

**INTERACTION BETWEEN HYDROXYPROPYLCELLULOSE AND
COCAMIDOPROPYL DIMETHYL GLYCINE**

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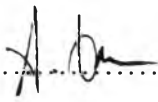
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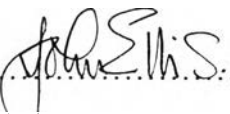
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ABSTRACT

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The interaction between hydroxypropylcellulose (HPC) and cocamidopropyl dimethyl glycine (CADG) was studied by dynamic light scattering and viscosity techniques in dilute solution at 30°C as a function of surfactant concentration and pH. The critical micelle concentration (CMC) of this surfactant depended on the pH. The minimum CMC occurred at pH 9.0. The results from dynamic light scattering and viscosity measurement indicated the formation of complexes between HPC and CADG. The decreases in specific viscosity (η_{sp}) and hydrodynamic radius (R_h) of HPC chains at very low CADG concentration occurred because bound CADG molecules induced HPC to be more hydrophobic and changed solvent quality. Beyond critical micelle concentration (CMC) the specific viscosity and hydrodynamic radius both increased because the electrostatic repulsion between charged micelles bound onto the HPC coils, causing the HPC chains to expand. Further addition of CADG concentration showed that the specific viscosity and hydrodynamic radius both decreased due to the decrease in the electrostatic repulsion between charged micelle because of the screening effect of counterions. At very high CADG concentrations, the specific viscosity rised as a function of CADG

concentration because of the increase in surfactant phase volume or the formation of micellar structures occurred. The specific viscosity of HPC-CADG complexes at pH 3.0 appeared to be similar to the HPC-CADG complexes at pH 9.0 and pH 12.0.

บทคัดย่อ

สุจลวี สมณี : การศึกษาปฏิกิริยาของไฮดรอกซีโพรพิลเซลลูโลสกับโคคามิโดโพรพิลไดเมทิลไกลซีน (Interaction between Hydroxypropylcellulose and Cocamidopropyl dimethyl glycine) อ. ที่ปรึกษา: ศ. อเล็กซานเดอร์ เอ็ม เจมิสัน และ รศ.ดร. อนุวัฒน์ ศิริวัฒน์ 101 หน้า ISBN 974-334-194-3

การศึกษาปฏิกิริยาของไฮดรอกซีโพรพิลเซลลูโลส (HPC) กับสารลดแรงตึงผิวโคคามิโดโพรพิลไดเมทิลไกลซีนถูกศึกษาโดยเทคนิคการกระสายแบบไดนามิกส์และการวัดความหนืดในสารละลายเจือจางที่อุณหภูมิ 30 องศาเซลเซียสภายใต้สภาวะการเปลี่ยนแปลงความเข้มข้นของโคคามิโดโพรพิลไดเมทิลไกลซีนและความเป็นกรดเบส จากการวัดความเข้มข้นวิกฤต (CMC) ของสารลดแรงตึงผิวพบว่าการเปลี่ยนแปลงในระบบที่มีการเปลี่ยนแปลงความเป็นกรดเบส ความเข้มข้นวิกฤตจะมีค่าต่ำสุดในสภาวะความเป็นเบสประมาณ 9.0 ผลการทดลองจากการวัดการกระจายแบบไดนามิกส์และการวัดความหนืดแสดงผลของการเกิดสารประกอบเชิงซ้อนระหว่างไฮดรอกซีโพรพิลเซลลูโลสกับโคคามิโดโพรพิลไดเมทิลไกลซีน การลดลงของค่าความหนืดจำเพาะ (specific viscosity) และค่ารัศมีพลศาสตร์ของเหลว (hydrodynamic radius) ของไฮดรอกซีโพรพิลเซลลูโลสเกิดขึ้นเมื่อเดิมความเข้มข้นต่างๆของสารลดแรงตึงผิวเนื่องจากสารลดแรงตึงผิวทำให้ไฮดรอกซีโพรพิลเซลลูโลสละลายได้น้อยลงและมีการเปลี่ยนแปลงคุณสมบัติของตัวทำละลาย การเพิ่มความเข้มข้นของสารลดแรงตึงผิวทำให้ค่าความหนืดจำเพาะและค่ารัศมีพลศาสตร์ของเหลวเพิ่มขึ้นเนื่องจากแรงผลักทางไฟฟ้าสถิตระหว่างประจุของไมเซลล์บนสายโซ่ไฮดรอกซีโพรพิลเซลลูโลส ดังนั้นจึงเป็นผลให้สายโซ่ของไฮดรอกซีโพรพิลเซลลูโลสมีขนาดเพิ่มขึ้น การเพิ่มความเข้มข้นของสารลดแรงตึงผิวในเวลาต่อมาทำให้ค่าความหนืดจำเพาะและค่ารัศมีพลศาสตร์ของเหลวลดลงเนื่องจากการลดลงของแรงผลักทางไฟฟ้าสถิตระหว่างประจุของไมเซลล์บนสายโซ่ไฮดรอกซีโพรพิลเซลลูโลสเป็นผลจากประจุตรงข้ามกับไมเซลล์ (counterion) ไปก้ำบังแรงผลักทางไฟฟ้าสถิตระหว่างไมเซลล์ ต่อมาเมื่อเพิ่มความเข้มข้นของสารลดแรงตึงผิวพบว่าค่าความหนืดจำเพาะเพิ่มขึ้นเนื่องจากการเพิ่มขึ้นของขนาดของไมเซลล์ จากการวัดค่าความหนืดจำเพาะของสารประกอบเชิงซ้อนระหว่างไฮดรอกซีโพรพิลเซลลูโลสกับสารลดแรงตึงผิว

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| C21 | Plot of polydispersity at the fixed HPC concentration of 2.6 g/L and at the fixed CADG concentration of 0.68 g/L for HPC/CADG/water system at pH 3.0 as a function of the scattering wave vector at 30°C | 98 |
| C22 | Plot of apparent diffusion coefficient at the fixed HPC concentration of 2.6 g/L and at the fixed CADG concentration of 1.03 g/L for HPC/CADG/water system at pH 3.0 as a function of the scattering wave vector at 30° | 100 |
| C23 | Plot of polydispersity at the fixed HPC concentration of 2.6 g/L and at the fixed CADG concentration of 1.03 g/L for HPC/CADG/water system at pH 3.0 as a function of the scattering wave vector at 30°C | 100 |