

A b s t r a c t

T i t l e	Inhibitory effects of antimicrobials on environmental nitrifying bacteria
A u t h o r	Shogo Ota
A d v i s o r	Professor Taro Urase

Nitrifiers, compared with heterotrophs, have slower growth rates due to lower energy conversion efficiencies in nitrification. Nitrification is often disturbed because nitrifiers are sensitive to the change in environmental conditions. Antimicrobials excreted from human after administration may disturb nitrification in the treatment of wastewater. This study focused on antimicrobials as toxic compounds capable of inhibiting nitrification. A series of nitrification inhibition tests were performed by comparing nitrification rates in the samples with/without antimicrobials. The nitrifiers used in the tests were obtained from activated sludge and river water. An isolate culture (*Nitrobacter winogradskyi*) was also used for comparison.

In the case of lower initial cell numbers in the sample, 50% inhibition of nitrification was observed even at lower concentrations of antimicrobials, whereas complete inhibition of nitrification was not observed due to the diversity of the nitrifiers even when high concentrations of the antimicrobials were added. This result suggests that the community of the nitrifiers in the activated sludge consists of insensitive and sensitive species to the antimicrobials.

The nitrification by *Nitrobacter winogradskyi* was completely suppressed by higher concentrations of antimicrobials than the thresholds concentration unlike in the case of activated sludge. However, *Nitrobacter winogradskyi* was insensitive against LVFX and GM based on 50% inhibitory concentration. Furthermore *Nitrobacter winogradskyi* was resistant to TC judging from the nitrification activity. Thus, *Nitrobacter winogradskyi* is considered to be less sensitive to antimicrobials compared with other species in the environment and in the activated sludge.

The nitrification by the nitrite oxidizing bacteria taken from all river water was completely suppressed by LVFX. On the other hand, the nitrification by the ammonia oxidizing bacteria taken only from clean rivers was completely suppressed. A slower nitrification even at higher antimicrobial concentration was observed for the environments consisting of wider community of nitrifiers, because some of the nitrifiers in the community might be insensitive to the target antimicrobials.