



Assessment of batch bioreactor odour nuisance using an e-nose

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ABSTRACT

The method of assessing a smell nuisance of the SBR laboratory bioreactor using a calibrated gas sensor array (e-nose) is described in the article. The SBR bioreactor is used to remove organic carbon and nutrients and can contribute to the emission of smell nuisance compounds. Two measurement devices were used as an information source regarding the presence of smell nuisance gases: an array consisting of 8 MOS-type gas sensors and a dynamic olfactometer. The research covered the stage of a normal bioreactor performance and simulation of the aeration system failure. With the gas sensor array, a static response has been recorded for air samples above the surface of treated wastewater. The dynamic olfactometer Ecoma TO-7 was simultaneously used in order to measure odour concentration with the “yes–no” method, according to EN-13725:2007. Comparative analyses were carried out with artificial neural networks in the statistical program. The research conducted indicates that normal bioreactor performance is related to a low smell nuisance. However, in the case of the failure during the activation of the aeration system, there occurs significant emission of smell nuisance compounds and an increase in odour concentration to 995,606 ou_E/m³. The correlation coefficient R between real odour concentration and the estimated value using the e-nose system exceeds 0.9, in the range of 1E5–1E6 ou_E/m³. The obtained results indicate that the gas sensor array can be used for assessment of the smell nuisance in the vicinity of SBR reactors during their normal performance as well in the case of the failure.

Keywords: SBR bioreactor; Wastewater treatment; Smell nuisance; E-nose; Dynamic olfactometer

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