Development of a novel ammonia removal method by using a marine bacterium

Yasushi Sugano and Makoto Shoda

Research Laboratory of Resources Utilization,
Tokyo Institute of Technology

Summary

Ammonia is a toxic and fouling gas. Therefore, ammonia removal from several environments, such as exhaust gas from fertilizer plants or garbage composting plants, is important. So far, several biodeodorization treatments to remove ammonia have been reported. Although autotrophic bacteria have been often used to construct ammonia removal system, it is difficult to prevent the contamination of other organisms as the growth rate is very slow compared with general heterotrophic bacteria. Low growth rate reveals low ammonia removal capacity or rate. Furthermore, contamination of other organisms results in the lowered ammonia removal performance of the system. Therefore, in this study, we propose a novel system to remove ammonia using *Vibrio alginolyticus* Oiso-1, which is a heterotrophic and halophilic bacterium. This strain grows fast and reveals high salt-tolerance compared with general microorganisms. Therefore, using this strain leads to decrease the risk of contamination and increase ammonia removal capacity. The growth pattern of this strain was investigated using ammonium sulfate for nitrogen source. The optimum salt concentration and carbon source for growth were 3 to 5% and glucose, respectively. In case of the salt concentration was lower than 2%, the number of viable cells was lower than those of optimum condition. Besides glucose, Oiso-1 could use sucrose as a carbon source but not use fructose and galactose. Using ammonia gas as a nitrogen source, two supplying patterns of inlet concentration of ammonia have been done. When ammonia supply concentration is constant (120 ppm), ammonia was removed for 7 days. When the supply concentration was stepwise increased, maximum removal concentration achieved 2400 ppm even though the optimum condition was not been determined yet. Therefore, it is considered that ammonia removal capacity could further raise by which the system would be improved. These results reveal that ammonia removal method by using Oiso-1 may be a promising method. It is important to clarify the ammonia removal mechanism as a future work.