Effect of free cyanide on biological carbon and nitrogen removals in the pre-denitrification process treating cokes wastewater

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The pre-denitrification process treating cokes wastewater often faces with abrupt variation in influent free cyanide concentration. Therefore, we investigated the effect of free cyanide loading on the pre-denitrification process performance as well as how the free cyanide toxicity affects nitrifying bacteria community and population using terminal restriction fragment length polymorphism (T-RFLP) and quantitative real-time PCR (QPCR). During the loading of 50 mg/L free cyanide, the reactor performance was significantly inhibited, except for phenol biodegradation. Thiocyanate removal efficiency decreased to 40% and nitrification performance was sharply decreased to 8%. Denitrification performance also was inhibited and nitrite accumulation occurred. The Nitrosomonas europaea and nitrosa was the predominant ammonia oxidizing bacteria (AOB), but from higher than 30 mg/L cyanide loads period, the Nitrosospira sp. was occurred and gradually disappeared during recovery period.