Potentiometric determination of fluoride with a flow system for the on-line monitoring of the fluorphenol degradation in a bioreactor

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Abstract

The new regulations and more strict limits created by the European Water Frame Directive (1) have increased the awareness of the importance of cleaning effluents to prevent water contamination. Treatment plants are required to carry out more efficient cleaning procedures in terms of new parameters and higher effluent volumes, leading to the development of new cleaning processes. Bioremediation processes are becoming quite common nowadays, namely involving the use of microorganisms and plants, as they are considered a green approach when compared to the classical chemical processes. Real-time monitoring of a bioreactor is a key element of its efficiency, so the more accurate the monitoring processes the better results of the cleaning process. If a proper monitoring of the bioreactor is not carried out, the entire process can be lost, due to the death or overgrowth of the biomass.

Flow analysis techniques represent an automated, fast, reliable solution for monitoring purposes enabling the possibility of on-line monitoring, avoiding off-line sample handling and measurement. In this work, the development of a flow injection analysis system for the potentiometric determination of fluoride for a sequencing batch reactor (SBR) monitoring is described. The SBR was developed for the biodegradation of 2-fluorphenol (2FP) in wastewaters. At the polishing level of cleaning effluents, the aim is to remove minimal amounts of highly toxic pollutants, such as the halogenated organic compound 2FP. The SBR involved in this study represents a new line of bioreactors aiming for a more efficient treatment process. The aim of the described method is to monitor the SBR removal efficiency through the determination of fluoride, a by-product of the 2FP biodegradation. The determination of the pollutant, 2FP, was carried out by high performance liquid chromatography (HPLC).

Keywords: Monitoring biodegradation process; On-line sampling; Flow injection analysis; Fluoride detetmination; Sequential injection.

References: [1] Water Frame Directive – directive 2000/60/EC of the parliament and the council, Official Journal of the European Communities L 327/1, 23 October 2000.