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ลิขสิทธิ์ของบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

EFFECT OF SOLVENT STRENGTH ON THE CHROMATOGRAPHIC
BEHAVIOR OF CERTAIN ORGANIC ACIDS ON A MULTIMODAL
PHENYLPROPANOLAMINE BONDED SILICA COLUMN

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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

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ความแรงของตัวทำละลายของสารตัวอย่างมีอิทธิพลอย่างมากต่อพฤติกรรมทางโครมาโทกราฟี
ของสารประกอบที่เป็นกรดอินทรีย์บางชนิดบนคอลัมน์ชนิดมัลติโมดัลของไฮเพอร์ฟอร์มานลิควิดโครมาโทกราฟี
ที่มีเฟนิลโพรพานอลามีนเป็นเฟสคงที่ กรดอินทรีย์ที่นำมาศึกษาได้แก่ ฟีนอล, กรดแอสคอร์บิก, กรด
เบนโซอิก, กรดอะเซทิลซาลิไซลิก และ กรดซาลิไซลิก โดยเลือกใช้ฟอสเฟตบัฟเฟอร์ที่ปรับ pH ในช่วง
2.5-6.5 ภายใต้ระบบไอโซเครติกเป็นเฟสเคลื่อนที่ ในขั้นแรกได้ศึกษาชนิดของอันตรกิริยาที่เด่นของ
แต่ละ pH โดยแปรสัคส่วนของอะซีโทไนทริลในเฟสเคลื่อนที่และการเปลี่ยนความแรงของตัวทำละลายอินทรีย์
จากการศึกษาพบว่ากรดอินทรีย์ 4 ชนิด คือ ฟีนอล, กรดเบนโซอิก, กรดอะเซทิลซาลิไซลิก และ กรดซาลิ-
ไซลิก แสดงผลเช่นเดียวกันคือ มีกลไกเด่นเป็นแบบไฮโครโพบิกโดยไฮโครโพบิกซี้ของสารเหล่านี้มีค่า
ลดลงเมื่อ pH สูงขึ้นสาเหตุเนื่องจากการแตกตัวของกรดอินทรีย์เหล่านี้ แต่พบว่ากรดแอสคอร์บิกมี
พฤติกรรมที่แตกต่างออกไปจากกรดอินทรีย์ตัวอื่น ๆ กล่าวคือ ที่ pH มีค่าต่ำพบว่ามีกลไกเด่นเป็นแบบ
ไอออนิก ในขณะที่ pH สูง พบว่าแสดงผลเหมือนกับกรดอินทรีย์ตัวอื่นที่ศึกษา อิทธิพลของความแรงของตัว
ทำละลายบนเฟสคงที่แบบมัลติโมดัลพบว่าเหมือนกับบนคอลัมน์รีเวอร์สเฟสเมื่อกลไกเด่นเป็นไฮโครโพบิก
นั่นคือค่าเพลตทางทฤษฎีของสารประกอบแต่ละชนิดขึ้นกับความแรงของตัวทำละลายอย่างชัดเจนและมีค่าคงที่
เมื่อความแรงของตัวทำละลายมีความแรงเท่ากับในเฟสเคลื่อนที่ ในขณะที่อิทธิพลของตัวทำละลาย ณ. pH
ที่แสดงอันตรกิริยาเด่นเป็นแบบไอออนิกพบว่าแสดงผลการแยก เช่นเดียวกับคอลัมน์ไอออนเอ็กเชนจ์

ภาควิชา ๒๑๖
สาขาวิชา ๒๑๖
ปีการศึกษา ๒๕๓๘

ลายมือชื่อนิสิต สันติวัฒน์ สันติวัฒน์
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SUNSANEE SINLAPADECH : EFFECT OF SOLVENT STRENGTH ON THE CHROMATOGRAPHIC BEHAVIOR OF CERTAIN ORGANIC ACIDS ON A MULTIMODAL PHENYL-PROPANOLAMINE BONDED SILICA COLUMN. THESIS ADVISOR : ASSOC. PROF. VITHAYA RUANGPORNVISUTI, Dr.rer.nat., THESIS CO-ADVISOR : SURAPOTE WONGYAI, Dr.rer.nat., 237 pp. ISBN 974-633-402-6

The solvent of the injected sample significantly influenced the chromatographic behavior of acidic compounds on a phenylpropanolamine bonded silica column. The retention of the tested compounds, including phenol, L-ascorbic acid, benzoic acid, acetylsalicylic acid and salicylic acid, was manipulated by modifying the pH of the solution within a range of 2.5-6.5 and the proportion of organic modifier in the mobile phase in isocratic mode. The mechanism of interaction at each pH was identified by changing the ratios of acetonitrile in the mobile phase and the solvent strength was studied. Four tested substances, i.e. phenol, benzoic acid, acetylsalicylic acid and salicylic acid showed the same effect, that is an increase in pH until reach their pKa resulted increase in the effect of solvent strength in accordance with the observation that their retention at high pH is governed predominantly by hydrophobic interaction comparing to low pH and hydrophobicity decreases when pH are higher than the pKa due to ionized form of all these organic acids except L-ascorbic acid, its retention at low pH is based mainly on ionic interaction. The effect of injected solvent strength on the multimodal stationary phase is the same as that on a reversed-phase column only when the hydrophobic interaction is dominant i.e. the number of theoretical plates of each compound distinctly depends on the strength of the injected solvent and reaches a constant level at the same strength as the mobile phase. Meanwhile the effect of the injected solvent at pH to which the ionic interaction is predominant is the same as that on an ion-exchange column.

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