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## Effect of Discharge Gas on Water Treatment Using Nanosecond Pulsed Power Discharges

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Nowadays, water pollution is one of the environmental problems. We have studied a sewage treatment using nanosecond pulsed power discharges. A surfactant was chosen as a treatment object because much surfactant occupies to domestic and industrial wastewater.

In order to reduce the costs for treatment, treatment using air gas as a discharge gas was studied. The treatments using streamer discharges in oxygen gas and simulated air gas, consisting of 20 % oxygen and 80 % nitrogen, were evaluated. The surfactant treatment was assessed by the height of foam in the reservoir, which was one of the characteristics. The 0.04 % surfactant solution of 1.0 L was treated for 80 minutes. The treatment by oxygen gas as discharge gas reduced the foam in reservoir faster than by using simulated air gas. Because ozone concentration produced in oxygen gas was higher, more OH radicals, having a stronger oxidizing power than ozone, would be produced and treat the surfactants. On the other hand, by the treatment in using simulated air gas, the foam in reservoir rapidly reduced for 0-20 minutes treatment. Then, absorbance at 220 nm of treated solution increased with treatment time. Because the absorption wavelength of nitric acid is approximately 220 nm, it suggested the production of nitric acid. Under the presence of low-concentrated  $\text{NO}_2$ , OH radicals would be actively produced; the foam decreased rapidly. However, the decrease of foam decelerated in simulated air gas for 20-80 minutes treatment. As  $\text{NO}_2$  concentration increased after 20 minutes, OH radical would be consumed for oxidation of  $\text{NO}_2$ , and nitric acid was produced. When nitrogen is contained in the discharge gas, the decrease of foam height became a discriminative variation in comparison with discharge gas consisting of only oxygen.

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