

Treatment of High Concentration Cutting Fluid Wastewater by Ceramic Membrane Bioreactor

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Abstract : In recent years, membrane bioreactors (MBR) have been widely utilized as it can effectively replace conventional activated sludge process (CAS). Membrane bioreactor (MBR) is found to be more effective technology compared to other conventional activated sludge process and advanced membrane separation technique. Additionally, as far as the MBR is concerned, it is having excellent control of sludge retention time (SRT) and hydraulic retention time (HRT) and conducive to the retention of high concentration of sludge biomass. The membrane bioreactor (MBR) can effectively reduce footprint in terms of area and omit the secondary processing procedures in the conventional activated sludge process (CAS). Currently, as per the membrane technology, the ceramic membrane is found to have highly strong anti-acid-base properties, and it is more suitable than polymeric membrane while using for backwash and chemical cleaning. This study is based upon the treatment of Cutting Fluid wastewater, as the Cutting Fluid is widely used in the cutting equipment. However, the Cutting Fluid wastewater is very difficult to treat. In this study, the ceramic membrane was used and combine with of MBR system to treat the Cutting Fluid wastewater. In this present study, different kind of chemical coagulants have been utilized for pretreatment purpose in order to get the supernatant and simultaneously this wastewater (supernatant) was treated by MBR process. Nevertheless, ceramic membrane has three advantages such as high mechanical strength, drug resistance and reuse. During the experiment, the backwash technique was used for every interval of 10 minutes in order to avoid fouling of the membrane. In this study, during pretreatment the Chemical Oxygen Demand (COD) removal efficiency was found to be 71-86% and oil removal efficiency was analyzed to be 83-92%. This pretreatment study suggests that it is quiet effective methodology to reduce COD and oil concentration. Finally, In the MBR system when the HRT is more than 7.5 hour, the COD removal efficiency was found to be 87-93% and could achieve 100% oil removal efficiency. Coagulation test series were seen in Refs coagulants for the treatment of wastewater containing cutting oil with better oil and COD removal efficiency. The results also showed that the oil removal efficiency in the MBR system could reduce the oil content to less than 1 mg / L when the oil quality was 126 mg / L. Therefore, in this paper, the performance of membrane bioreactor by utilizing ceramic membrane has been demonstrated for treatment of Cutting Fluid wastewater.

Keywords : membrane bioreactor, cutting fluid, oil, chemical oxygen demand

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