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Use of Diatomaceous Earth Wastes and Plant derived Binders in Water Purification Systems

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Authors:
Mary Taabu Simiyu, Francis Nyongesa, Bernard Aduda Zephania Birech, Godwin Mwebaze

The outbreaks of water-borne diseases are a common occurrence in developing countries and have claimed millions of lives in the recent years despite the many water purification approaches in use. This is because most of these water purification systems are unaffordable to the poor of developing world and are inefficient in removal of viruses from drinking water. Furthermore, the DE wastes have not found direct application in science. Thus, the wastes pose a challenge to DE industries. In this work, the nanomaterials of diatomaceous earth (DE) wastes and charcoal are employed in the design of efficient and effective water filtration membranes capable of eliminating pathogens and viruses from water. The DE waste and charcoal raw materials were ground to the range of 86.0 nm to 200.0 nm. The DE wastes were characterized in terms of chemical analysis. They were found to contain 89% silica and a total flux content of 11.0% (4.14% of Al2O3, 3.88 of CaO, 0.85% of K2O, 0.19% of MgO and 5.10% of Na2O) making it a suitable material for water filter membranes. The samples for the filter membranes were fabricated from a mixture of DE and charcoal in various ratios and fired at 900 oC. The pore size of the finished filter was in the range of 22.0 nm –150 nm. The mechanical strength of the filter membranes was enhanced by use of plant derived binders ("Mrenda") thereby increasing the filter flow rate without compromising on its structural reliability.

Presenter: TAABU SIMIYU, Mary (University of Nairobi)

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