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Mineralization of oxalic acid in biotechnological process with preliminary partial destruction by catalytic ozonation

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Abstract

Biotechnological process for removal of oxalic acid from the aqueous medium with its initial concentration, causing complete inhibition of microbial degradation (40 mmol/l), with preliminary partial destruction by catalytic ozonation was realized. To determine the optimal conditions for mineralization of oxalic acid during the biodegradation and catalytic ozonation kinetics of these processes was studied. The dependence of oxalic acid biodegradation rate on its concentration in the aqueous phase was investigated. It was found that increasing of oxalic acid concentration in the range of 2.5-10 mmol/l led to the growth of its specific biodegradation rate. Further increase of oxalic acid concentration slows its biodegradation, which stops completely upon acid content of 40 mmol/l. The dependence of oxalic acid mineralization rate during ozonation on catalyst (fine particles of activated carbon AG-5 with size 40-100 microns) concentration in the liquid phase was studied. It was shown that the ozonation process was advantageously carried out at catalyst concentration of 0.6 g/l, because further increase of its content did not lead to the growth of mineralization rate. The introduction of activated carbon in this amount in oxalic acid aqueous solution during ozonation increased the effective constant of mineralization rate of 23.5 times, while the degree of ozone utilization in the reactor for ozonation was increased 2 times. This led to significant reducing of ozone amount for partial oxalic acid mineralization before biodegradation process.

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