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INFLUENCE OF STIRRING SPEED AND GAS-TO-LIQUID RATIO ON ACTIVATED SLUDGE PERFORMANCE IN CARBAMAZEPINE ELIMINATION USING RESPONSE SURFACE METHODOLOGY AND PRINCIPAL COMPONENT ANALYSIS

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Abstract

Activated sludge (AS) is the mainly used biological process in water treatment; therefore, assessing the influence of various operating conditions on this process is relevant. This study aimed to evaluate at laboratory-scale the influence of the gas-to-liquid volume ratio ($R_{G/L}$) and the stirring speed (*SS*) on the biodegradation of carbamazepine (CBZ) by activated sludge. For this purpose, a central composite design (CCD) was used in association with response surface methodology (RSM). Batch cultures were carried out at room temperature for 21 days in a mineral medium of initial pH 7, containing CBZ at an initial concentration of 5 mg L^{-1} and a given amount of AS (achieving 0.05 AU at 600 nm). The two parameters *SS* and $R_{G/L}$ have been varied in the ranges of 80 to 320 rpm and 0.2 to 5, respectively. The pH, the (600 nm)-absorbance and the concentration of CBZ in the medium were monitored and their kinetics were modeled and linked to the operating conditions using principal component analysis (PCA). The obtained results showed that a low content of oxygen has a high positive effect, while an extreme stirring speed has a tiny negative effect on the process yield.

Key words: activated sludge, carbamazepine, composite central design, principal component analysis

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