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TREATMENT OF AN ALKALINE BUTYL RUBBER WASTEWATER BY THE PROCESS OF COAGULATION AND FLOCCULATION - HYDROLYSIS ACIDIFICATION - BIOLOGICAL CONTACT OXIDATION - MBR

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Abstract

Wastewater from butyl rubber production is causing an increasing environmental problem due to its large quantity and complex quality. In this paper, two types of wastewaters generated from rubber synthesis, i.e. alkaline wastewater (AW) and cleaning and flushing wastewater (CFW), were investigated. Coagulation and flocculation were firstly applied to remove suspended solids (SS) from the AW. By single factor experiment, the optimum operational conditions were obtained as pH 8, PAC dosage 40 mg/L, and PAM dosage 8 mg/L, by which the Chemical Oxygen Demand (COD) removal was 31.5±22.4%, and the turbidity of supernatant was 2.7±0.4 NTU. Subsequently, a combined process of hydrolysis acidification (HA) – biological contact oxidation (BCO) – membrane bioreactor (MBR) was designed to treat the mixture of treated AW and raw CFW, according to the biodegradability of the hybrid wastewater. Under the hydraulic retention times (HRTs) of 6h (HA), 4h (BCO), and 10h (MBR), respectively, a COD removal of 88.6± 6.3% was achieved. The organic components of raw water and a series of effluent of each treatment unit were analyzed by GC/MS. Biological acute toxicities of the same samples were measured using luminescent bacterium test. Some transformations of organic components caused by the treatment of HA were revealed. The toxicity of the water was enhanced by HA, and removed by MBR subsequently, which indicated the detoxification of MBR.

Key words: biological acute toxicity, biological contact oxidation, butyl rubber wastewater, coagulation, hydrolysis acidification,

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