

**SYNTHETIC LANDFILL LEACHATE TREATMENT USING POLY
ALUMINIUM CHLORIDE (PAC): INFLUENCE OF IRON
NANOPARTICLES AS COAGULANT AID IN COD REMOVAL**

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ABSTRACT

SYNTHETIC LANDFILL LEACHATE TREATMENT USING POLY ALUMINIUM CHLORIDE (PAC): INFLUENCE OF IRON NANOPARTICLES AS COAGULANT AID IN COD REMOVAL

Inclined populations have greatly increased the amount and types of municipal solid waste (MSW) dumped in landfill sites. This leads to increasing contaminants contained in landfill leachate. Aligned with this, an improvised treatment of landfill leachate is needed. Coagulation and flocculation processes are widely used in wastewater treatment. However, the usage of primary coagulant alone, such as poly aluminium chloride (PAC) and poly diallyl dimethylammonium chloride (PDADMAC), is insufficient to remove the pollutants in landfill leachate due to its incompetence in removing certain pollutants. Therefore, the implementation of coagulant aid is necessary to increase the efficiency of pollutant removal. In this study, synthetic landfill leachate (SLL) was treated using PAC as the primary coagulant and iron nanoparticles (FeNPs) as the coagulant aid to remove chemical oxygen demand (COD). For this purpose, the effects of coagulant dosage (0.1-0.5 mL), coagulant type, pH (4-8), coagulation aid dosage (10-30 mg/L), and addition of coagulant aid were studied by using the jar test. The outcome of this study indicates that 0.4 mL and 0.3 mL are the optimum dosage for PAC and PDADMAC coagulant respectively. In between PAC and PDADMAC, PAC is chosen as the more suitable primary coagulant. The best pH for SLL coagulation found at pH 6, due to charge neutralisation mechanism. The optimum dosage for FeNPs is determined to be 25 mg/L. Further addition of FeNPs enhanced the removal of COD up to 57% due to their adsorption mechanism. Based on these results, the addition of FeNPs potentially enhances the coagulation of SLL for COD removal.

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