

**PARTICULATE SOIL DETERGENCY : PERFORMANCE AND
MECHANISM OF REMOVAL OF HYDROPHOBIC PARTICULATES**

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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

2006

ISBN 974-9937-61-9

Thesis Title: Particulate Soil Detergency: Performance and Mechanism of Removal of Hydrophobic Particulates
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Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfillment of the requirements for the Degree of Master of Science.

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ABSTRACT

4771006063: Petrochemical Technology Program

Chairat Chadavipoo: Particulate Soil Detergency: Performance and Mechanism of Removal of Hydrophobic Particulates

Thesis Advisors: Assoc. Prof. Sumaeth Chavadej, Prof. John F.Scamehorn, 104 pp. ISBN 974-9937-61-9

Keywords: Particulate soil/ Detergency/ Carbon black

In this research, the effects of type and concentration of surfactant on particulate soil removal from two types of fabrics were investigated. Carbon black was selected as a model hydrophobic particulate and two types of fabrics were used, polyester and cotton. The detergency experiments of carbon black removal were carried out using two surfactants, sodium dodecyl sulfate (SDS) and cetyltrimethyl ammonium bromide (CTAB). To gain a better understanding of the mechanism of particulate soil detergency, the adsorption isotherms of surfactant, zeta potentials and contact angles were measured at different solution pH values. For any given type of fabric and surfactant, % particulate soil removal increased with increasing solution pH and the maximum was found around pH 11. For any given type of fabric and solution pH, SDS was found to exhibit better particulate soil removal than CTAB. Carbon black was removed from polyester better than from cotton since the zeta potential on the polyester surface is more negative than that on the cotton. From the result of contact angle measurements, the wettability of SDS onto carbon black is lower than that of CTAB. CTAB has a higher adsorption onto carbon black than SDS.

บทคัดย่อ

ชัยรัตน์ ขญาวิภู: การกำจัดสิ่งสกปรก,วิธีการและกลไกของการกำจัดอนุภาคของแข็งที่ไม่ชอบน้ำ (Particulate Soil Detergency : Performance and Mechanism of Removal of Hydrophobic Particulates) อ. ที่ปรึกษา : รศ.ดร. สุเมธ ชวเดช และ ศ.ดร. จอห์น เอฟ สกามีฮอร์น 104 หน้า ISBN 974-9937-61-9

งานวิจัยนี้ผลกระทบของชนิดและความเข้มข้นของสารลดแรงตึงผิวในการชำระล้างคราบสกปรกของอนุภาคของแข็งบนผ้า 2 ชนิดได้ถูกศึกษา คาร์บอนแบล็กถูกนำมาใช้เป็นตัวจำลองคราบสกปรกของอนุภาคของแข็งแบบไม่ชอบน้ำ และผ้า 2 ชนิดได้ถูกเลือกใช้คือผ้าโพลีเอสเตอร์ และผ้าฝ้าย การทดลองการทำความสะอาดในการกำจัดคาร์บอนแบล็กได้ใช้สารละลายลดแรงตึงผิว 2 ชนิดคือสารละลายโซเดียมโคเคซิลซัลเฟต และสารละลายซิติล ไตรเมทิลแอมโมเนียมโบรไมด์ เพื่อที่จะเข้าใจหลักการของการกำจัดคราบสกปรกของอนุภาคของแข็งได้ดียิ่งขึ้นการดูดซับของสารลดแรงตึงผิว,การวัดความต่างศักย์ไฟฟ้า,การวัดมุมสัมผัสของสารละลาย และการวัดแรงตึงผิว ได้วัดที่ค่าความเป็นกรดต่างๆ สำหรับชนิดของผ้าและสารลดแรงตึงผิวหนึ่งๆ พบว่า เฟอร์เซ็นต์ของการกำจัดคราบสกปรกเพิ่มขึ้นเมื่อเพิ่มค่าความเป็นกรดต่าง และกำจัดได้สูงสุดที่ค่าความเป็นกรดต่าง 11 สำหรับชนิดของผ้าและค่าความเป็นกรดต่างหนึ่งๆ สารละลายโซเดียมโคเคซิลซัลเฟตสามารถกำจัดคราบสกปรกของอนุภาคของแข็งได้ดีกว่าสารละลายซิติล ไตรเมทิลแอมโมเนียมโบรไมด์ การกำจัดคาร์บอนแบล็กบนผ้าโพลีเอสเตอร์ให้ประสิทธิภาพสูงกว่าบนผ้าฝ้าย ทั้งนี้เนื่องจากค่าศักย์ไฟฟ้าบนผ้าโพลีเอสเตอร์เป็นประจุลบมากกว่าบนผ้าฝ้าย จากผลของการวัดมุมสัมผัสของสารละลายสารลดแรงตึงผิวพบว่าการเปียกของสาร โซเดียมโคเคซิลซัลเฟตบนคาร์บอนแบล็กต่ำกว่าของสารละลายซิติล ไตรเมทิลแอมโมเนียมโบรไมด์ การดูดซับของสารละลายซิติล ไตรเมทิลแอมโมเนียมโบรไมด์บนคาร์บอนแบล็กมีค่าสูงกว่าสารละลายโซเดียมโคเคซิลซัลเฟต

ACKNOWLEDGEMENTS

This work would not have been success without the helpful of the following individuals and organizations.

First of all, I wish to express my deep gratitude to Assoc. Prof. Dr. Sumaeth Chavadej and Prof. John F. Scamehorn for valuable suggestions, and discussion as well as encouragement throughout this work.

I would like to thank the Petroleum and Petrochemical Technology Consortium under The Ministry of Education and The Research Unit of Applied Surfactants for Separation and Pollution Control for providing all research facilities and financial support, respectively. This thesis work is partially funded by postgraduate Education and Research Programs in Petroleum and Petrochemical Technology (PPT Consortium).

I wish to thank my friends at the Petroleum and Petrochemical College for their kind assistance and all those who helped and encouraged me over the years of this study.

I would like to express my sincere graduate to the faculty and staffs who contributed in various degrees to the success of my work.

Finally, I would like to express my deepest appreciation to my parents for their love, encouragement and worthy moral support throughout my study at Chulalongkorn University.

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