



Mass transfer of acrylonitrile wastewater treatment by high gravity air stripping technology

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ABSTRACT

Air stripping is the one of effective technologies for removing volatile organic compounds from wastewater. However, the low removal rate of acrylonitrile in wastewater by air stripping at ambient temperature and the huge stripping column remain a technical problem. Hence, high gravity is adopted to intensify air stripping process which is strongly affected by gas–liquid mass transfer. The effects of high gravity factor, gas–liquid ratio, liquid spray density and initial concentration of acrylonitrile wastewater on the liquid overall mass transfer coefficient and the removal rate of acrylonitrile were investigated separately. Under the suitable conditions, the liquid overall mass transfer coefficient and acrylonitrile removal efficiency could reach $0.906 \text{ kmol m}^{-3} \text{ s}^{-1}$ and 69.1%, respectively. Furthermore, correlations of liquid overall mass transfer coefficient and removal rate of acrylonitrile were established. Comparing experimental data with fitting data, the average relative errors are both below 4%, revealed that the accuracy of correlations was reasonable. In addition, high gravity air stripping and conventional technologies were compared. The obtained results imply great potential and good economic benefits of high gravity air stripping technology in the treatment of acrylonitrile wastewater.

Keywords: High gravity; Stripping; Mass transfer; Wastewater; Purification

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