

**PARTICULATE SOIL DETERGENCY: PERFORMANCE AND  
MECHANISM OF REMOVAL OF HYDROPHILIC PARTICULATE**

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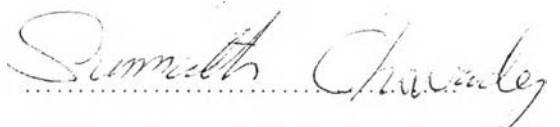
**Thesis Advisor:** Assoc. Prof. Sumaeth Chavadej  
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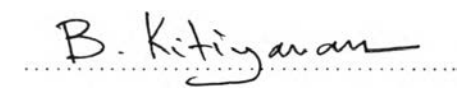
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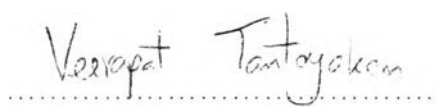
  
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## ABSTRACT

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Detergency is the detachment of unwanted substances from a fabric surface immersed in a media and is dependent on several factors. In this research, the effects of surfactant concentration, surfactant type, type of fabric, and solution pH on the detergency performance in hydrophilic particulate removal were investigated. Ferric oxide was selected as a model hydrophilic particulate and three types of fabric were used: pure polyester, pure cotton, and blended polyester-cotton. The detergency experiments of ferric oxide removal were carried out by using an anionic surfactant (methyl ester sulfonate, MES) and a nonionic surfactant (alcohol ethoxylate with 9 oxyethyl groups, AE<sub>9</sub>). To gain a better understanding of the mechanisms of particulate soil detergency, the adsorption isotherms of the surfactants, the Zeta potential, and the contact angle were studied. For any given type of surfactant, detergency performance increased with increasing solution pH and the maximum performance was found at pH11. In addition, MES was found to exhibit a better detergency than AE<sub>9</sub> since the zeta potential on the ferric oxide surface in MES solutions is more negative than those in AE<sub>9</sub> solutions.

## บทคัดย่อ

นายภูมิพัฒน์พงษ์ แสงอินทร์ : การกำจัดสิ่งสกปรกที่เป็นอนุภาคของแข็งที่ชอบน้ำ, ประสิทธิภาพและกลไกการกำจัดสิ่งสกปรกที่เป็นอนุภาคของแข็งที่ชอบน้ำ (Particulate Soil Detergency: Performance and Mechanism of Removal of Hydrophilic Particulate) อ.ที่ปรึกษา: รศ.ดร.สุเมธ ชวเดช Prof. John F. Scamehorn 154หน้า

งานวิจัยนี้ศึกษาผลกระทบของชนิดและความเข้มข้นของสารลดแรงตึงผิว ค่าความเป็นกรดต่างของสารลดแรงตึงผิว ในการชำระล้างคราบสกปรกของอนุภาคของแข็งบนผ้าสามชนิด ได้แก่ ผ้าโพลีเอสเตอร์ ผ้าฝ้าย และผ้าโพลีเอสเตอร์ผสมผ้าฝ้าย เหล็กออกไซด์ถูกนำมาใช้เป็นตัวจำลองคราบสกปรกอนุภาคของแข็งแบบชอบน้ำ การทดลองกำจัดเหล็กออกไซด์ได้ใช้สารละลายลดแรงตึงผิวสองชนิด ได้แก่ สารละลายเมทิลเอสเตอซิลโฟเนท และสารละลายแอลกอฮอล์อีทอกซีแลท เพื่อที่จะเข้าใจหลักการของการกำจัดคราบสกปรกของอนุภาคของแข็งได้ดียิ่งขึ้น การดูดซับสารลดแรงตึงผิว, การวัดความต่างศักย์ไฟฟ้า และการวัดมุมสัมผัสของสารละลาย ได้วัดที่ค่าความเป็นกรดต่างๆ สำหรับชนิดของผ้าและสารลดแรงตึงผิวหนึ่งๆพบว่า เฟอร์เซ็นต์ของการกำจัดคราบสกปรกเพิ่มขึ้นเมื่อเพิ่มค่าความเป็นด่าง และกำจัดได้สูงสุดที่ค่าความเป็นด่าง 11 นอกจากนี้พบว่าสารละลายเมทิลเอสเตอซิลโฟเนท สามารถกำจัดคราบสกปรกของอนุภาคของแข็งได้ดีกว่าสารละลายแอลกอฮอล์อีทอกซีแลท เนื่องจากว่าสารละลายเมทิลเอสเตอซิลโฟเนท มีค่าศักย์ไฟฟ้าบนเหล็กออกไซด์เป็นประจุลบมากกว่าสารละลายแอลกอฮอล์อีทอกซีแลท

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