

Title : Seasonal Variations of VOC Emissions and Secondary Aerosol and Ozone Formation in Rice Field

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Major : Chemistry

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Type of presentation : Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
 Poster (กรณี นำเสนอผลงานปัญหาพิเศษ/การค้นคว้าอิสระ)
 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

Air pollution is a significant factor impacting human health and the environment, especially from pollutants originating from volatile organic compounds (VOCs). This research aims to analyze the relationship between VOCs and the formation of secondary aerosols and ozone in the atmosphere, with a focus on evaluating the impact of VOCs released from plants. These VOCs serve as precursors in the formation of secondary aerosols and ozone. The data obtained from this study were used to calculate the Ozone Formation Potential (OFP) and Secondary Organic Aerosol Potential (SOAP) to assess environmental risks and support the development of future pollution control measures. Air samples were collected from rice fields in Khon Kaen province, northeastern Thailand, in 2023, using thermal desorption unit-gas chromatography-mass spectrometry (TDU-GC-MS) techniques, covering summer, rainy, and winter seasons. The analysis revealed that oxygenated VOCs were the most abundant group (39%), followed by alkanes (37%), aromatics (18%), alkenes (5%), and haloalkanes (1%). Calculations of OFP and SOAP showed that phenol had the highest OFP value in summer, while isoprene and isoprene derivatives dominated in the rainy and winter seasons, respectively. Furthermore, phenol exhibited the highest SOAP value across all three seasons, followed by benzene, isoprene, and toluene. The seasonal variation in VOC emissions from rice fields is closely related to environmental factors that vary by season, such as temperature, humidity, sunlight, and the biological characteristics of rice plants.

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