



Evaluation of an Activated Sludge Process Combined with Powdered Activated Carbon for the Treatment of Oil Refinery Wastewater

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Abstract: The work described herein is a study of the use of powdered activated carbon (PAC) in the activated sludge process (PACT™ - Powdered Activated Carbon Treatment) for the treatment of wastewater from oil refinery. In the first step, two carbon samples were chosen out of four different types of activated carbon based on the results of tests that evaluated the removal efficiency of recalcitrant organic substances. Next, experiments in a continuous bioreactor were conducted at laboratory scale, which simulated the sludge activated process. Two different operating conditions were tested by varying carbon replacement and sludge age. The best results were achieved by activated sludge and Norit (SAE Super 94009-7) PAC under the following reactor conditions: HRT, 24 h; SRT, 30 d; carbon replacement, 150 mg_{PAC}L⁻¹_{effluent}; and 4,5 g_{PAC}.L⁻¹_{reactor}. Under these conditions, the removal efficiencies were 98% for COD and 99% for phenol, and there was an overall decrease in *Ceriodaphnia dubia* chronic toxicity. Additionally, the PACT process was more stable compared to the control reactor process (activated sludge without PAC).

Keywords: *Oil refinery wastewater; activated sludge; powdered activated carbon*

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