

# EVALUATION RISKS OF WAX DEPOSITION FOR THAI CRUDE OIL

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## ABSTRACT

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Wax deposition is currently a problem in petroleum production in Thailand. The resulting deposits can generate pressure drop in production pipeline and eventually cause plugging. The objectives of this research work are; to study the characteristics and properties of wax in Thai crude oil from Lankrabue and U-Thong oil fields by using DSC, Sim-Dist GC, and ASTM apparatus, and to investigate how to solve the problem by adding wax inhibitors, poly (ethylene-co-vinyl acetate) (EVA), and PMMA. The result indicates that initial boiling point, wax content, WAT, WDT, and pour point of Lankrabue crude oil are higher than that of U-Thong crude oil. For the separated fractions, macro- and micro-crystalline wax as obtained employing both the referred method and modified method in this work were free from asphaltene. Therefore, in future work, the modified method to separate the wax fractions from crude oil which is less time consuming than the referred method can be used to study more about the effect of wax inhibitors. In addition, it was found that when Lankrabue and U-Thong crude oils were treated by PMMA, VH grade, at 1,000 ppm, and EVA, 25 %VA, at 200 ppm, respectively, maximum reduction of pour point was obtained.

## บทคัดย่อ

วิสันต์ ศรีศิริวิไลกุล: การประเมินความเสี่ยงของการสะสมตัวของไขสำหรับแหล่งน้ำมันดิบ (Evaluation Risks of Wax Deposition for Thai Crude Oil) อ. ที่ปรึกษา: รศ. กัญญา บุญเกียรติ รศ.ดร. จินตนา สายวรรณ และ ศ.ดร. เอ็มมานูเอล เบฮาร์ 66 หน้า ISBN 974-9651-20-0

การสะสมตัวของไขเป็นปัญหาต่างๆไปในการผลิตปิโตรเลียมในประเทศไทย ผลของการสะสมตัวของไขสามารถทำให้เกิดความดันที่ลดต่ำลงในท่อที่ใช้ผลิต และท้ายที่สุดเป็นเหตุให้เกิดการอุดตัน วัตถุประสงค์ของงานวิจัยนี้的首要คือศึกษาลักษณะจำเพาะและคุณสมบัติของน้ำมันดิบในไทยที่ได้จากแหล่งน้ำมันดิบลานกระบือและอุทองโดยใช้เครื่องมือวิเคราะห์ได้แก่ ดีเอสซี ซิม-คิสท์ จีซี และ เครื่องมือวิเคราะห์ตามมาตรฐานของ เอเอสทีเอ็ม และอย่างที่สองคือค้นหาวิธีการแก้ปัญหาโดยใช้สารยับยั้งการเกิดไขอันได้แก่ อีวีเอ และ พีเอ็มเอ็มเอ ซึ่งผลได้ชี้ให้เห็นว่าจุดเดือดเริ่มต้น ปริมาณของไข อุณหภูมิที่ทำและไม่ทำให้เกิดไข และ จุดไหลเทของน้ำมันดิบจากแหล่งลานกระบือนั้นสูงกว่าน้ำมันดิบจากแหล่งอุทอง สำหรับส่วนองค์ประกอบของไขที่แยกจากน้ำมันดิบนั้นพบว่า ไขที่เป็นไฮโดรคาร์บอนชนิดโซ่ตรง และ โซ่กิ่ง ซึ่งได้มาจากวิธีที่อ้างอิงจากงานวิจัยก่อนหน้านี้กับวิธีที่ปรับเปลี่ยนขึ้นมาจากวิธีดังกล่าวในงานวิจัยนี้ ปราศจากแอสฟัลทีน เพราะฉะนั้นสามารถใช้วิธีที่ปรับเปลี่ยนขึ้นมาเพื่อที่จะแยกองค์ประกอบของไขจากน้ำมันดิบซึ่งใช้เวลาในการแยกน้อยกว่าวิธีเดิมนี้ในการศึกษาเพิ่มเติมถึงผลกระทบของสารยับยั้งการเกิดไข นอกจากนี้ยังพบว่าน้ำมันดิบลานกระบือซึ่งเดิม พีเอ็มเอ็มเอ เกรด วีเอช ในความเข้มข้น 1,000 พีพีเอ็ม และน้ำมันดิบอุทองซึ่งเดิม อีวีเอ ซึ่งมี VA อยู่ 25% ในความเข้มข้น 200 พีพีเอ็ม มีจุดไหลเทลดลงสูงที่สุด

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