

**ALCOHOL-FREE MICROEMULSION FORMATION
WITH PERCHLOROETHYLENE AND A GEMINI SURFACTANT**

Ms. Sangaroon Aowiriyakul

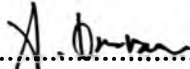
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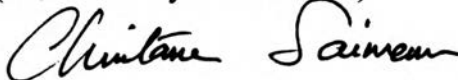
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ABSTRACT

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The Dowfax8390/perchloroethylene(PCE)/octanoic acid system formed an upper phase microemulsion (type I). The phase behavior of the system showed that the inversion of microemulsion from type I to III (or IV), and II occurred by scanning with CaCl_2 concentration. Gel formation occurred before formation of type II microemulsion at low surfactant concentration due to the presence of octanoic acid (co-surfactant) and high concentration of CaCl_2 electrolyte, and disappeared at high surfactant concentration. The presence of gel prevented the use of surfactant at low concentration for microemulsion formation. At fixed surfactant concentration, and 24 °C, the reduction of octanoic acid concentration had little effect on gel formation. Similar effects occurred with the temperature at 35 °C and 45 °C or with mixed electrolyte ($\text{CaCl}_2 + \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$). The solubilization parameters of oil and water in the micellar phase were studied to select the optimum system for surfactant enhanced aquifer remediation (SEAR). As surfactant concentration increased, the optimum solubilization parameter increased to the maximum, and then decreased beyond the optimum surfactant concentration. The maximum solubilization parameter was the optimum system for PCE removal. The solubilization parameter decreased with decreasing co-surfactant, and increasing temperature.

บทคัดย่อ

แสงอรุณ เอาวิริยะกุล : การเกิดไมโครอิมัลชันที่ปราศจากอัลกอฮอล์จากเปอร์คลอโรเอธิลีนและเจมิโนเซอร์แฟคแตนท์ (Alcohol-Free Microemulsion Formation with Perchloroethylene and a Gemini Surfactant) อ. ที่ปรึกษา: ศ. ดร. เจฟฟรีย์ เอช ฮาเวล (Prof. Dr. Jeffrey H. Harwell) และผศ. ดร. จินตนา สายวรรณ 117 หน้า ISBN 974-638-501-1

ไมโครอิมัลชันที่เฟสชั้นบน (แบบที่ 1) เกิดจากระบบที่ประกอบด้วยดาวแฟกซ์ 8390 เปอร์คลอโรเอธิลีน(พีซีอี) และกรดออกตาโนอิก พฤติการณ์ของเฟสแสดงการเปลี่ยนชนิดของไมโครอิมัลชันจากแบบที่ 1 ไปสู่แบบที่ 3 (หรือแบบที่ 4) และไปสู่แบบที่ 2 เกิดขึ้นจากการเปลี่ยนความเข้มข้นของเกลือแคลเซียมคลอไรด์ การเกิดเจลในไมโครอิมัลชันแบบที่ 2 เกิดขึ้นที่ความเข้มข้นของเซอร์แฟคแตนท์ต่ำเนื่องจากการมีกรดคาโนอิก(เซอร์แฟคแตนท์ร่วม) และความเข้มข้นของเกลือแคลเซียมคลอไรด์มีค่าสูง และเจลดหายไปเมื่อความเข้มข้นของเซอร์แฟคแตนท์มีค่าสูงๆเนื่องจากการลดเกลือที่ใช้ลง การมีเจลดเกิดขึ้นชัดเจนจากการใช้เซอร์แฟคแตนท์ที่ความเข้มข้นต่ำ เมื่อให้ความเข้มข้นของเซอร์แฟคแตนท์คงที่ และอุณหภูมิที่ 24 °ซ การลดกรดออกตาโนอิกลง มีผลต่อการเกิดเจลงเพียงเล็กน้อย การใช้อุณหภูมิที่ 35°ซ และ 45°ซ หรือการใช้เกลือผสม (แคลเซียมคลอไรด์ และแมกนีเซียมคลอไรด์ เฮกซาไฮเดรต) ก็ให้ผลในทำนองเดียวกัน การศึกษาค่าตัวแปรการละลายของน้ำมันและน้ำในเฟสของไมเซลเพื่อใช้เลือกระบบที่เหมาะสมเมื่อใช้เซอร์แฟคแตนท์เพิ่มการแก้ไขพื้นดิน(เอส อี เอ อาร์) เมื่อความเข้มข้นของเซอร์แฟคแตนท์เพิ่มขึ้น ค่าตัวแปรการละลายที่เหมาะสมเพิ่มขึ้นถึงค่าสูงสุดและลดลงเมื่อความเข้มข้นของเซอร์แฟคแตนท์เพิ่มขึ้นเกินค่าเหมาะสม ค่าตัวแปรการละลายที่เหมาะสมเป็นค่าที่เหมาะสมของระบบที่ใช้จัดพีซีอี ค่าตัวแปรการละลายลดลงตามปริมาณเซอร์แฟคแตนท์ร่วมที่ลดลง การใช้เกลือผสม และการเพิ่มอุณหภูมิ

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