

Application of wet electrostatic precipitation in wastewater treatment

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The electrostatic precipitator (ESP) has commonly been used for the separation of particulate matter from off-gas. This project discusses applications of corona discharge in wastewater treatment.

A tube type electrostatic precipitator was equipped with a brush discharge electrode. The current/voltage characteristic of brush discharge electrodes differs significantly from wire type discharge electrodes. For comparable operation voltage the corona current is improved by nearly four times the corona current observed with wire type electrodes. Modeling of current/voltage characteristics confirms the effect of brush wire diameter on corona onset field intensity and onset voltage.

As expected, corona discharge with brush electrodes produces significant portions of ozone, well comparable with ozone generation with air. Besides, nearly five percent of the supplied power is transferred into 254 nm UV-radiation. Radiation intensity was quantified with a Rahn actinometer.

The electrode-specific features may probably give wet electrostatic precipitators access to applications in off-gas purification as well as wastewater treatment.

The effect of corona discharge with brush electrodes on degradation and mineralization of wastewater constituents was investigated with acetone, EDTA and phenol. The test constituents did undergo degradation as well as mineralization.