Mitsubishi Electric Develops Novel Water Treatment Technology using Gas/Liquid Interfacial Discharge

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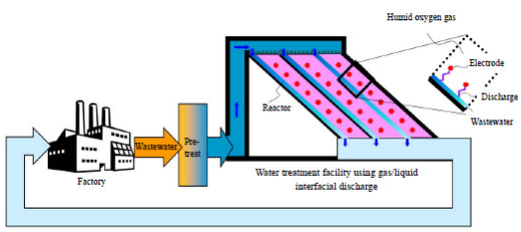
Enables sustainable low-cost recycling of industrial wastewater and sewage

Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has developed a novel water treatment technology that enables industrial wastewater and sewage to be recycled on a low-cost basis. The technology efficiently removes persistent organic substances in wastewater by using hydroxyl (OH) radicals generated through an electric discharge created at a gas/liquid interface. Mitsubishi Electric, aiming to contribute to sustainable water recycling, will apply the technology in an industrial wastewater reuse system that it hopes to commercialize by the fiscal year ending in March 2019.



System diagram of industrial wastewater reuse using gas/liquid interfacial discharge technology

The system's reactor uses several inclined plate electrodes in humid oxygen over which the wastewater flows. A pulsed corona discharge generated at the interface of the humid oxygen gas and wastewater produces OH radicals, a strong oxidant with an oxidation potential of 2.85 eV, compared to 2.07 eV for ozone. Due to the OH radical's high reactivity, persistent substances such as surfactants or dioxane decompose into carbon dioxide, water molecules and other inorganic compounds.

The effective generation of OH radicals makes the treatment twice as efficient as conventional advanced oxidation processes, such as the combined use of ozone and ultraviolet irradiation (O3/UV). Oxygen gas consumption is reduced significantly by up to 90% due to gas recycling. The modularized structure of the discharge units makes the equipment more simple and cost effective than the O3/UV method.

Population growth and improving living standards are expected to increase the global need for wastewater reuse. In the western United States, Singapore and other water-deficient regions, the installation of water reuse systems is already under way. Since water, like electricity, is an essential part of every society, there is a compelling need for low-cost water reuse systems.
Persistent organic substances dissolved in industrial wastewater discharged from various types of production facilities must be treated before reuse, but conventional water treatment methods, such as chlorination or ozonation, are usually ineffective. Special processes have been developed to remove these substances, such as adsorption with active carbon or decomposition using the O3/UV advanced oxidation process, but they are costly.
Mitsubishi Electric is now working to apply its technology in practical industrial wastewater and sewage reuse systems that are expected to help realize societies capable of sustainable water recycling.

This technology is currently under joint development with Yasushi Minamitani, an associate professor at Graduate School of Science and Engineering, Yamagata University.

About Mitsubishi Electric Corporation

With over 90 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of 4,054.3 billion yen (US$ 39.3 billion*) in the fiscal year ended March 31, 2014. For more information visit http://www.MitsubishiElectric.com *At an exchange rate of 103 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2014