Decomposition Characteristics of Acetone in an Atmospheric DC Corona discharge

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1. Introduction

Volatile Organic Compounds (VOCs) has a possibility of the generating suspended matter (SPM) and photochemical oxidant.

Objective

We clarify the decomposition process of acetone by an atmospheric DC corona discharge in nitrogen-oxygen mixture at atmospheric pressure.

We examine the influence of oxygen concentration in a background gas on decomposition characteristics of acetone in the corona discharge, from the detailed investigation of mass balance for carbon atoms, the yield and selectivity of CO₂.

2. Experimental apparatus and conditions

Objective

We focus on acetone, which is an organic solvent used for semiconductor cleaning etc., has an affect on the malfunction of biological and central nervous system.

Approaches to decompose VOCs using discharge plasma has attracted attention.

3. Results and discussion

Concentration variations of acetone and by-products

Before discharge

CH₃OH : 5019cm⁻¹

C=O : 2050~2220cm⁻¹, 1206cm⁻¹

After discharge

CH₃OCH₃ : 3019cm⁻¹

C=O : 1715cm⁻¹, CH₃ : 981cm⁻¹

4. Conclusions

CO₂ yield and selectivity are shown.

The oxygen concentration in the background gas does not influence the deposition on the electrodes and walls.

Acetone is chiefly inverted to CO₂ via CO at high oxygen concentration and via CO and CH₄ at low oxygen concentration.

The CO₂ yield and selectivity have tendencies to increase with decreasing the oxygen concentration.