

Treatment of Paper Wastewater Using Combination of Coagulation Flocculation and Membrane Methods

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Abstract

The previous research has been conducted to find out the potential of non-wood fibers as an alternative for paper-making raw material. The non-wood fibers used are combination of rice straw and used paper. It was processed by using soda pulping method. The paper waste contains dissolved lignin component and other organic compounds in high pH condition can produce wastewater with high chemical oxygen demand (COD). In this research, pulp or paper wastewater was treated through combination of coagulation flocculation and membrane method to achieve a permitted level of COD. It was also determined the optimal condition which can reduce the COD value to fulfill the requirement for water disposal. The initial conditions of paper wastewater are pH = 14, COD in the range of 3,000 - 11,000 ppm. The coagulation-flocculation process was conducted by using Poly Aluminium Chloride (PAC) as coagulant and anionic flocculant. The experiment is conducted by two steps, firstly determined the optimum coagulation flocculation (coagulant dose) for soluble organic material removal and then followed by micro-or ultrafiltration process. To produce asymmetric membrane for filtration process, it was synthesized cellulose acetate membrane through phase inversion technique. The pore size of the membrane was modified by varying the composition of cellulose acetate in the range of 15-18% w/w. The COD value of wastewater was analyzed before and after treatment to find out the effectivity of coagulation and the membrane process by studying its flux and rejection. The result showed that COD reduction less than 200 ppm can be reached through the treatment of combination of coagulation - flocculation and micro-or ultrafiltration process. The result also indicated that with initial COD 6,063 ppm, 10,000 ppm of coagulant, 1 ppm of flocculant and 18 % w/w of cellulose acetate membrane, COD can be reduced up to 96.87%