Application of coagulation process for the treatment of combined sewer overflows (CSOs)

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ABSTRACT

Nonpoint source pollutions discharged with stormwater runoff during rainfall events degrade public waterbodies. Because combined sewer overflows (CSOs) especially affect public waterbodies, necessary measures must be taken for CSOs. Therefore, this study treated CSOs using the ultra-rapid coagulation (URC) process. More than 50% of the study site was comprised of an industrial area, followed by forest, farmland and residential areas at 21.3, 2.6, and 23.5%, respectively. The 30,000 ton capacity URC process was used to treat CSOs generated from the catchment. Monitoring was conducted over 8 rainfall events, and the samples were analyzed for pollutant parameters such as total suspended solids (TSS), biochemical oxygen demand (BOD), chemical oxygen demand (CODc), total nitrogen (TN), total phosphorus (TP), and heavy metals. At the beginning of the rainfall, the first flash effect was observed, but was not observed 20 min later. The concentration of TSS and BOD increased as the rainfall intensity became stronger in the middle stage of the rainfall. The treatment efficiency of the pollutants by the URC process was analyzed as TSS 94.4%, BOD 70.8%, CODc 77.6%, TN 36.1%, and TP 83.5%. These treatment efficiencies were higher than those of other nonpoint pollution control facilities. Meanwhile, the removed particle size ranged from 0.1 to 10 μm or from 80 to 300 μm.

Keywords: Ultra rapid coagulation (URC); Coagulation; Weighted coagulant additives (WCAs); CSOs; Alum

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