

畜産排水からの窒素回収に関する研究

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INTRODUCTION

In many case of Kumamoto Prefecture of Kyushu, JAPAN, livestock-breeding drainage was treated with activated sludge with long time retention time, about 30days. Treated water is stored in store tank, and sometimes it is sprayed in Field. This is the factor of the ground water pollution. Though various biological methods are examined, management often becomes difficult by the ratio of TOC/TN in the nitrogenous removal(Osada T.,1991).The denitrification and ammonia stripping was examined for the unit treatment process. COD remains is about 600mg/l, it thought denitrification process is progress without adding external organic substance .There are the stripping treatment plants for raw piggery waste water in the foreign country (Weiland P), but, it has never tried with treated water. The removal of the remaining phosphorus and a decrease in potassium become possible by this operation. Finally the proposed method of denitrification-stripping was evaluated.

MATERIALS AND METHODS

NH₄-N removal by ammonia stripping

The experiments were conducted at 25 °C using laboratory-scale bubble column with draught tube, sedimentation basin .This container is shut tight, and there is an outlet of the gas in the cap. Discharged gas is absorbed to the gas-washing bottle in sulfuric acid solution. The 5L raw water which pH varied to 11 using

from 5L/min. The experiment conditions were shown in the Table 1.After operation, formed precipitation solid was collected and dissolved in 1N sulfuric concentration, its measured NH₄-N,PO₄-P, K.

NO_x-N removal

The experiments were conducted at 15-20 °C using laboratory-scale cylindrical column with draught tube, sedimentation basin, having a 5L liquid volume for reactor part and a 5L for sedimentation basin. The reactor was cylindrical, with outer diameter 14cm and a liquid depth of 60cm. The raw nitrogen concentration could vary by using five facilities samples. The liquid, which consist 6L sludge and 2L raw water were mixed using stirred . MLSS is 4000-5000mg/l. DO maintained under 0.5mg/l. All denitrification run, was conducted out batch wisely.

Analysis

Samples were taken from the reactor of filters and analyzed for nitrate, nitrite and ammonia, total nitrogen and COD_{cr} concentrations. For the determination of nitrate, nitrite , ammonia and total nitrogen ,photometric methods following Japan sewage method and parameters measured during operation were pH, dissolved oxygen.

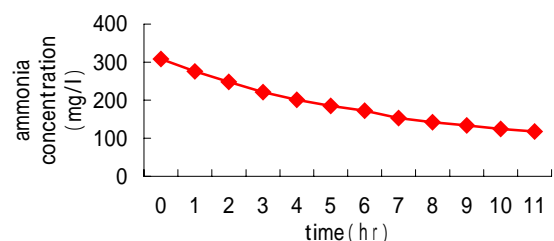


Figure1 Ammonia concentration change with elapsed time

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RESULTS AND DISCUSSION

Ammonia stripping

The result when it deals with it with pH11 is shown in the Figure 1. Ammonia concentration decreased from 308 to 118mg/l in 11 hours, and declined to 32m g/l after 18 hours, then pH decreased to 9.5. When operation was repeated 5 times, ammonia concentration in sulfuric acid solution was 1.5%. The precipitation in the stripping reactor was consisted 2% of nitrogenous, 2% of the phosphorus and 4.4% in precipitation solid. It can get liquid manure when this solid dissolved ammonia absorbents liquid. And 4000mg/l potassium and 30mg/l phosphorus is remaining raw water. Phosphorus concentration was decreased to0.5mg/l by the stripping operation. A decrease in that potassium can contributes to prevents it accumulates in the soil and has a bad influence

Denitrification

The nitrate concentration made changed from 140 to 400mg/l in mixed liquid at the experiments starts. Figure 2 shows various nitrogen form of raw water include of 150mg/l of initial nitrate concentration changed with elapsed time. Nitrite decreased first from 16 hours and nitrate began to decrease after that. As for this NOx-N removal caused using organic substance, which remains in raw water. Figure 3 shows effect of initial NOx-N concentration on denitirificaiton. As for which initial concentration as well, could finally decrease to 0mg/l without addition of the external carbon source

CONCLUSION

First, NOx-N is made 0mg/l in the denitrification process, and it could decrease of ammonia with a stripping process. That results total nitrogen becomes less than 120mg/l, the value is under JAPAN low regulation. (Table 1)

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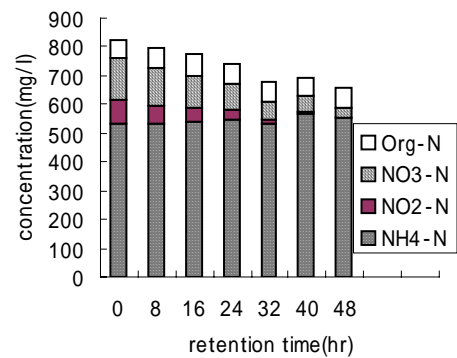


Figure 2 Various form nitrogen

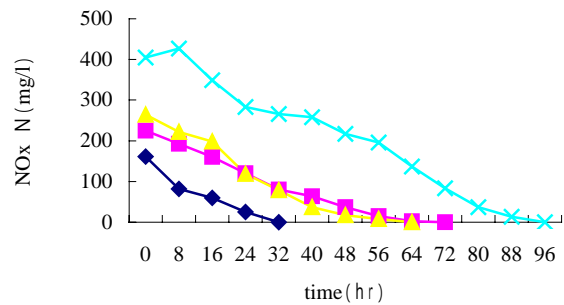


Figure 3 Effect of initial NOx-N concentration

Table 1 The result of further treatment process

	activated sludge	further treatment process	
		denitrification	stripping
time(days)	30	2.5	0.6
T - N(mg/l)	634	393	117