

**THE ADSORPTION OF SURFACTANT ON INKS AND ON PAPER
FIBERS RELATED TO PAPER RECYCLING**

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ABSTRACT

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Flotation deinking is the common method used to remove ink from paper in paper recycling processes, the fundamental mechanisms of flotation deinking have not been well understood. This work was focused on the mechanism of “collector chemistry” in flotation deinking by investigating the adsorption isotherms of surfactant (sodium octanoate, C8) and calcium ion, as well as coadsorption of both species on model ink (carbon black) and model fiber (common office paper). The zeta potential of both model ink and model fiber was measured in order to facilitate the understanding in the adsorption mechanism of collector chemistry. The results indicated that the carbon black and paper fiber have the same loading of adsorbate and the adsorption of C8 and calcium on both surfaces was cooperative adsorption. The addition of calcium concentration enhanced the C8 adsorption on carbon black and further decreased the absolute magnitude of zeta potential. Moreover, the specific interactions between the carboxylate and the paper fiber resulted in decreasing calcium adsorption with increasing C8 adsorption and diminishing zeta potential.

บทคัดย่อ

สุรรัตน์ ใจรักดี : การดูดซับของสารลดแรงตึงผิวบนผิวหมึกและบนเส้นใยกระดาษ สัมพันธ์ต่อการนำกระดาษกลับมาใช้ใหม่ (The Adsorption of Surfactant on Inks and on Paper Fibers Related to Paper Recycling) อ. ที่ปรึกษา: ศ. จอห์น เอฟ. สกEMAฮอน รศ. กัญญา บุญเกียรติ และ ดร.กิติพัฒน์ สีมานนท์ 74 หน้า ISBN 974-13-0701-2

ในกระบวนการนำกระดาษกลับมาใช้ใหม่ โดยทั่วไปมักจะใช้สารลดแรงตึงผิวเพื่อช่วยในการดึงหมึกพิมพ์ออกจากเส้นใยกระดาษ และยังไม่มีความเข้าใจอย่างชัดเจนในกลไกพื้นฐานของกระบวนการนี้ งานวิจัยนี้จึงมุ่งศึกษาถึงกลไกของสารลดแรงตึงผิวและตัวช่วย คือ แคลเซียมไอออน ในกระบวนการดึงหมึกพิมพ์ออกจากกระดาษ โดยศึกษาการดูดซับของสารลดแรงตึงผิว (โซเดียมออกทาทาโนเอท, ซีแปด) และแคลเซียมไอออนบนผงคาร์บอนแบลคและบนพื้นผิวเส้นใยกระดาษ นอกจากนี้ยังศึกษาถึงค่าความต่างศักย์ของสารแขวนลอยที่โซเดียมออกทาทาโนเอทดูดซับบนผงคาร์บอนแบลคและบนเส้นใยกระดาษ เพื่อช่วยให้เข้าใจถึงกลไกของสารลดแรงตึงผิวและแคลเซียมไอออนในกระบวนการดึงหมึกพิมพ์ออกจากเส้นใยกระดาษได้ดีขึ้น ผลการทดลองแสดงว่าที่พีเอชเป็นเบสทั้งผงคาร์บอนแบลคและเส้นใยกระดาษมีความสามารถในการดูดซับโซเดียมออกทาทาโนเอทได้เท่ากัน การดูดซับของซับโซเดียมออกทาทาโนเอทและแคลเซียมไอออนเป็นการดูดซับร่วม และยังพบว่าเมื่อเพิ่มความเข้มข้นของแคลเซียมไอออนจะสามารถเพิ่มการดูดซับของโซเดียมออกทาทาโนเอท บนพื้นผิวคาร์บอนแบลคได้มากกว่าบนพื้นผิวเส้นใยกระดาษและส่งผลให้ค่าความต่างศักย์มีค่าลดลง ซึ่งจะช่วยในการแยกหมึกออกจากกระดาษได้ดีขึ้น นอกจากนี้การเกิดปฏิกิริยาระหว่างหมู่คาร์บอกซิเลตและพื้นผิวเส้นใยกระดาษมีผลทำให้การดูดซับแคลเซียมลดลงเมื่อโซเดียมออกทาทาโนเอทดูดซับเพิ่มขึ้น และ ทำให้ความต่างศักย์มีค่าลดลง

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