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Remediation of oily wastewater from an interceptor tank using a novel photocatalytic drum reactor

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ABSTRACT

A novel photocatalytic reactor has been developed to remediate oily wastewaters. In the first instance degradation rates of model organic compounds, methylene blue (MB) and 4-chlorophenol (4-CP) were determined. The experimental set-up investigated a 1:10 w/v catalyst to organic solution volume, 30 g catalyst, 300 mls MB (10 μM) or 4-CP (100 μM). The catalyst investigated was a pellet catalyst to improve separation of the remediated volume from the catalyst following treatment. MB concentration decreased by 93% after 15 mins irradiation whilst 4-CP concentration decreased by 94% following 90 mins irradiation. Oily waste water (OWW) from an interceptor tank typically containing diesel oils was obtained from Sureclean, an environmental clean-up company. The OWW was treated using the same conditions as MB and 4-CP, the model organic compounds. Levels of total organic carbon (TOC) and total petroleum hydrocarbon (TPH) were used to monitor the efficacy of the photocatalytic reactor. TOC reduced by 45% following two 90 mins treatment cycles. TPH reduced by 45% following 90 mins irradiation and by a further 25% during a second stage of treatment. This reactor can be used as a polishing technique assembled within a wastewater treatment plant. Allowing for more than one pass through the reactor improves its efficiency.

Keywords: 4-chlorophenol; Interceptor water remediation; Methylene blue; Photocatalytic reactor

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