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REMOVAL OF ODOROUS COMPOUNDS IN WASTEWATER WITH A STRIPPING PROCESS

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EXTENDED ABSTRACT

Odorous compounds occur in both municipal and industrial wastewaters. The most important family of organic sulfur-containing compounds, mercaptans, are formed by the demethylation of lignin, by the decomposition of sulfur-containing compounds in petroleum products, as byproducts in manufacturing process of pharmaceuticals and plastics and by bacterial decomposition of organic materials found in domestic wastewater.

The release of these substances from water and wastewater treatment plants as well as from natural water bodies to ambient air, due to volatilization, has recently caused great concern.
The removal of an aliphatic mercaptan from its aqueous solutions to air involves mass-transfer from the liquid into the gaseous phase. In this study 1-Butylmercaptan has been stripped from aqueous solutions (0.78-2.33 mol/m^3) in a stirred semibatch reactor with nitrogen. Data have been collected in a laboratory-scale reactor at different conditions of inert gas flow rates (10^{-4}-5.5*10^{-4} m^3/min), pH (7-12.5) and temperature (26-38^{o}C).

A simplified mathematical model is developed from which mass-transfer coefficients $k_L\alpha$ are calculated and found in the range 5.03*10^{-6} - 1.47*10^{-3} s^{-1}**.** Comparing the coefficients derived from experimental results according the simplified model with those from oxygen transfer data, the simplified model fails to predict realistic values of mass-transfer coefficients especially when water chemistry plays an important role.
At pH < pKa high transfer rates are measured because of the shift in the equilibrium between mercaptan and mercaptide ion which results in a varying driving force.
Increasing inert gas flow rate, higher driving forces are expected and consequently greater removal rates are measured.
The effectiveness of stripping the model substance is determined by water chemistry and by its hydrophobicity (low aqueous solubility) rather than its pure component volatility.
Additionally apparatus geometry and conditions of gas-liquid contact are of great importance. Under the specific experimental setup the phenomenon evolves with outlet gas being far from saturation conditions.

Key words: stripping, 1-Butylmercaptan, mass-transfer