

Effects of electric potential, NaCl, pH and distance between electrodes on efficiency of electrolysis in landfill leachate treatment

ABSTRACT

This study investigated the effects of different parameters on the removal efficiencies of organic and inorganic pollutants in landfill leachate treatment by electrolysis. Different parameters were considered such as the electric potential (e.g., 24, 40 and 60 V), hydraulic retention time (HRT) (e.g., 40, 60, 80, 100 and 120 min), sodium chloride (NaCl) concentration (e.g., 1, 3, 5 and 7%), pH (e.g., 3, 7 and 9), electrodes materials [e.g., aluminum (Al) and iron (Fe)] and distance between electrodes (e.g., 1, 2 and 3 cm). The best operational condition of electrolysis was then recommended. The electric potential of 60 V with HRT of 120 min at 5% of NaCl solution using Al as anode and Fe as cathode (kept at a distance of 3 cm) was the most efficient condition which increased the removal efficiencies of various parameters such as turbidity, salinity, total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and heavy metals (e.g., Zn and Mn). The higher removal percentages of many parameters, especially COD (94%) and Mn (93%) indicated that the electrolysis is an efficient technique for multi-pollutants (e.g., organic, inorganic and heavy metals) removal from the landfill leachate.

Keyword: Electric potential; Electrode; Electrolysis; Leachate; NaCl; pH