

Treatment of High Organic Carbon Industrial Wastewater using Photocatalysis Process

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Abstract

In Thailand, agricultural machinery manufacturing companies are known to generate high organic carbon wastewater from painting and leak testing processes. Chemical oxygen demand (COD) value in leak test wastewater is found to be in the range of 3,000-5,000 mg/l. In this study, three scales including lab-scale, pilot-scale and industrial-scale photocatalytic reactors were developed to investigate the efficiency of wastewater treatment. In lab-scale, the 800 ml reactors were set up to optimize the best condition for pH and TiO₂ loading. The results suggested that the pH had no effects on the COD removal, whereas the COD removal efficiency was increased by TiO₂ loading. The highest COD removal efficiency of 85% was found at the TiO₂ loading of 1 g/l. The 200 l reactor of pilot-scale and the 3000 l reactor of industrial-scale were established and continuously operated for 30 days. The results revealed that the COD removal efficiency was >90%, and the COD concentration was reduced to 250-300 mg/l in the treated wastewater. The COD value of treated wastewater met the standard set by the Industrial Estate Authority of Thailand to discharge into a central wastewater treatment plant, which verified the successful implementation of process to the actual industrial wastewater.

Keywords: Actual industrial wastewater treatment, high organic carbon wastewater, photocatalysis process