

**EFFECT OF ORGANIC DILUENTS ON SEPARATION OF HEAT STABLE
SALTS (HSSs) GENERATED DURING CARBON DIOXIDE ABSORPTION
USING AMINE SOLUTION**

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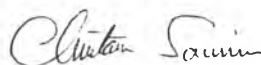
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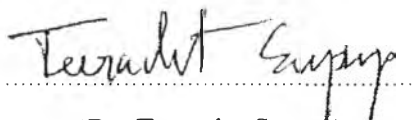


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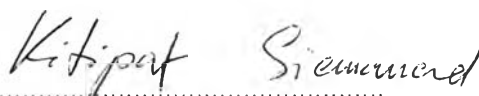
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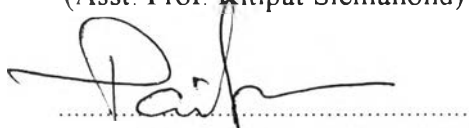
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ABSTRACT

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Panupat Suppaibulsuk: Effect of Organic Diluents on Separation of Heat Stable Salts (HSSs) Generated During Carbon Dioxide Absorption Using Amine Solution.

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Organic diluents, i.e. 2-ethyl-1-hexanol, 1-octanol, 1-heptanol, 1-hexanol, and 1-pentanol, were used in the liquid-liquid extraction of heat stable salts (HSSs) in a monoethanolamine (MEA) solution used in the carbon dioxide absorption process. The HSSs aqueous solution consisted of 1,000 ppm of formate, acetate, oxalate, and glycolate. An equal volume of 1 M of extractant in different diluents to HSSs solution was mixed for complete separation. Analyses of the concentrations of HSSs in aqueous solutions were completed by using high performance liquid chromatography with an ultra violet detector. The extraction of HSSs without MEA solution revealed that, for the same carbon chain length, the extraction efficiency of 2-ethyl-1-hexanol was better than 1-octanol. The extraction efficiency decreased with decreasing of carbon chain length for formate, acetate, and glycolate. In the presence of MEA solution, the HSS extraction efficiency in every diluent at room temperature decreased with a small variation. The extraction of HSSs with MEA was independent of carbon numbers of diluents. The extraction efficiency does not change with increasing in extraction temperature.

บทคัดย่อ

ภาณุพัฒน์ ทรัพย์ไพฑูรย์สุข : ผลจากตัวทำละลายอินทรีย์ที่มีต่อการแยกเกลือเสถียรความร้อน ซึ่งเกิดจากกระบวนการดูดซับคาร์บอนไดออกไซด์ด้วยสารละลายเอมีน (Effect of Organic Diluents on Separation of Heat Stable Salts (HSSs) Generated During Carbon Dioxide Absorption Using Amine Solution) อ.ที่ปรึกษา: รศ.ดร. จินตนา สายวรรณ และ ดร. ชีรเดช สุภาพ, 108 หน้า

ตัวทำละลายอินทรีย์ เช่น 2-เอทิล-1-เฮกซานอล 1-ออกทานอล 1-เฮปทานอล 1-เฮกซานอล และ 1-เพนทานอล ถูกใช้ในการสกัดเกลือเสถียรความร้อน (HSSs) ในสารละลายโมโนเอทานอลามีน (MEA) ที่ถูกใช้ในกระบวนการดูดซับก๊าซคาร์บอนไดออกไซด์ด้วยวิธีสกัดของเหลวกับของเหลว สารละลายเกลือเสถียรความร้อนประกอบไปด้วย ฟอรัม, อะซิเตท, ออกซาเลท และ ไกลโคเลท ซึ่งแต่ละตัวมีความเข้มข้น 1,000 ส่วนในล้านส่วน ตัวสกัดละลายในตัวทำละลายอินทรีย์ถูกปั่นกวนกับเฟสของเหลว ทำปฏิกิริยากับสารละลายเกลือเสถียรความร้อนโดยใช้ปริมาตรเท่ากัน ความเข้มข้นของเกลือเสถียรความร้อนถูกวิเคราะห์โดยเครื่องแยกองค์ประกอบของเหลวสมรรถนะสูง (HPLC) ด้วยเครื่องตรวจจับอัลตราไวโอเลท การสกัดเกลือเสถียรความร้อนชนิดที่ไม่มีสารละลาย MEA แสดงให้เห็นว่าในตัวทำละลายที่มีความยาวสายโซ่เท่ากัน ประสิทธิภาพการสกัดของ 2-เอทิล-1-เฮกซานอล ดีกว่า 1-ออกทานอล อีกทั้งประสิทธิภาพการสกัดลดลงเมื่อจำนวนอะตอมคาร์บอนในสายโซ่ของตัวทำละลายลดลงสำหรับฟอรัม อะซิเตท และ ไกลโคเลท ในส่วนของการสกัดเกลือเสถียรความร้อนในสถานะที่มีสารละลาย MEA ที่อุณหภูมิห้อง พบว่าประสิทธิภาพลดลง โดยมีค่าเบี่ยงเบนในแต่ละข้อมูลเล็กน้อย และไม่ขึ้นกับจำนวนอะตอมคาร์บอนในตัวทำละลาย พบว่าประสิทธิภาพการสกัดลดลงเมื่อจำนวนอะตอมคาร์บอนในสายโซ่ของตัวทำละลายลดลง ประสิทธิภาพการสกัดไม่เปลี่ยนแปลงตามการเพิ่มอุณหภูมิเมื่อทำการสกัดเกลือเสถียรความร้อนด้วยตัวทำละลาย

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ABBREVIATIONS

HSS	Heat Stable Salt
MEA	Monoethanolamine
DEA	Diethanolamine
MDEA	Monodiethanolamine
TEA	Triethanolamine
DGA	Diglycolamine
DIPA	Diisopropanol
TIPA	Triisopropanol
AMP	2-amino-2-methyl-1-propanol
THEED	N,N,N'-tris(2-hydroxyethyl)ethyldiamine
BHEP	N,N'-bis(2-hydroxyethyl)piperazine
HEED	N-(2-hydroxyethyl) ethylenediamine
EDTA	Ethylenediaminetetraacetic acid
VOC	Volatile Organic Compound
NDELA	Nitrosodiethanolamine
NDMA	Nitrosodimethylamine
NMOR	Nitrosomorpholine
MMA	Monomethylamine
DMA	Dimethylamine
ED	Electrodialysis
AEM	Anion-exchange membrane
MIBK	Methyl isobutyl ketone
TOA	Tri-n-octylamine