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EFFECT OF ζ-POTENTIAL OF INFLUENT PARTICLES ON INITIAL FILTER COEFFICIENT FOR RAPID SAND FILTERS

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Simultaneous experimental study was carried out on down-flow (DF) and up-flow (UF) sand filters using artificial influent replicating settled surface water in order to assess dependence of initial filter coefficient (λ_0, m^{-1}) on ζ-potential of influent particles (ζ_p, mV). The ζ_p for various filter runs was varied by using poly-aluminum chloride (PAC) for coagulation of artificial raw water. In order to improve performance of UF filter, it was conditioned by down-flushing with PAC modified wash water subsequent to fluidized wash. An attempt is made to correlate ζ_p and λ_0 using observations through various runs with different rates of filtration for both filters. System constants proposed in the nonlinear relationship were computed for the different rates of filtration, using method of least-square fit. It was evident from the computation of coefficient of determination for the regression that the hypothesized nonlinear relationship provided an excellent fit for each case. The ζ_p is found to be dominant parameter and so, worth of continuous monitoring for operational control in order to avail consistent filter performance. Effect of influent with less negative ζ_p on DF and UF filter was evaluated by conducting full length filter runs; and it was observed that surface removal was aggravated in DF filter whereas better removal and less incremental increase in head-loss were witnessed for UF filter.

Introduction

The role of rapid granular filters in water treatment is to clarify the water by removing suspended particles. The principal removal mechanisms operative in rapid granular filtration are basically physicochemical [1]. The physicochemical properties of granular media as well as influent being filtered are crucial for granular filtration. As the removal of particles much smaller than pore spaces is achieved in rapid granular filtration, straining is not merely the removal mechanism [2]. On the contrary, excessive surface straining is not

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