

DISSOLUTION KINETICS OF FRACTIONATED ASPHALTENES

Ms. Waraporn Pumpaisanchai

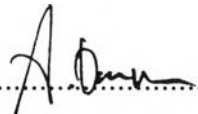
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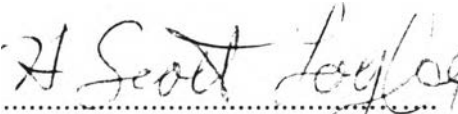
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ABSTRACT

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The pentane-insoluble asphaltene was fractionated into two fractions with different polarities which were formulated using dichloromethane-heptane binary solvent at 25% v/v for fraction 1 and 5% v/v for fraction 2. The kinetic study was conducted in a differential reactor flow system. Two amphiphiles, dodecylbenzenesulfonic acid (DBSA) and nonylphenol (NP), were used with n-heptane as alkane solvent. The results showed that both of the mass transfer processes and surface reactions played an important role for the dissolution of fractionated asphaltenes. The dissolution rate followed the Langmuir-Hinshelwood kinetics with respect to the amphiphile concentration. The apparent activation energies were 5.87, 10.77, 2.41 and 4.11 kcal/mole for the dissolution of asphaltene fraction 1 in 10wt% DBSA (AspF1-10DBSA), asphaltene fraction 1 in 20wt% NP (AspF1-20NP), asphaltene fraction 2 in 10wt% DBSA (AspF2-10DBSA), and asphaltene fraction 2 in 20wt% NP (AspF2-20NP), respectively.

บทคัดย่อ

วราภรณ์ พุ่มไพศาลชัย : การศึกษาจลนศาสตร์การละลายของแอสฟัลทีนซึ่งแยกลำดับส่วน (Dissolution Kinetics of Fractionated Asphaltenes) อ.ที่ปรึกษา : ศ. ดร. เอช สกอตต์ ฟอกเลอร์ และ ดร.พรพจน์ เปี่ยมสมบูรณ์ 47 หน้า ISBN 974-636-048-5

แอสฟัลทีน ส่วนที่ไม่ละลายในเพนเทน ถูกแยกเป็นสองส่วน และปรับความเป็นขี้ผึ้งให้ต่างกัน โดยใช้ตัวทำละลายผสมของไดคลอโรมีเทนและเฮปเทน ที่ความเข้มข้นร้อยละ 25 โดยปริมาตร สำหรับ แอสฟัลทีน ลำดับส่วนที่หนึ่ง และที่ความเข้มข้นร้อยละ 5 โดยปริมาตร สำหรับแอสฟัลทีน ลำดับส่วนที่สอง

ในการศึกษาจลนศาสตร์ของการละลาย ทำโดยใช้ระบบการไหลผ่านเครื่องปฏิริยาแบบคิฟเฟอร์เรนเซียล สารละลายที่ใช้ในการศึกษาประกอบด้วยสารลดแรงตึงผิว สองชนิด คือ กรดโคเดซิลเบนซีน ซัลโฟนิค และ โนนิลฟีนอล ผสม ในตัวทำละลายเฮปเทน ผลการทดลองแสดงให้เห็นว่ากระบวนการถ่ายโอนมวลสาร และการเกิดปฏิริยาที่ผิวของแอสฟัลทีนมีบทบาทสำคัญต่อการละลายของแอสฟัลทีนซึ่งแยกลำดับส่วน อัตราการละลายของแอสฟัลทีน จะขึ้นอยู่กับความเข้มข้นของสารลดแรงตึงผิวที่ใช้ในสารละลาย ซึ่งเป็นไปตามกฎจลนศาสตร์ของ แลงเมียร์-ฮินเชลล์วูด แอสฟัลทีนมีค่าพลังงานกระตุ้นของการละลาย เป็น 5.87, 10.77, 2.41 และ 4.11 กิโลแคลอรีต่อโมล สำหรับกรณีการละลายของ แอสฟัลทีนลำดับส่วนที่หนึ่งในสารละลายซึ่งมีกรดโคเดซิลเบนซีนซัลโฟนิค ร้อยละ 10 โดยน้ำหนัก, แอสฟัลทีนลำดับส่วนที่หนึ่งในสารละลายซึ่งมีโนนิลฟีนอล ร้อยละ 20 โดยน้ำหนัก, แอสฟัลทีนลำดับส่วนที่สองในสารละลายซึ่งมีกรดโคเดซิลเบนซีนซัลโฟนิค ร้อยละ 10 โดยน้ำหนัก และ แอสฟัลทีนลำดับส่วนที่สองในสารละลายซึ่งมีโนนิลฟีนอล ร้อยละ 20 โดยน้ำหนัก ตามลำดับ

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