BIOTECHNOLOGY & BIOENGINEERING

硝酸盐回流A/O模氮工艺内循环回流量和外碳源投加量

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摘要 Nitrogen and phosphorous concentrations of effluent water must be taken into account for the design and operation of wastewater treatment plants. In addition, the requirement for effluent quality is becoming strict. Therefore, intelligent control approaches are recently required in removing biological nutrient. In this study, fuzzy control has been successfully applied to improve the nitrogen removal. Experimental results showed that a close relationship between nitrate concentration and oxidation-reduction potential (ORP) at the end of anoxic zone was found for anoxic/oxic (A/O) nitrogen removal process treating synthetic wastewater. ORP can be used as online fuzzy control parameter of nitrate recirculation and external carbon addition. The established fuzzy logic controller that includes two inputs and one output can maintain ORP value at-86 mV and −90 mV by adjusting the nitrate recirculation flow and external carbon dosage respectively to realize the optimal control of nitrogen removal, improving the effluent quality and reducing the operating cost.

Fuzzy Control of Nitrate Recirculation and External Carbon Addition in A / O Nitrogen Removal Process

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Abstract Nitrogen and phosphorous concentrations of effluent water must be taken into account for the design and operation of wastewater treatment plants. In addition, the requirement for effluent quality is becoming strict. Therefore, intelligent control approaches are recently required in removing biological nutrient. In this study, fuzzy control has been successfully applied to improve the nitrogen removal. Experimental results showed that a close relationship between nitrate concentration and oxidation-reduction potential (ORP) at the end of anoxic zone was found for anoxic/oxic (A/O) nitrogen removal process treating synthetic wastewater. ORP can be used as online fuzzy control parameter of nitrate recirculation and external carbon addition. The established fuzzy logic controller that includes two inputs and one output can maintain ORP value at-86 mV and -90 mV by adjusting the nitrate recirculation flow and external carbon dosage respectively to realize the optimal control of nitrogen removal, improving the effluent quality and reducing the operating cost.

Key words fuzzy control; nitrate recirculation; external carbon dosage; A/O nitrogen removal process

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