ORP

\[ \text{ORP} = \text{ORP}_1 + \text{ORP}_2 + \text{ORP}_3 \]

(1) \[ \text{ORP}_1 = 1 \text{ ORP}_2 = 2 \text{ ORP}_3 = 1 \text{ ORP}_4 = 2 \]

(2) \[ \text{ORP}_1 = 150090 \text{ ORP}_2 = 100022 \text{ Email: yaoyi@163.com} \]

Effect of Carbon Source and Nitrate Concentration on Denitrifying Dephosphorus Removal and Variation of ORP

WANG Yiyi', PENG Yongzhen'2, WAGN Shuying2,SONG Xuwei3, WAGN Shapo2

1. School of Munic. and Environ. Eng., Harbin Institute of Technology, Harbin 150090; 2. School of Environment and Energy Eng., Beijing Polytechnic University, Beijing 100022, China. E-mail: yaoyi@163.com

Abstract: The effect of added carbon source and nitrate concentration on the denitrifying phosphorus removal by SBR process was systematically studied, at the same time the variation of oxidation reduction potential (ORP) was investigated. The results showed the phosphate release rate and denitrifying and dephosphorus uptake rate in anoxic phase increased with the high carbon source concentration under anaerobic condition (100 - 300 mg/L). However when the carbon source added in anaerobic phase was high to 300 mg/L, the residual COD inhibited the success denitrifying dephosphorus uptake. High nitrate concentration (5 - 50 mg/L) in anoxic phase increased the initial denitrifying dephosphorus rate. Once the nitrate depletes, phosphate uptake changed to phosphate release. Moreover, the time of the turning point occurred later with the higher nitrate addition. ORP can be used as a control parameter of phosphorus release, and it can also indicate the denitrification react degree during the anoxic phosphorus removal but can't be used as control parameter of phosphorus uptake.

Key words: denitrifying dephosphorus removal; denitrifying phosphate-accumulating organism (DPAOs); ORP; COD; nitrate
1 1.2 1.3

1.2 4L SBR (O) NaAc, K2HPO4, KNO3 (O)
2) COD, PO4−-P, NO3−-N
3) pH (8-9) (O) pH (O)
4) NaOH, HCl (O)
5) 20-23°C (O)
6) DO, ORP (O)

1.3

1.2 1.3

COD, 5B-1, COD, MLSS (O)

2.1 ORP (O)

2.1 Dephanox (O) (O) pH (O)

2.1.1 2.1.2 SBR (O)

NaAc, K2HPO4, KNO3 (O)

MLSS (O) 5000 mg/L (O)

100 mg/L, 300 mg/L (O), PO4−-P (O)

10 mg/L (O) 3h (O)

60 mg/L (O) 4h (O)

ORP, pH, DO (O)

COD, PO4−-P, NO3−-N, ORP (O)

3

180 min, 60 min (O)

ORP, ORP (O)

ORP (O)

ORP (O) 312 mV, 221 mV (O)

180 min, 120 min (O)

ORP, ORP (O)

ORP (O) (O) A, B (O)

ORP, ORP (O) 225 min (O)
Fig. 3 The relationships between the variation in the concentration of COD, NO$_3^-$, and PO$_4^{3-}$-P and ORP with different initial

2.2.2...
Fig. 4  Effect of COD concentration added in anoxic phase on denitrifying phosphorus removal
15 min. NO₃-N concentration in the anoxic condition

3.5 mg/L 5a 5b

7.55 4.5 12 mg/L (g²h⁻¹)

4.54 9.54 9.81 mg/L (g²h⁻¹)

5 mg/L NO₃-N concentration for 15 min.

PO₄³⁻ uptake (11.62 mg/L)

30 min.

NO₃-N concentration for 15 min.

NO₃-N concentration for 30 min.

300 mg/L COD uptake.

300 mg/L DNPAO uptake.

Fig. 5 Effect of different NO₃⁻ N concentration on phosphate uptake under anoxic condition.

References:


