Application of Indigenous Materials in Drinking Water Treatment

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Abstract

Volcanic ash and Moringa oleifera (M. oleifera) were investigated as indigenous materials for drinking water treatment based on problems identified at Kampala and Masaka water treatment plants in Uganda. Coagulation experiments were done using swamp raw water at Masaka National Water & Sewerage Corporation water treatment plant and pilot-scale filtration experiments carried out at Ggaba II (Kampala) water treatment plant. The results from the study indicated that there were both operational and design handicaps at the treatment plants in Kampala. There is need to modify the filtration and clarification units to enable production of water meeting both the national and international standards. At Masaka water treatment, there was increase in trihalomethanes concentration as a result of pre-chlorination. Following aeration and pre-chlorination processes, the average increase of total trihalomethanes concentration was over 4000% with over 99% being chloroform. Preliminary results from the jar test experiments indicated that use of alum with MOC-SC as coagulant aid is promising as a first stage in the treatment train for waters with a humic materials and high content of iron, typical of swamp water sources. This would probably eliminate the formation of unwanted by-products by eliminating the pre-chlorination process. Assessment of the characteristics of the volcanic ash showed that it meets the requirements for a filtration material; and results obtained from the pilot study showed that it was a suitable alternative material for use in a dual media filtration system. There was an increase in the filter run length of about two and half fold in the dual media filtration column compared to the mono medium column. Both columns produced similar water quality levels. Therefore, conversion of the rapid sand filters at Ggaba and similar water treatment plants in the country to dual media (volcanic ash on top of sand) systems would probably significantly improve the performance of the filtration systems.

Key words: Coagulant aid, drinking water treatment, dual media filtration, *Moringa oleifera*, primary coagulant, trihalomethanes, volcanic ash

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