

Studies on Two Stage Biological Treatment of Pulp and Paper Mill Wastewater

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Abstract The pulp and paper mill is a major industrial sector utilizing a huge amount of lignocellulosic materials and water during the manufacturing process, and releases chlorinated lignosulphonic acids, chlorinated resin acids, chlorinated phenols and chlorinated hydrocarbons in the effluent. About 500 different chlorinated organic compounds have been identified including chloroform, chlorate, resin acids, chlorinated hydrocarbons, phenols, catechols, guaiacols, furans, dioxins, syringols, vanillins, etc. These compounds are formed as a result of reaction between residual lignin from wood fibres and chlorine/chlorine compounds used for bleaching. Colored compounds and Adsorbable Organic Halogens (AOX) released from pulp and paper mills into the environment poses numerous problems Laboratory scale studies were performed for the sequential anaerobic treatment of pulp and paper mill wastewater with special emphasis on the removal of Adsorbable Organic Halides (AOX). Anaerobic hybrid reactor consisting of a UASB at the bottom and an anaerobic filter on the upper side. The effluent from anaerobic hybrid reactor was passed through a column type sequencing batch reactor (SBR) operated in a continuously automatic mode under aerobic conditions using timers and solenoid valves. The anaerobic reactor was seeded with digester sludge obtained from a sewage treatment plant while SBR was seeded with activated sludge. The influent from Naini Tissue Mill, Kashipur, India was fed to the anaerobic hybrid reactor. The anaerobic hybrid reactor was operated at HRT of 24 hours and SBR was operated with a 24 hour cycle which was reduced to 18 hours. The overall BOD and COD removal efficiency from the reactor systems was found to be 90% and 85% respectively. The overall AOX removal efficiency was found to be 80%. The study revealed that the reactor systems employed in the present investigation was found effective for removing AOX and organics from the pulp and paper Mill wastewater.