Development on the Process for Nitrogen and Phosphorus Removal in Municipal Wastewater Treatment System

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Abstract

The removal effect of total nitrogen in municipal wastewater by decreasing hydraulic retention time(HRT) from 6 hour to 4 hour on MNR process was not decreased.. The removal efficiencies of nutrient removal process combining A2/O process with media for T-N were 63.1% in the reactor operated 6 hour , and 73.5% in the reactor operated 5 hour and 77.0% in the reactor operated 4 hour.

Introduction

The effluent of activated sludge process tend to supply the nutrients (nitrogen and phosphorus) for algal growth in reservoir There is an increasing need for an advanced wastewater treatment technology development to cope with ever increasing inputs of nitrogen and phosphorus The purpose of this study is develope an economic and technical nutrient removal process using media and evaluate the removal effect of organic matter and nutrient throuout the four season. The aim of this study was to evaluate on the removal effect of total nitrogen in municipal wastewater by decreasing hydraulic retention time(HRT) from 6 hour to 4 hour.

Material and Method

For separate batch experiments, microorganisms were taken from the MLSS of a 50-ton pilot plant of MNR, and wastewater from the each tank of the pilot were supplemented with extra ammonia (NH_4Cl), nitrate (KNO_3) and COD (glucose) to be 5-80 ppm. The biological reaction tank is divided into anaerobic tank, anoxic tank and aerobic tank to treat sewage and waste water containing organic substance, nitrogen and phosphate, and waste water influent divide into the anaerobic tank and the anoxic tank. aerobic tank is filled with bio-film media using the adhering microorganism and floating microorganism

Results and Discussion

Lots of nitrifier which multiply slowly are fixed on the bio ciliary membrane filling the aerobic tank to improve the nitrification efficiency. NO_3^- which is inner-returned from the aerobic tank to the anoxic tank is reduced into N_2O and NO, etc. through nitrate/nitrite respiration by denitrifier in the denitrification reaction tank to improve the denitrification efficiency. Since it is a combination of fixed and floating media, microorganism can adhere thereon easily. Since attachment and detachment continues while cilia move, it is free from any clogging. Since the sludge conglomerate on the bio film is eaten by bacteria and metazoa in a complicated food chain, the amount of the sludge is reduced in the MNR process as compared with the conventional process. It keeps high treatment efficiency at low water temperature in a cold winter. The microorganism attached to the bio-film form conglomeration of sludge to keep high treatment efficiency at low water(10℃) temperature in winter. It keeps high treatment efficiency in the conventional waste water treatment plant. It can highly effectively treat waste water at HRT 5-7hr in the conventional waste water treatment plant without reconstructing the existing sewage treatment plant. The aim of this study was to evaluate on the removal effect of total nitrogen in municipal wastewater by decreasing hydraulic retention time(HRT) from 6 hour to 4 hour on MNR process. MNR process is the process combining A_2/O process with media. The removal efficiencies for T-N were 63.1% in the reactor operated 6 hour , and 73.5% in the reactor operated 5 hour and 77.0% in the reactor operated 4 hour. The specific nitrification(g-NH_3-N/ g-MLVSS.d) of Oxic in the CNR process operated 6 hour was 0.07-0.32. The specific denitrification in Anoxic and the specific nitrification in aerobic basin operated 4 hour was higher than aeobic basin operated 6 hour because of optimum F/M ratio.

Conclusion

The removal effect of total nitrogen in municipal wastewater by decreasing hydraulic retention time(HRT) from 6 hour to 4 hour on MNR process was not decreased.. The removal efficiencies of nutrient removal process combining A2/O process with media for T-N were 63.1% in the reactor operated 6 hour , and 73.5% in the reactor operated 5 hour and 77.0% in the reactor operated 4 hour.

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