Optimization method for the treatment of Tehran petroleum refinery wastewater using activated sludge contact stabilization process

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ABSTRACT

This paper describes the results of side by side large scale testing of contact stabilization and extended aeration activated sludge processes on the petroleum refinery wastewater at Tehran (Iran) oil refinery by using continuous large scale experiments during the three month investigation period. The process optimization for performance evaluation was studied. Sampling results indicated that the contact stabilization process shows more effective performance than extended aeration process in removing chemical oxygen demand (COD) and biological oxygen demand (BOD), and also the mixed liquor volatile suspended solids were less in contact stabilization as compared to those in the extended aeration process. The excess sludge production was affected by the amount of sludge loading rate and aeration. The applied aeration to the mixed liquor and the sludge recycle rate were found to be critical parameters in the successful optimization of the contact stabilization process. The appropriate optimized operational conditions that allowed obtaining the best performance with COD removal efficiency of 96 and 95% were food to micro-organism ratio of 0.38 with sludge recycle rate of 110 and 77% sludge recycling in aeration of 0.27 L of air per liter of wastewater per minute, respectively. All in all, contact stabilization activated sludge process with high degree of assurance and less operation cost can be suggested for the treatment of wastewater originated from petroleum refineries.

Keywords: Petroleum refinery wastewater; Optimization; Contact stabilization; Sludge recycle rate; Aeration; F/M ratio

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