

Dissolution modeling of silver nanoparticles with influence of ammonia

김민현, 유창규[†]

경희대학교

(ckyoo@khu.ac.kr[†])

The discharge of silver nanoparticles (AgNPs) to wastewater treatment plant (WWTP) has been increased due to the wide use of AgNPs, which disrupt biological process in WWTP. In particular, since Ag^+ ion is more antibacterial due to its smaller size than AgNPs, it is required to predict dissolution of AgNPs. In this research, influence of ammonia among the other factors which affect the rate of AgNPs dissolution is only considered. First, this study proposed a prediction model of AgNPs initial concentrations that are the dominating parameter of its dissolution. On the other hand, in order to develop an AgNPs dissolution model with influence of ammonia, it was assume that the dissolution rate can be expressed in the first-order reaction. Since general first-order reaction cannot consider effect of ammonia for dissolution rate, the dissolution model was proposed using submodel which estimates the rate constant for ammonia concentration. Through the model, it is possible to predict Ag^+ ion and prevent disruption of biological process by Ag^+ toxicity in WWTP.

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