

9. Biological Treatment of High concentrated Nitrogen Wastewater with Heavy Metals

토목환경공학과 나 승 진
지도교수 송 영 채

To develop the effective treatment parameters in the electroplating wastewater treatment by SRB(Sulfate Reducing Bacteria), SRB activity, removal capacity of heavy metals, and feasibility of nitrogen removal were investigated with respect to diverse ratios of COD/sulfate in an anaerobic continuous reactor. During the start-up when COD/sulfate ratios were gradually increased from 1.53 with the fixed COD concentration of 500 mg/L as glucose, successful sulfate reduction of above 95% was achieved. Furthermore, in order to determine the activities of SRB at varying COD/sulfate ratios, influent COD concentrations were controlled to maintain COD/sulfate ratios at 0.18, 0.33, 0.5, 0.82, 1.2 after fixation of sulfate concentration of 2000 mg/L in the feed



electron wastewater. At the relatively low value of 0.18, and 0.33, deficiency of organics in the feed affected the activity of SRB. Sulfate reduction efficiency was 61% and 59%, respectively, at the COD/sulfate ratio of 0.82 and 1.2, relatively high. These results were not different in a large amount compared to the value of 57% at 0.5, which means sulfide inhibited the SRB's activity at the high COD/sulfate ratios. From the results, economic COD/sulfate ratio was considered about 0.33 to reduce sulfate 2000 mg/L.

The amount of external carbon supply can be determined on the basis of heavy metal amount in the wastewaters since sulfate reduction rate can be controlled by the external carbon supply. Heavy metals were effectively removed by SRB at above pH 6.4 regardless of metal species, however removal efficiency decreased dramatically at pH 5.4 due to the reduction of SRB activity caused by unfavorable pH condition. Consequently, at least, above pH 5.4 was necessary for the neutralization of electroplating wastewaters to maintain the stable activity of SRB.

In case of the heavy metal inhibition test in nitrification reactor, the results of Phase 1 showed about 20% inhibition, and maximum inhibition of 75% was observed at the latter experiments. The removal feasibility of ammonia nitrogen of 400 mg/L in electroplating wastewaters was evaluated by the symbiotic relationship of three different microorganisms. High concentrations of nitrate were effectively removed in a single anaerobic reactor containing alkalinity of 3000 mg/L as CaCO_3 and COD 1000 mg/L by the symbiotic relationship of SRB, SDRB, and DNR.

