Higher Filter Performance of Burned Coconut Shells Filter Media

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Filtration is one of the essential unit process of water and wastewater treatment in which energy and water are used for backwashing to ensure continuous operation. Silica sand has traditionally been used as the filter medium for rapid gravity filtration. It was the predominant filter media due to its wide availability, low cost, and the large amount of information and experience concerning its use. Many research are being conducted with the aim of energy-efficient filtration since it is crucial as a remedy for the overuse of energy and backwash water in rapid sand filtration. This study focused on introducing burned coconut shells (BCS) as the filter media for rapid gravity filtration in mono-media and dual-media configurations. The research was conducted on a pilot scale filter column facilitated with air and water backwash for testing the filter performance of the BCS filter media, sand, and anthracite and the result was compared. BCS filter media of 1.0 mm effective size and uniformity coefficient of 1.5 were tested. Clarified water with a turbidity of nearly 4.0 NTU was used as the filter inlet. The flow rate was set to 2.0 l/min to create an 8 m/h surface loading. The result showed that water filtered through the BCS media satisfied the drinking water quality standard, SLS 614(2013). The average filter run time in mono-media setup was almost similar (55 hours) for all media types. In dual-media setup, BCS showed a higher filter run value of 95 hours. Water saving of about 2.0% from the total production was observed in the sand and BCS dual-media setup compared to the sand in mono media configuration. This study revealed that the BCS filter media can be used in rapid gravity filtration with higher water production (98.8 %) by only consuming 1.2 % for backwashing.

Keywords: Burnt Coconut Shells filter media; Filter Performance; Filter Run Time; Rapid Gravity Filtration; Anthracite