

AROMATICS SEPARATION BY LIQUID-LIQUID EXTRACTION

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พีระพงศ์ เนียรภาค: การแยกสารอะโรมาติกส์โดยการสกัดของเหลวด้วยของเหลว (Aromatics Separation by Liquid-Liquid Extraction) อ. ที่ปรึกษา: รศ. กัญจนานุญเกียรติ รศ. ดร. เลอสรวง เมฆสุด และ ดร. โซฟี จูเลียน 59 หน้า ISBN 974-9651-11-1

แนฟทาร์ฟอรัมेटเป็นส่วนหนึ่งในส่วนประกอบหลักของน้ำมันเบนซินเนื่องจากมีปริมาณอะโรมาติกส์สูง ค่าออกเทนจึงสูงตามไปด้วย อย่างไรก็ตามสารเหล่านี้ถือเป็นสารก่อมะเร็งซึ่งถูกควบคุมการใช้อย่างเข้มงวด และเนื่องจากสารประกอบอะโรมาติกส์ส่วนใหญ่ในช่วงนี้ประกอบด้วย เบนซีน โทลูอิน และไซลีน (BTXs) ซึ่งใช้เป็นวัตถุดิบที่สำคัญที่ใช้กันทั่วไปในอุตสาหกรรมปิโตรเคมี จึงสามารถใช้กระบวนการสกัดอะโรมาติกส์ออกจากรีฟอรัมेटด้วยตัวทำละลายในการควบคุมปริมาณอะโรมาติกส์ให้ตรงตามข้อกำหนดได้ ในงานวิจัยนี้ศึกษากระบวนการสกัดแบบกะโดยใช้ตัวทำละลายหลายชนิด ทั้งในรูปของตัวทำละลายเดี่ยวและตัวทำละลายคู่เพื่อตรวจสอบผลของอุณหภูมิ และอัตราส่วนของตัวทำละลายต่อสารตั้งต้นที่มีต่อการสกัด เบนซีน โทลูอิน และพาราไซลีน ออกจากนอมัลเฮกเซน ตัวทำละลายเดี่ยวที่ใช้ได้แก่ ซัลโฟเลน ไดมethylซัลฟอกไซด์ (DMSO) เอทิลีนไกลคอล (EG) เอทิลีนคาร์บอเนต (EC) และ 3-เมทอกซีโพรพิโอนไตรล์ (3MOPN) และตัวทำละลายคู่ประกอบด้วย ตัวทำละลายผสมระหว่างเอทิลีนคาร์บอเนตและไดเมทิลซัลฟอกไซด์ (EC/DMSO) และตัวทำละลายผสมระหว่างเอทิลีนไกลคอลและ 3-เมทอกซีโพรพิโอนไตรล์ (EG/3MOPN) จากการทดลองพบว่า เบนซีน ถูกสกัดออกจากสารตั้งต้นได้ดีกว่าโทลูอินและพาราไซลีนตามลำดับ นอกจากนี้ยังพบว่า ซัลโฟเลน มีความสามารถในการเลือกและความสามารถในการพาที่ดีกว่าตัวละลายเดี่ยวชนิดอื่นที่ศึกษา ในขณะที่ตัวทำละลายผสมระหว่างเอทิลีนคาร์บอเนตและไดเมทิลซัลฟอกไซด์ในอัตราส่วนการผสมที่ 10/90 โดยปริมาตร แสดงสมบัติร่วมที่ดีของตัวทำละลายทั้งสองที่ใช้ในการผสมทั้งในด้านความสามารถในการพาและความสามารถในการเลือก

ABSTRACT

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Naphtha reformat is a major contributor in gasoline blending because of its high aromatics and hence high octane number. They are, however, well-known carcinogenic substances and are restricted by regulations. As most of the aromatics in this range are made up of benzene, toluene, and xylenes (BTXs) and are widely used as essential feedstocks for the petrochemical industry, solvent extraction of aromatics from the reformat has been used to control the aromatics content to within specified limits. In this work the batch extractions of several solvents were studied as single solvent and dual solvents to observe the influence on the extractions of BTX from n-hexane as well as the effect of operating temperature (30°–50°C), and solvent-to-feed ratio (1:1–3:1). The single solvents investigated were sulfolane, dimethyl sulfoxide (DMSO), ethylene glycol (EG), ethylene carbonate (EC), and 3-methoxy propionitrile (3MOPN) and the dual solvents were EC/DMSO and EG/3MOPN. Among the three aromatics, benzene was better extracted than toluene and *p*-xylene, respectively. It was observed that sulfolane performed better selectivity and capacity than the other single solvents. The mixed solvent of EC/DMSO at 10/90 by volume performed good combined properties of the solvents in terms of capacity and selectivity.

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TABLE OF CONTENTS

	PAGE
Title Page	i
Abstract (in English)	iii
Abstract (in Thai)	iv
Acknowledgements	v
Table of Contents	vi
List of Tables	x
List of Figures	xi
CHAPTER	
I	
INTRODUCTION	1
II	
BACKGROUND AND LITERATURE REVIEW	3
2.1 Sources of Aromatics	3
2.1.1 Petroleum Fractions	3
2.1.2 Naphtha Catalytic Reforming Effluents	3
2.1.3 Fluid Catalytic Cracking Effluents	4
2.1.4 Steam Cracking Effluents	4
2.2 Aromatics Extraction	5
2.3 Solvent Properties	7
2.3.1 Selectivity	7
2.3.2 Solvent Capacity	7
2.4.1 Specific Gravity	7
2.4.2 Boiling Temperature	7
2.4.3 Viscosity	7
2.5.6 Others	8
2.4 Hydrocarbon System	8

CHAPTER		PAGE
III	EXPERIMENTAL	9
	3.1 Materials and Equipment	9
	3.1.1 Chemicals	9
	3.1.1.1 Aromatic Hydrocarbons	9
	3.1.1.2 Normal Paraffin Hydrocarbon	9
	3.1.1.3 Solvents	9
	3.1.1.4 Others	9
	3.1.2 Equipment	10
	3.2 Experimental Procedures	10
	3.2.1 Determination and Preparation of Water Contents in the Solvents	10
	3.2.2 Sample Preparation	10
	3.2.3 Determination of Critical Solution Temperature	11
	3.2.4 Solvents	11
	3.2.4.1 Single Solvents	11
	3.2.4.2 Mixed Solvents	11
	3.2.5 Batch Extraction	11
	3.2.6 Extraction Analysis	12
IV	RESULTS AND DISCUSSIONS	14
	4.1 Water Contents of the Solvents	14
	4.2 Critical Solution Temperature (CST)	14
	4.2.1 Single Solvent	14
	4.2.1.1 Benzene/Hexane/Solvent Systems	14
	4.2.1.2 Toluene/Hexane/Solvent Systems	15
	4.2.1.3 <i>p</i> -Xylene/Hexane/Solvent Systems	15
	4.2.2 Mixed Solvent	16
	4.2.2.1 Benzene/Hexane/Mixed Solvent Systems	16
	4.2.2.2 Toluene/Hexane/Mixed Solvent Systems	16
	4.2.2.3 <i>p</i> -Xylene/Hexane/Mixed Solvent Systems	17

CHAPTER	PAGE
4.3 Aromatics Extraction	17
4.3.1 Single Solvent	17
4.3.1.1 Ethylene Glycol (EG)	17
4.3.1.2 Dimethyl Sulfoxide (DMSO)	19
4.3.1.3 Sulfolane	21
4.3.1.4 Ethylene Carbonate (EC)	23
4.3.1.5 3-Methoxy Propionitrile (3MOPN)	25
4.3.2 Mixed Solvents	27
4.3.2.1 Mixed solvent of EG/3MOPN at 70/30 by volume	27 ✓
4.3.2.2 Mixed solvent of EG/3MOPN at 50/50 by volume	29 ✓
4.3.2.3 Mixed solvent of EG/3MOPN at 30/70 by volume	31 ✓
4.3.2.4 Mixed solvent of EC/DMSO at 50/50 by volume	33 ✗
4.3.2.5 Mixed solvent of EC/DMSO at 10/90 by volume	35 ✓
 V CONCLUSIONS AND RECOMMENDATIONS	 38
5.1 Conclusions	38
5.2 Recommendations	39
 REFERENCES	 40
 APPENDICES	 42
Appendix A Calibration curves of the extraction of aromatic with single and mixed solvents	42
Appendix B Sample of calculation	46

CHAPTER	PAGE
Appendix C Numerical data obtained from the extraction of aromatic with single solvent	49
Appendix D Numerical data obtained from the extraction of aromatic with mixed solvent	54
CURRICULUM VITAE	59

LIST OF TABLES

TABLE		PAGE
2.1	Composition of naphtha reforming catalytic effluents	3
2.2	Composition of steam cracking effluents	4
2.3	Boiling point of hydrocarbons used in the experiment	8
3.1	Batch-extraction volume used for different solvent-to-feed ratios	12
4.1	Water contents of the solvents before and after the solvent preparation	14
4.2	Critical solution temperatures of benzene/hexane/solvent systems	15
4.3	Critical solution temperatures of toluene/hexane/solvent systems	15
4.4	Critical solution temperatures of <i>p</i> -xylene/hexane/solvent systems	16
4.5	Critical solution temperatures of benzene/hexane/mixed solvent systems	16
4.6	Critical solution temperatures of toluene/hexane/mixed solvent systems	16
4.7	Critical solution temperatures of <i>p</i> -xylene/hexane/mixed solvent systems	17
B1	Numerical and calculated data of the extraction of Benzene/Hexane/EG system at 50°C and S/F ratio of 3:1	48
C1	Numerical data of hexane/aromatic/EG systems	51
C2	Numerical data of hexane/aromatic/DMSO systems	52
C3	Numerical data of hexane/aromatic/sulfolane systems	56
C4	Numerical data of hexane/aromatic/EC systems	54
C5	Numerical data of hexane/aromatic/3MOPN systems	54
D1	Numerical data of hexane/aromatic/EG/3MOPN (70/30) systems	56
D2	Numerical data of hexane/aromatic/EG/3MOPN (50/50) systems	57
D3	Numerical data of hexane/aromatic/EG/3MOPN (30/70) systems	57
D4	Numerical data of hexane/aromatic/EC/DMSO (50/50) systems	58
D5	Numerical data of hexane/aromatic/EC/DMSO (50/50) systems	59

LIST OF FIGURES

FIGURE		PAGE
3.1	Batch aromatics-extraction set up	12
4.1	Mass fraction of the aromatic in extract phase of aromatic/hexane/EG systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	18
4.2	Selectivity of the extraction of aromatic/hexane/EG systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	18
4.3	Solvent capacity of the extraction of aromatic/hexane/EG systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	19
4.4	Mass fraction of the aromatic in extract phase of aromatic/hexane/DMSO systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	20
4.5	Selectivity of the extraction of aromatic/hexane/ DMSO systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	21
4.6	Solvent capacity of the extraction of aromatic/hexane/ DMSO systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	22
4.7	Mass fraction of the aromatic in extract phase of aromatic/hexane/sulfolane systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	22
4.8	Selectivity of the extraction of aromatic/hexane/sulfolane systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	22

FIGURE	PAGE
4.9 Solvent capacity of the extraction of aromatic/hexane/sulfolane systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	23
4.10 Mass fraction of the aromatic in extract phase of aromatic/hexane/EC systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	24
4.11 Selectivity of the extraction of aromatic/hexane/EC systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	24
4.12 Solvent capacity of the extraction of aromatic/hexane/EC systems at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	25
4.13 Relationship between selectivity and solvent capacity of the single solvents studied	26
4.14 Mass fraction of the aromatic in extract phase of aromatic/hexane/mixed solvent of EG/3MOPN at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	27
4.15 Selectivity of the extraction of the systems of aromatic/hexane/mixed solvent of EG/3MOPN at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	28
4.16 Solvent capacity of the extraction of the system of aromatic/hexane/mixed solvent of EG/3MOPN at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	28

FIGURE	PAGE
4.17 Mass fraction of the aromatic in extract phase of aromatic/hexane/mixed solvent of EG/3MOPN at 30/70 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	29
4.18 Selectivity of the extraction of the systems of aromatic/hexane/mixed solvent of EG/3MOPN at 30/70 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	30
4.19 Solvent capacity of the extraction of the system of aromatic/hexane/mixed solvent of EG/3MOPN at 30/70 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	30
4.20 Mass fraction of the aromatic in extract phase of aromatic/hexane/mixed solvent of EG/3MOPN at 70/30 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	31
4.21 Selectivity of the extraction of the systems of aromatic/hexane/mixed solvent of EG/3MOPN at 70/30 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	32
4.22 Solvent capacity of the extraction of the system of aromatic/hexane/mixed solvent of EG/3MOPN at 70/30 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	32
4.23 Mass fraction of the aromatic in extract phase of aromatic/hexane/mixed solvent of EC/DMSO at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	33

FIGURE	PAGE	
4.24	Selectivity of the extraction of the systems of aromatic/ hexane/mixed solvent of EC/DMSO at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	34
4.25	Solvent capacity of the extraction of the system of aromatic/ hexane/mixed solvent of EC/DMSO at 50/50 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	34
4.26	Mass fraction of the aromatic in extract phase of aromatic/hexane/mixed solvent of EC/DMSO at 10/90 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	35
4.27	Selectivity of the extraction of the systems of aromatic/ hexane/mixed solvent of EC/DMSO at 10/90 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	35
4.28	Solvent capacity of the extraction of the system of aromatic/ hexane/mixed solvent of EC/DMSO at 10/90 by volume at the temperature of 30°, 40°, and 50°C and 1:1, 2:1, and 3:1 of solvent-to-feed ratios	36
4.29	Relationship between selectivity and solvent capacity of the single and mixed solvents studied	37
A1	Calibration curve of benzene	42
A2	Calibration curve of toluene	41
A3	Calibration curve of <i>p</i> -xylene	43
A4	Calibration curve of <i>n</i> -hexane	43
A5	Calibration curve of ethylene glycol (EG)	43
A6	Calibration curve of dimethylsulfoxide (DMSO)	44
A7	Calibration curve of sulfolane	44

FIGURE		PAGE
A8	Calibration curve of ethylene carbonate (EC)	44
A9	Calibration curve of 3-methoxypropionitrile (3MOPN)	45
B1	Numerical data of feed, solvent, raffinate phase, and extract phase of the aromatic/paraffin/solvents system	47
B2	Numerical data of feed, solvent, raffinate phase, and extract phase of the Benzene/Hexane/EG system at 50°C and Solvet-to-feed ratio of 3:1	47