

REDUCTION OF FOULING IN A CAUSTIC TOWER

Mr. Sakchai Thawanworakit

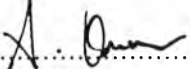
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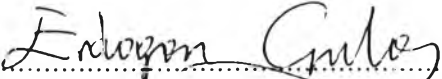
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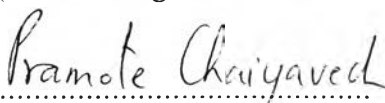
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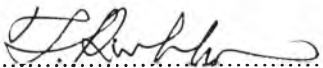
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ABSTRACT

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Aldol Condensation

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It was found that the aldol condensation of aldehyde can possibly be the cause of the fouling in a caustic tower. A systematic method of following the fouling formation using a colorimeter was applied. The effects of temperature, concentration of aldehyde, and concentration and type of antipolymerants on the aldol condensation were investigated. It was shown that aldol condensation rates increased with increasing temperature. The aldol condensation rate was proportional to the concentration of aldehyde present. Two antipolymerants used in this work were hydroxylamine hydrochloride and hydroxylamine sulfate. Both antipolymerants inhibited the aldol condensation, and their efficiency decreased with increasing temperature. The efficiency of the reduction was found to be proportional to the concentration of antipolymerant. Comparison of the two antipolymerants indicates that hydroxylamine sulfate is more preferable for reducing fouling. Sodium sulfate, which is present in the spent caustic treatment unit, was found to be a promoter for fouling even in small amounts.

บทคัดย่อ

ศักดิ์ชัย ถวัลย์วรกิจ : การลดการอุดตันในหอคอกสติก (Reduction of Fouling in a Caustic Tower) อ. ที่ปรึกษา : ศ. เออร์โดกัล กุลาตี, ศ. ปราโมทย์ ไชยเวช, ผศ. ชีร์ศักดิ์ ฤกษ์สมบูรณ์ และ ดร. ปราโมช รังสรรค์วิจิตร 63 หน้า ISBN 974-334-146-3

งานวิจัยนี้เกี่ยวข้องกับการศึกษาการลดการอุดตันในหอคอกสติกโดยขั้นต้นได้ทำการหาสาเหตุของการอุดตันพบว่ามาจากปฏิกิริยาอัลคัลคอนเด็นเซชัน การติดตามการเกิดปฏิกิริยาอัลคัลคอนเด็นเซชันทำโดยใช้เครื่องวัดสี นอกจากนั้นได้ทำการศึกษาผลของอุณหภูมิ ความเข้มข้นของอัลคัลดีไฮด์ ความเข้มข้นของสารยับยั้งการเกิดโพลีเมอร์และชนิดของสารยับยั้งการเกิดโพลีเมอร์ต่อปฏิกิริยาอัลคัลคอนเด็นเซชัน ผลการทดลองชี้ให้เห็นว่าอัตราการเกิดปฏิกิริยาอัลคัลคอนเด็นเซชันจะเพิ่มขึ้นเมื่ออุณหภูมิสูงขึ้นและอัตราการเกิดปฏิกิริยาจะขึ้นกับความเข้มข้นของอัลคัลดีไฮด์ สารยับยั้งการเกิดโพลีเมอร์ที่ใช้การศึกษาได้แก่ ไฮดรอกซีเอมีน ไฮโดรครอไรด์และไฮดรอกซีเอมีนซัลเฟต การทดลองแสดงให้เห็นว่าสารยับยั้งการเกิดโพลีเมอร์ทั้งสองตัวสามารถยับยั้งการเกิดปฏิกิริยาอัลคัลคอนเด็นเซชันได้และประสิทธิภาพจะลดลงเมื่ออุณหภูมิเพิ่มขึ้น ประสิทธิภาพของการลดการอุดตันจะขึ้นกับความเข้มข้นของสารยับยั้งการเกิดโพลีเมอร์และจากการเปรียบเทียบประสิทธิภาพของสารยับยั้งการเกิดโพลีเมอร์ทั้งสองตัวพบว่าไฮดรอกซีเอมีนซัลเฟตมีประสิทธิภาพที่ดีกว่า นอกจากนั้นยังพบว่าโซเดียมซัลเฟตซึ่งมีอยู่ในระบบบำบัดคอกสติกเป็นตัวเร่งให้เกิดการอุดตันในอุปกรณ์ที่ใช้ในระบบบำบัดคอกสติก

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