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Assessment of the Effectiveness of Chlorination for Drinking Water Treatment

- Chapter
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Biotechnological Approaches to Sustainable Development Goals

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Abstract

Chlorination is an effective and inexpensive disinfection method that eliminates pathogenic microorganisms from water to make it safe for consumption. This study investigates the effectiveness of chlorination in water treatment using time kill test. A total of 12 water samples were collected from different sources. Two samples are from each of the untreated water (borehole, rain, well) and treated water (tap, bottled, and sachet water). The physicochemical properties of all the water samples were determined using standard methods. Also, microbial analysis was carried out to isolate and identify microorganisms present in the water samples. The untreated water was subjected to time kill test to evaluate the in vitro microbial population reduction after exposure to different concentrations (0, 0.2, 0.3, 0.4, and 0.5 mg/L) of sodium hypochlorite for varied period of time (10, 20, 30, 40, 50, and 60 min). The pH of treated water is within the range of 6.7–7.6, while for untreated water, the pH is within the range of 6.2 and 7.6. RW2 has the highest turbidity. Seven bacterial isolates were identified from the untreated water (*Escherichia coli*, *Streptococcus* sp., *Enterobacter* spp., *Klebsiella* spp., *Clostridium*, *Pseudomonas*, and *Staphylococcus aureus*), while *Enterobacter* spp., *Klebsiella* spp., and *Salmonella* spp. were isolated from the treated water. The microbial populations were totally inactivated in RW1 and RW2 from 50 min of chlorine contact except at 0.2 and 0.3 of chlorine concentrations. All levels of chlorine concentration at varied time were effective for elimination of microbial population in WW1 and WW2. However, more time is required for total inactivation of microbial population in BHW1 and BHW2 water samples. The study concluded that 0.2–0.5 mg/L of chlorine is effective for treatment of water for at least 50 min depending on the water source.

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