Effects of toxic compounds on nitrification and methods of reducing toxicity in coke plant wastewater treatment process

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Coke plant wastewater contains high concentration of toxic pollutants such as phenols, thiocyanate, ammonia and cyanide. Although the activated sludge processes are adapted for the treatment of this wastewater, the high concentration of pollutants is known to be toxic to the activated sludge. In this study, we evaluated effects of toxic pollutants on nitrification of microbial sludge obtained from the wastewater treatment facility of a coke plant in batch experiments. Ammonia below 500 mg/L did not cause substrate inhibition. Thiocyanate and ferric cyanide did not inhibit nitrification, while free cyanide above 0.2 mg/L seriously inhibited nitrification. The threshold concentration of phenol, cresol and chloro phenol were 200 mg/L, 100 mg/L and 20 mg/L, respectively. Meanwhile, several methods were also tested for reducing toxic effects of pollutants. Among them, the use of activated carbon showed good removal performance for phenol, and air purging method was efficient in removing free cyanide.