

A comparative evaluation of dried activated sludge and mixed dried activated sludge with rice husk silica to remove hydrogen sulfide.

ABSTRACT

The aim of this study was to investigate the effectiveness of dried activated sludge (DAS) and mixed dried activated sludge with rice husk silica (DAS & RHS) for removal of hydrogen sulfide (H₂S). Two laboratory-scale filter columns (packed one liter) were operated. Both systems were operated under different conditions of two parameters, namely different inlet gas concentrations and different inlet flow rates. The DAS & RHS packed filter showed more than 99.96% removal efficiency (RE) with empty bed residence time (EBRT) of 45 to 90 s and 300 mg/L inlet concentration of H₂S. However, the RE decreased to 96.87% with the EBRT of 30 s. In the same condition, the DAS packed filter showed 99.37% RE. Nonetheless, the RE was shown to have dropped to 82.09% with the EBRT of 30 s. The maximum elimination capacity (EC) was obtained in the DAS & RHS packed filter up to 52.32 g/m³h, with the RE of 96.87% and H₂S mass loading rate of 54 g/m³h. The maximum EC in the DAS packed filter was obtained up to 44.33 g/m³h with the RE of 82.09% and the H₂S mass loading rate of 54 g/m³h. After 53 days of operating time and 54 g/m³h of loading rates, the maximum pressure drop reached to 3.0 and 8.0 (mm H₂O) for the DAS & RHS packed and DAS packed filters, respectively. Based on the findings of this study, the DAS & RHS could be considered as a more suitable packing material to remove H₂S.

Keyword: Hydrogen sulphide; Rice husk silica; Dried activated sludge; Removal efficiency; Elimination capacity; Pressure drop.