

INVESTIGATIONS INTO ASPHALTENE DEPOSITION

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ABSTRACT

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The magnitude of asphaltene deposition problems in the oil industry has significantly increased because, with time, reservoirs of conventional light crude oil have been depleted and oil exploration is now driven towards heavier crude oil reservoirs which generally have higher amount of asphaltenes. This research is focused on developing an understanding of the precipitation and deposition of asphaltenes. This work shows that when the refractive index technique is used to study asphaltene precipitation, water present in the crude oil can yield misleading results by indicating the onset of asphaltene precipitation, when actually asphaltenes have not yet precipitated. The results for the onset of asphaltene precipitation obtained from the refractive index method were confirmed by using microscopy. A capillary flow technique is used for measuring asphaltene deposition by monitoring the change in pressure drop when a mixture of crude oil and precipitant is pumped through the capillary. The experimental setup is an improvement over previous systems for asphaltene deposition due to a novel design of the mixing system, which reduces the residence time between the mixing of crude oil and heptane and their entrance into the capillary, thereby eliminating the precipitation of asphaltenes before entering the capillary. Deposition experiments prove that at higher concentration of the precipitant, the rate of deposition is higher.

บทคัดย่อ

ทาบิช มักบูล : การตรวจหาเหตุผลการตกตะกอนของแอสฟัลทีน (Investigations into Asphaltene Deposition) อ. ที่ปรึกษา ศศ. ดร. ปมทอง มาลากุล ณ อยุธยา, ศ. เศษ สกอตต์ ฟอกเลอร์ 35 หน้า ISBN 974-9937-85-6

ปัญหาการสะสมของตะกอนแอสฟัลทีนในอุตสาหกรรมน้ำมัน มีความสำคัญเพิ่มขึ้นทุกขณะ เนื่องจากในปัจจุบันน้ำมันเบนซินสามารถพบได้น้อยลง การสำรวจในปัจจุบันที่พบส่วนใหญ่จะเป็นน้ำมันหนักซึ่งมีปริมาณของแอสฟัลทีนในปริมาณสูง ในการศึกษาที่มุ่งที่จะพัฒนาและทำความเข้าใจการตกตะกอนและการสะสมของตะกอนแอสฟัลทีน จากการศึกษาการตกตะกอนโดยใช้วิธีดัชนีการสะท้อนแสง การมีน้ำปนอยู่ในน้ำมันจะส่งผลให้ผลการทดลองที่ได้มีความคลาดเคลื่อนในการหาจุดเริ่มต้นของการตกตะกอนแอสฟัลทีน โดยที่ความเป็นจริงแล้วแอสฟัลทีนยังไม่ได้ตกตะกอน ณ จุดนี้ จุดเริ่มต้นของการตกตะกอนของแอสฟัลทีนโดยวิธีดัชนีสะท้อนแสงได้รับการยืนยันได้การใช้กล้องจุลทรรศน์ การศึกษาการไหลในท่อขนาดเล็กถูกใช้เพื่อศึกษาการสะสมของตะกอนแอสฟัลทีน โดยการติดตามการเปลี่ยนแปลงของความดันที่ลดลง เมื่อของผสมระหว่างน้ำมันดิบกับสารที่เหนียวนำการตกตะกอนถูกบีบเข้าไปสู่ท่อขนาดเล็ก การจัดเตรียมการทดลองถูกพัฒนาจากระบบก่อนหน้า โดยการพัฒนากระบวนการผสมเพื่อที่จะลดเวลาที่ของผสมอยู่นอกท่อขนาดเล็ก ดังนั้นด้วยวิธีนี้จะกำจัดปัญหาการตกตะกอนของแอสฟัลทีนก่อนเข้าไปสู่ท่อขนาดเล็ก จากการศึกษาด้วยวิธีการไหลด้วยท่อขนาดเล็กพบว่าถ้าความเข้มข้นของสารที่เหนียวนำการตกตะกอนสูง อัตราการสะสมของตะกอนจะสูงตามไปด้วย

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