Suppression of Formation of Dioxins in Combustion Gas of Municipal Waste Incinerators by Spray Water Injection

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Dioxins in the combustion gas of municipal solid waste incinerators (MSWIs) are resynthesized when the combustion gas passes from the outlet exaust gas boiler to the outlet gas duct. The objective of the study was to estimate if the suppression of the formation of dioxins depends on the inlet gas temperature and diameter and/or temperature of droplet spray water using an actual incinerator operation data. The dioxin formation and/or the quenching temperature is revealed using the Altwicker theory equation with the information of inlet gas temperature and droplet spray water. The evaporation rate of a spray water droplet also can be estimated using the Mizutani theory. The highest dioxin formation was found at 350°C; thereafter, it decreased quickly. When an area of 500 μm for droplet-formed dioxins is defined as 100%, the values of formed dioxins for 400, 300, 200 and 100 μm droplet areas are estimated as 71, 41, 25 and 18%, respectively. It is revealed that the smaller size of droplet spray water and lower inlet gas temperature enable the decrease in dioxin formation. The decreased dioxin formation and/or the lower quenching temperature is revealed using the Altwicker theory equation with the information of inlet gas temperature and droplet spray water size.