



Scientific/Technical offer for licensing

Nitrogen removal control system based on low-cost sensors

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Background: Control systems implemented on wastewater treatment plants (WWTPs) may be able not only to accomplish more rigorous effluent standards but also to minimize energy consumption associated to the process. Nowadays, control systems in WWTPs with biological nitrogen removal are mainly based on on-line nitrogen analyzers that measure ammonium and nitrate concentrations in the anoxic and oxic zones of the treatment process. This kind of instrumentation involves a significant acquisition and maintenance cost because of the complexity of necessary equipment. Furthermore, a continuous supervision from plant operators becomes necessary.

The invention: Researchers from the *Universitat de València* and the *Universitat Politècnica de València* have developed a control system based on fuzzy logic for continuous WWTPs with biological nitrogen removal using low-cost sensors such as pH and ORP sensors. The control system is composed of two independent controllers for nitrification and denitrification processes respectively:

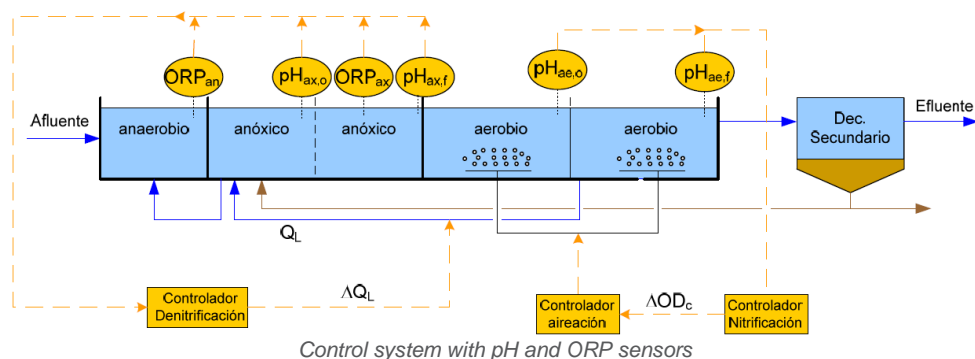
- A nitrification process controller acts over concentration of dissolved oxygen of the aerobic reactor allowing the increase of said concentration when necessary for ammonium removal.
- A denitrification process controller acts over the internal recirculation flow from aerobic to anoxic reactor allowing the increase of said flow when the process has the capacity for denitrification of nitrate from this recirculation.

This control system allows optimization of the activated sludge process since maintains effluent nitrogen concentration under limit values with minimum energy consumption. Moreover, this technology involves lower initial investment and lower maintenance and operational costs for the control system, by replacing commonly used ammonium and nitrate sensors with low cost sensors. Besides, low cost sensors have the additional advantage of their easy usage and lower time response.

Applications: Control systems for biological removal of nitrogen applicable to WWTPs with continuous systems with either plug flow reactor or complete mix reactors.

Advantages: The most remarkable advantages provided by this technology are:

- Cost reduction of initial investment and maintenance
- Easier operation than nutrient analysers
- Lower time response
- Lower aeration energy consumption
- Lower pumping energy consumption



Related technologies: BioCalibra: Device for activated sludge models calibration (Ref. OTRI 200606R-Seco, A.);

Ref. OTRI

200814R-Seco, A

Knowledge area

Chemical Engineering
Water treatment
Environment

Collaboration

Technology available for licensing
Other collaborations may be considered

Intellectual Property Rights

Patent rights

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