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Use of marble and iron waste additives for enhancing arsenic and *E. coli* contaminant removal capacity and strength of porous clay ceramic materials for point of use drinking water treatment

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ABSTRACT

This paper elaborates manufacture and performance analysis of new clay ceramic (CC) water filtration materials. The CC is manufactured from clay and sawdust mix. Waste marble powder and machined iron fines are used as additives to the mix for manufacturing the new modified materials. An equal volume of clay and sawdust were used to manufacture the control CC. Another ceramic, marble clay ceramic (MCC), was manufactured with distinct volume fractions of clay, sawdust, and marble (40:40:10). Third ceramic, ferrous clay ceramic (FCC), was manufactured from an equal volume of clay and sawdust and five percent by volume of iron fines. FCC showcased better arsenic (As (V)) contaminant removal from water at acidic pH while MCC showcased best As (V) removal at around pH of 8. Average flexural strength of MCC was comparatively better than FCC and CC. The modified materials showcased similar percolation rates at par with control CC. MCC showcased comparatively better *E. coli* removal capabilities than FCC and CC. Only limited volumetric addition of marble powder and iron fines were found to positively affect compressive strength. The results demonstrate new low-cost ways of modifying strength and specific water treatment characteristics of CC using waste materials from local marble-processing and iron-machining industries.

Keywords: Ceramic; Marble; Iron; *E. coli*; Arsenic; Strength; Waste

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