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Estimation of volatilization rate of volatile organic compounds from wastewater.

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ABSTRACT

Air pollution became a major concern in South Africa in the late 1980's and regulatory requirements for the chemical process industries to reduce hazardous emissions have increased ever since. Volatile organic compounds (VOCs) contribute significantly to the formation of ozone and photochemical oxidants and their associated impact on human health has become a major issue worldwide. Volatilisation is a significant process in determining the fate of organic compounds in the environment.

In this study, volatilisation rate of VOCs (specifically benzene, toluene, ethylbenzene, and xylene) from a wastewater collection basin, also called the oily sewer basin (OSB) was measured using a flux chamber method and the VOCs were characterised. Theoretical models that can be used to estimate volatilisation rate were also studied. Meteorological data was collected to evaluate the effect of temperature, humidity and wind speed on volatilisation rate.

This study showed that toluene and ethylbenzene have the highest volatilisation rate compared to benzene and o-xylene. It was found that system conditions and physico-chemical properties of a compound have a significant effect on volatilisation. It was also identified that the measured concentrations of VOCs escaping from the OSB do comply with Occupational Health and Safety Act and Regulations 85 of 1993 standards. It was recommended that surfactants be used to inhibit volatilisation of VOCs.