

APPLYING INTERNAL CIRCULATION ANAEROBIC REACTOR FOR WASTEWATER TREATMENT: A CASE STUDY IN SAIGON PAPER MILL WASTEWATER TREATMENT PLANT

Nhat-Ha TRAN^a and Manh-Ha BUI^{b*}

^aBSc; Department of Environmental Sciences, Saigon University, 273 An Duong Vuong Street, District 5, Ho Chi Minh City 700000, Vietnam

^bPhD; Department of Environmental Sciences, Saigon University, 273 An Duong Vuong Street, District 5, Ho Chi Minh City 700000, Vietnam

*E-mail address: *manhhakg@sgu.edu.vn*

Received: 24.06.2019; Revised: 8.07.2019; Accepted: 8.07.2019

Abstract

Internal Circulation reactor (IC reactor) is an anaerobic digestive system with the capability to treat high-load Chemical Oxygen Demand (COD) of industrial wastewater (e.g. brewery, potato starch, pulp and paper). IC reactor advantages include of the following: only small areas required, shock load resistance, produces more biogas and uses less energy compared to the Upflow Anaerobic Sludge Blanket (UASB) reactor. BIOPAQ[®]ICX is an upgrade to BIOPAQ[®]IC that has higher efficiency, lower volume, able to build from the current anaerobic reactor, and its trial has produced positive results in many different countries and with various types of wastewater. A case study of the wastewater treatment plant at Saigon Paper's mills shows that the IC reactor COD removal rate is over 80% when the COD is not over 2300 mg/L; Volumetric Load Rate (VLR) is 6–14 kgCOD/m³.day and the removal rate is higher with a higher load and could reach 80% at 14 kgCOD/m³.day; granular sludges settle very well, and the three-phase separator is efficient of preventing sludge from washing out; pH, Total Suspended Solids (TSS), alkalinity, Volatile Fatty Acids (VFA), N-NH₄⁺, P-PO₄³⁻, Ca²⁺, SO₄²⁻ were also analysed and indicated that the IC reactor is operating well.

Keywords: Internal Circulation reactor (IC reactor); Paper mill wastewater; Granular sludge; Organic compounds.