in such systems is low and irregular. Intermittent supply puts the quality of water being supplied at a risk of being poor. Under

parameters all met the standards of the World Health Organization but deviated from the ones collected from Malaba treatment plant.

I recommend that the water is also occasionally tested at the delivery points to ensure that any large deviations are corrected and also, the reservoirs and pipes should be changed from time to time so that they do not become a point of contamination.

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