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**THE EFFECT OF PRECIPITANT ON  
APHALTENE AGGREGATION AND DEPOSTION**

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A Thesis Submitted in Partial Fulfilment of the Requirements  
for the Degree of Master of Science  
The Petroleum and Petrochemical College, Chulalongkorn University  
in Academic Partnership with  
The University of Michigan, The University of Oklahoma,  
Case Western Reserve University, and Institut Français du Pétrole  
2013

T. 2.837289X

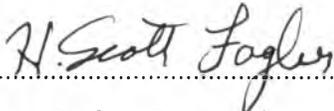
**Thesis Title:** The Effect of Precipitant on Asphaltene Aggregation and Deposition  
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**Program:** Petrochemical Technology  
**Thesis Advisors:** Prof. H. Scott Fogler  
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Accepted by The Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfilment of the requirements for the Degree of Master of Science.

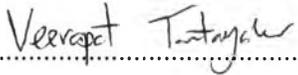
  
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## ABSTRACT

5471030063: Petrochemical Technology Program

Wattana Chaisoontornyotin: The Effect of Precipitant on Asphaltene Aggregation and Deposition.

Thesis Advisors: Prof. H. Scott Fogler and Asst. Prof. Pomthong

Malakul 50 pp.

Keywords: Asphaltene/ Precipitant/ Aggregation/ Deposition

Asphaltenes are fraction of crude oil that cause serious problems in the petroleum industry. The goal of this study is to compare trends in asphaltene aggregation and deposition. More specifically, to relate the asphaltene aggregation particle-particle collision efficiency to the deposition rate by varying the precipitant carbon number and concentration. Establishing a relationship between the aggregation and deposition behavior of asphaltenes will provide valuable insight into both processes. The amount of asphaltenes that are destabilized with different precipitants and at various concentrations was obtained from centrifugation experiments, and the collision efficiency for asphaltene aggregation was calculated using a geometric population balance model. The results revealed that for a fixed volume fraction of precipitant, the asphaltene-asphaltene collision efficiency decreased with higher carbon number precipitants. Decreasing the precipitant concentration resulted in lower collision efficiency. A correlation between collision efficiency and mixture solubility parameter was established for the oil used and different precipitants. In order to investigate asphaltene deposition behavior using different precipitants, the deposition rate was measured using capillary flow. The consistency of the capillary deposition apparatus has been improved by considering the initial inner diameter of the capillary. Scanning electron microscopy (SEM) images of the asphaltene deposits were obtained and used to assess the mixing of oil and precipitant.

## บทคัดย่อ

วรรณะ ชัยสุนทรโยธิน : ผลของสารตกตะกอนต่อการรวมตัวและการเกาะติดของ แอลฟัลทีน (The Effect of Precipitant on Asphaltene Aggregation and Deposition) อาจารย์ที่ปรึกษา: ศาสตราจารย์ ดร. เอช สก๊อตต์ ฟอกเลอร์ และผู้ช่วยศาสตราจารย์ ดร. ปมทอง มาลากุล ณ อยุธยา 50 หน้า

แอลฟัลทีนคือส่วนประกอบในน้ำมันดิบที่ก่อให้เกิดปัญหาสำคัญในอุตสาหกรรมปิโตรเลียม จุดประสงค์ของงานวิจัยนี้คือ ทำการเปรียบเทียบแนวโน้มของการรวมตัวและการเกาะติดของแอลฟัลทีนและเชื่อมโยง collision efficiency ระหว่างอนุภาคในการรวมตัวของแอลฟัลทีนกับอัตราการเกาะติดของแอลฟัลทีน โดยทำการเปลี่ยนจำนวนคาร์บอนและความเข้มข้นของสารตกตะกอน ทั้งนี้ ปริมาณแอลฟัลทีนซึ่งถูกทำให้ไม่เสถียรโดยใช้สารตกตะกอนและความเข้มข้นต่างๆสามารถหาได้จากการทดลองโดยใช้การเหวี่ยง ส่วน collision efficiency ของการรวมตัวของแอลฟัลทีนนั้นสามารถคำนวณได้จากการใช้โมเดล geometric population balance ผลจากการทดลองแสดงให้เห็นว่าที่ความเข้มข้นคงที่ collision efficiency ระหว่างแอลฟัลทีนลดลงตามการเพิ่มจำนวนคาร์บอนของสารตกตะกอน ส่วนการลดความเข้มข้นของสารตกตะกอนส่งผลให้ collision efficiency มีค่าลดลง ความสัมพันธ์ระหว่าง collision efficiency และ solubility parameter ของของผสมสำหรับน้ำมันที่ใช้และสารตกตะกอนต่างๆถูกสร้างขึ้นสำหรับน้ำมันและสารตกตะกอนต่างๆ ที่ใช้ นอกจากนี้ พฤติกรรมการเกาะติดของแอลฟัลทีนโดยใช้สารตกตะกอนต่างๆ ได้ถูกศึกษาโดยวัดอัตราการเกาะติดด้วยอุปกรณ์การไหลในแคปิลารี และทำการปรับปรุงความสอดคล้องของการวัดการเกาะติดในแคปิลารี โดยการคำนึงถึงขนาดเส้นผ่านศูนย์กลางภายในของแคปิลารี ภาพของแอลฟัลทีนที่เกาะติดที่ถ่ายโดยใช้กล้องจุลทรรศน์อิเล็กตรอนถูกนำมาใช้ในการประเมินการผสมของน้ำมันและสารตกตะกอน

## ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my advisor, Prof. H. Scott Fogler for giving me a great opportunity and a memorable experience to do research at the University of Michigan. I also would like to thank my co-advisor, Asst. Prof. Pomthong Malakul for being helpful in my thesis and giving advices to me. Moreover, I am very grateful to have Prof. Sumaeth Chavadej and Dr. Veerapat Tantayakom as my thesis committee.

I would also like to thank the group members, Michael Hoepfner, Nasim Haji Akbari Balou, Claudio Vilas Boas Favero, and Nina Gasbarro, for numerous helpful suggestions and valuable discussion. In addition, I would like to thank Phitsanu Teeraphakul for helping in performing onset experiments.

The author would like to thank the sponsors of the University of Michigan Industrial Affiliates Program for financial support. Program members include the following: Chevron, ConocoPhillips, MSi Kenny, NALCO, BP, Shell, Statoil and Total. I am also grateful for the scholarship and funding of the thesis work provided by the Petroleum and Petrochemical College; and the National Center of Excellence for Petroleum, Petrochemicals, and Advanced Materials, Thailand

I would like to acknowledge and thank the University of Michigan staffs: Laura Bracken, Susan Hamlin, Michael Africa, Shelley Fellers, and Pablo Lavallo who provided technical support, departmental and visiting scholar business.

I would like to give special thanks to Thanawat Thanthong for many helpful discussions and Thammaporn Somkhan for contributed to proofread many of my manuscript.

Finally, I would like to give a personal thank to my family for their support and encouragement. Thank you very much.

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