

**PURIFICATION OF WASTEWATER BY CLOUD POINT EXTRACTION
PROCESS: EFFECT OF MOLECULAR STRUCTURE OF SURFACTANT**

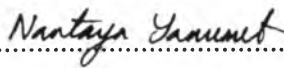
Sasisoam Singh

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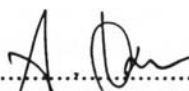
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Process; Effect of Molecular Structure of Surfactant
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Program: Petrochemical Technology
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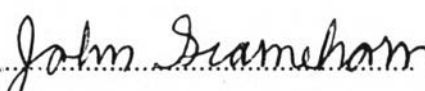
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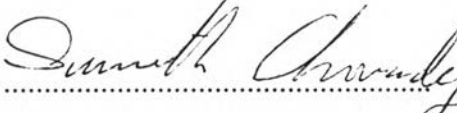

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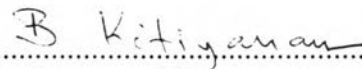
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ABSTRACT

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Cloud point extraction (CPE) is considered as a new technique that takes advantage of the nonionic surfactant clouding phenomenon to remove organic compounds from wastewaters. Molecular structure of nonionic surfactant, such as the number of carbon atoms in the alkyl chain, and the ethylene oxide (EO) strongly affected the cloud point, which is the main factor that determines CPE efficiency. The aim of this work was to study the effect of molecular structure of surfactant on the extraction efficiency. The EO number of the alcohol ethoxylate (AE) was varied in the range of 5-12 at a given number of carbon atoms ranging from 12-14. Aqueous solutions of solutes (phenol and *p*-cresol) and nonionic surfactant were homogeneously prepared and kept at various operating temperatures between 60 and 80 °C in an isothermal water bath. The results showed that the CPE efficiency increased with increasing number of carbon atoms in the alkyl chain. A change in EO number had an insignificant effect on CPE efficiency. Increasing an operating temperature resulted in increasing organic solute extraction performance but decreasing coacervate volume. The salinity effect was also investigated by the addition of sodium chloride into the aqueous solutions. It was found that the CPE efficiency increased with increasing sodium chloride concentration.

บทคัดย่อ

ศศิโสสม ชิงห์: การบำบัดน้ำเสียด้วยวิธีการสกัดแบบขุ่น: ผลกระทบของโครงสร้างโมเลกุลของสารลดแรงตึงผิว (Purification of Wastewater by Cloud Point Extraction Process: Effect of Molecular Structure of Surfactant) อาจารย์ที่ปรึกษา: ศ.ดร. สมชาย โอสุวรรณ, ศ.ดร. จอห์น เอฟ สแกมาฮอร์น (Prof. John F. Scamehorn) และ รศ.ดร.ธีรศักดิ์ ฤกษ์สมบูรณ์ 84 หน้า ISBN 974-9937-01-5

การสกัดแบบขุ่นเป็นเทคนิคใหม่ที่ใช้กำจัดสารอินทรีย์ที่ละลายอยู่ในน้ำเสียโดยนำข้อดีของปรากฏการณ์ขุ่นของสารลดแรงตึงผิวแบบไม่มีประจุมาใช้ ลักษณะโครงสร้างโมเลกุลของสารลดแรงตึงผิวแบบไม่มีประจุ เช่น จำนวนคาร์บอนในสายโซ่อัลคิล และ จำนวนกลุ่มเอทิลีนออกไซด์ มีผลอย่างมากต่อการเปลี่ยนแปลงของจุดขุ่น ซึ่งเป็นตัวบ่งชี้ถึงประสิทธิภาพของการสกัดแบบขุ่น งานวิจัยนี้ได้ศึกษาผลกระทบของโครงสร้างโมเลกุลของสารลดแรงตึงผิวที่มีต่อประสิทธิภาพของการสกัดแบบขุ่น จำนวนเอทิลีนออกไซด์ของสารลดแรงตึงผิวแบบไม่มีประจุชนิดแอลกอฮอล์เอทอกซิลเลทที่มีค่าในช่วง 5 ถึง 12 กลุ่ม โดยมีจำนวนคาร์บอนตั้งแต่ 12 ถึง 14 อะตอม ได้ทำการทดลองโดยเตรียมสารละลายของฟีนอลและพาราครีซอลที่ใช้เป็นตัวถูกละลายในสารลดแรงตึงผิวแบบไม่มีประจุโดยคงอุณหภูมิการสกัดในอ่างน้ำที่ปรับอุณหภูมิคงที่ระหว่าง 60 และ 80 องศาเซลเซียส จากการทดลองพบว่าประสิทธิภาพของการสกัดแบบขุ่นเพิ่มขึ้นเมื่อเพิ่มจำนวนคาร์บอนในสายโซ่อัลคิล การเปลี่ยนแปลงจำนวนกลุ่มเอทิลีนออกไซด์แทบไม่มีผลกระทบต่อประสิทธิภาพการสกัด รวมทั้งได้ศึกษาผลกระทบของเกลือ โดยการเติมโซเดียมคลอไรด์ลงในสารละลาย พบว่าประสิทธิภาพการสกัดเพิ่มขึ้นเมื่อเพิ่มความเข้มข้นของโซเดียมคลอไรด์

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