

**Abstract**  
**Process Economics Program Report 35C**  
**BUTADIENE**  
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Most of the world's butadiene is obtained as a by-product of ethylene manufacture. The growing butadiene surplus resulting from the increasing liquid feedstock-based ethylene production in recent years has led to the shutdown of most on-purpose dehydrogenation plants. As the surplus continues with the higher demand growth rate for ethylene, processes for the selective and total hydrogenation of steam cracker C<sub>4</sub>s are being developed to dispose of the excess butadiene. Western European ethylene cracker operators favor selective hydrogenation to butenes, and they often build such units without corresponding butadiene extraction units. In contrast, total hydrogenation to butane for recycle to the steam cracker is preferred in the Asia-Pacific, where the process is often used along with a butadiene extraction unit to improve butadiene inventory flexibility.

This report contains the process economics for butadiene recovery from steam cracker C<sub>4</sub>s using dimethylformamide (DMF) and N-methylpyrrolidone (NMP) extractive distillation. We have also developed process economics for the selective and total hydrogenation of steam cracker C<sub>4</sub>s. Results show that extractive distillation and hydrogenation economics depend heavily on raw material valuations, which are location-specific.

## CONTENTS

<b>1 INTRODUCTION</b>	1-1
<b>2 SUMMARY</b>	2-1
INDUSTRY ASPECTS	2-1
TECHNICAL ASPECTS	2-2
Extractive Distillation Processes	2-2
Butadiene Recovery by Dimethylformamide Extractive Distillation	2-3
Butadiene Recovery By N-Methylpyrrolidone Extractive Distillation	2-3
Selective Acetylene Hydrogenation/Single-Stage Extractive Distillation	2-4
Hydrogenation Processes	2-4
Selective Hydrogenation of Steam Cracker C <sub>4</sub> s	2-4
Total Hydrogenation of Steam Cracker C <sub>4</sub> s	2-5
ECONOMIC ASPECTS	2-5
Extractive Distillation Processes	2-5
U.S. Gulf Coast	2-7
Western Europe	2-7
Asia-Pacific	2-7
Hydrogenation Processes	2-7
Selective Steam Cracker C <sub>4</sub> Hydrogenation	2-7
Total Steam Cracker C <sub>4</sub> Hydrogenation	2-9
<b>3 INDUSTRY STATUS</b>	3-1
WORLD BUTADIENE SUPPLY AND DEMAND	3-6
CONSUMPTION PATTERNS	3-9
Elastomers	3-10
Styrene-Butadiene Rubber	3-10
Polybutadiene Rubber	3-11
Polychloroprene (Neoprene) Rubber	3-11
Nitrile Rubber	3-11
Adiponitrile/Hexamethylenediamine	3-11
Styrene-Butadiene Copolymer Latexes	3-11
Acrylonitrile-Butadiene-Styrene-Resins	3-12
Other Polymers	3-12
BUTADIENE PRICE	3-12

## CONTENTS (Continued)

<b>3</b>	<b>INDUSTRY STATUS (Concluded)</b>	
	ALTERNATIVE BUTADIENE USES	3-14
	Selective Hydrogenation of Steam Cracker C <sub>4</sub> s	3-14
	Total Hydrogenation of Steam Cracker C <sub>4</sub> s	3-15
	Butadiene as a Chemical Feedstock	3-16
<b>4</b>	<b>BUTADIENE EXTRACTION</b>	4-1
	BUTADIENE RECOVERY BY DIMETHYLFORMAMIDE EXTRACTIVE DISTILLATION	4-2
	Process Description	4-3
	Cost Estimates	4-9
	Investment Costs	4-9
	Production Costs	4-9
	BUTADIENE RECOVERY BY N-METHYLPYRROLIDONE EXTRACTIVE DISTILLATION	4-13
	Process Description	4-13
	Cost Estimates	4-20
	Investment Costs	4-20
	Production Costs	4-20
	BUTADIENE EXTRACTION PROFITABILITY	4-24
	U.S. Gulf Coast	4-24
	Western Europe	4-24
	Asia-Pacific	4-26
<b>5</b>	<b>SELECTIVE ACETYLENE HYDROGENATION/BUTADIENE EXTRACTION</b>	5-1
	PROCESS REVIEW	5-1
	PROCESS DESCRIPTION	5-2
	Selective Acetylene Hydrogenation (Section 100)	5-2
	Butadiene Extraction (Section 200)	5-3
	PROCESS DISCUSSION	5-8
	Selective Acetylene Hydrogenation Reaction System	5-8
	Exothermic Temperature Control	5-8
	Production Capacity	5-8

## CONTENTS (Continued)

<b>5 SELECTIVE ACETYLENE HYDROGENATION/BUTADIENE EXTRACTION (Concluded)</b>	
COST ESTIMATES	5-9
Investment Costs	5-9
Production Costs	5-9
<b>6 BUTADIENE HYDROGENATION TECHNICAL REVIEW</b>	6-1
HYDROGENATION CHEMISTRY	6-1
HYDROGENATION CATALYSTS AND CHEMISTRY	6-2
Metal Function	6-2
Hydrogenation Mechanism	6-3
Vapor Phase Hydrogenation Mechanism	6-3
Liquid Phase Hydrogenation Mechanism	6-3
Catalyst Poisons	6-4
Catalyst Disposal	6-4
HYDROGENATION THERMODYNAMICS	6-6
HYDROGENATION PROCESS CONDITIONS	6-6
Reaction Conditions	6-7
Hydrogen/Butadiene Ratio	6-7
Recycle Ratio	6-9
Pressure	6-9
Reactor Configuration	6-9
Stand-Alone Reactor	6-9
Catalytic Distillation	6-10
Cycle Length	6-10
COMMERCIAL PROCESSES	6-10
<b>7 SELECTIVE BUTADIENE HYDROGENATION</b>	7-1
PROCESS DESCRIPTION	7-3
Single-Reactor System (Cases 1 and 2)	7-3
Two-Reactor System (Case 3)	7-4

## CONTENTS (Continued)

<b>7 SELECTIVE BUTADIENE HYDROGENATION (Concluded)</b>	
PROCESS DISCUSSION	7-17
Reactor System	7-17
Exothermic Temperature Control	7-17
Butene Isomerization	7-17
Hydrogenation Catalyst	7-18
Hydrogenation Catalyst Poison	7-18
Hydrogen Requirement	7-18
Storage Requirements	7-19
COST ESTIMATES	7-19
Investment Costs	7-19
Production Costs	7-19
SELECTIVE BUTADIENE HYDROGENATION ECONOMICS	7-29
<b>8 TOTAL STEAM CRACKER C<sub>4</sub> HYDROGENATION</b>	8-1
PROCESS DESCRIPTION	8-1
PROCESS DISCUSSION	8-7
Exothermic Temperature Control	8-7
Hydrogen Requirement	8-7
Product Recovery	8-7
Hydrogenation Catalyst	8-7
Hydrogenation Catalyst Poison	8-8
Storage Requirements	8-8
COST ESTIMATES	8-8
Investment Costs	8-8
Production Costs	8-8
TOTAL STEAM CRACKER C <sub>4</sub> HYDROGENATION ECONOMICS	8-8
<b>APPENDIX A: PHYSICAL PROPERTIES</b>	A-1
<b>APPENDIX B: POLYMER AND RUBBER GRADE SPECIFICATIONS</b>	B-1
<b>APPENDIX C: HAZARDS</b>	C-1
<b>APPENDIX D: COEFFICIENT OF RELATIVE VOLATILITY FOR C<sub>4</sub> HYDROCARBON IN NMP, DMF, AND DMAC</b>	D-1

## CONTENTS (Concluded)

<b>APPENDIX E: PHYSICAL PROPERTIES OF NMP, DMF, AND DMAC</b>	<b>E-1</b>
<b>APPENDIX F: PATENT SUMMARY TABLES</b>	<b>F-1</b>
<b>APPENDIX G: DESIGN AND COST BASES</b>	<b>G-1</b>
<b>APPENDIX H: CITED REFERENCES</b>	<b>H-1</b>
<b>APPENDIX I: PATENT REFERENCES BY COMPANY</b>	<b>I-1</b>
<b>APPENDIX J: PROCESS FLOW DIAGRAMS</b>	<b>J-1</b>



## ILLUSTRATIONS

3.1	Historical World and U.S. Butadiene Production	3-7
3.2	Historical Butadiene Production and Trade	3-8
3.3	World and Regional Butadiene Consumption: 1994	3-9
3.4	Historical Butadiene to Ethylene Price Ratio	3-13
4.1	Butadiene Extraction by Nippon Zeon Dimethylformamide Process	J-3
4.2	Butadiene Extraction by BASF N-Methylpyrrolidone Process	J-5
4.3	Butadiene Extraction Economics: U.S. Gulf Coast, 1994	4-25
4.4	U.S. Butadiene Extraction Economics: Western Europe, 1994	4-27
4.5	Butadiene Extraction Profitability: Western Europe, 1994	4-28
4.6	Butadiene Extraction Economics: Korea, 1994	4-29
4.7	Butadiene Extraction Profitability: Korea, 1994	4-30
5.1	Selective Acetylene Hydrogenation/Butadiene Extraction Process	J-7
6.1	Butadiene Hydrogenation Mechanism	6-5
6.2	Effects of Hydrogen/Butadiene Ratio	6-8
7.1	Traditional Steam Cracker C <sub>4</sub> Recovery Schemes	7-2
7.2	Selective Butadiene Hydrogenation Cases 1 and 2: 0.2 wt% Butadiene in Product	7-6
7.3	Selective Butadiene Hydrogenation Case 3: 500 ppm Butadiene in Product	7-7
8.1	Total Steam Cracker C <sub>4</sub> Hydrogenation Process	8-3
8.2	Return on Investment in Asia-Pacific: Hydrogen at Fuel Value and Steam Cracker C <sub>4</sub> s at 90% of Naphtha Price	8-13





## TABLES

2.1	World Butadiene Supply and Demand: 1994	2-1
2.2	Effects of Extractive Distillation Solvents on the Relative Volatilities of Hydrocarbons	2-3
2.3	Summary of Butadiene Recovery Economics	2-6
2.4	Butadiene Production Cash Cost versus Spot Market Price	2-7
2.5	Summary of Steam Cracker C <sub>4</sub> Hydrogenation Economics	2-8
2.6	Effect of Steam Cracker C <sub>4</sub> s Value on C <sub>4</sub> Olefins Product Cost	2-9
3.1	Butadiene Plant Capacity, Location, and Extraction Processes	3-2
3.2	World Butadiene Supply and Demand: 1994	3-6
3.3	World Butadiene Consumption for Derivatives	3-10
3.4	Butadiene Spot Price: 1994	3-14
3.5	Plants Practicing Selective Hydrogenation of Steam Cracker C <sub>4</sub> s	3-15
3.6	Plants Practicing Total Hydrogenation of Steam Cracker C <sub>4</sub> s	3-16
4.1	Boiling Points of Steam Cracking C <sub>4</sub> Stream Components	4-1
4.2	Boiling Points and Solubilities of Hydrocarbons in Dimethylformamide	4-3
4.3	Butadiene Extraction by the Dimethylformamide Process Design Basis	4-3
4.4	Butadiene Extraction by the Nippon Zeon Dimethylformamide Process Stream Flows	4-5
4.5	Butadiene Extraction by the Nippon Zeon Dimethylformamide Process Major Equipment	4-6
4.6	Butadiene Extraction by the Nippon Zeon Dimethylformamide Process Utilities Summary	4-8
4.7	Butadiene Extraction by the Nippon Zeon Dimethylformamide Process Total Capital Investment	4-10
4.8	Butadiene Extraction by the Nippon Zeon Dimethylformamide Process Production Costs	4-11
4.9	Boiling Points and Solubilities of Hydrocarbons in N-Methylpyrrolidone at 40°C	4-13

## TABLES (Continued)

4.10	Butadiene Extraction by the N-Methylpyrrolidone Process Design Basis	4-14
4.11	Butadiene Extraction by the BASF N-Methylpyrrolidone Process Stream Flows	4-16
4.12	Butadiene Extraction by the BASF N-Methylpyrrolidone Process Major Equipment	4-17
4.13	Butadiene Extraction by the BASF N-Methylpyrrolidone Process Utilities Summary	4-19
4.14	Butadiene Extraction by the BASF N-Methylpyrrolidone Process Total Capital Investment	4-21
4.15	Butadiene Extraction by the BASF N-Methylpyrrolidone Process Production Costs	4-22
4.16	Butadiene Spot Price: 1994	4-24
5.1	Selective Acetylene Hydrogenation/Butadiene Extraction Process Stream Flows	5-4
5.2	Selective Acetylene Hydrogenation/Butadiene Extraction Process Major Equipment	5-5
5.3	Selective Acetylene Hydrogenation/Butadiene Extraction Process Utilities Summary	5-7
5.4	Selective Acetylene Hydrogenation/Butadiene Extraction Process Total Capital Investment	5-10
5.5	Selective Acetylene Hydrogenation/Butadiene Extraction Process Capital Investment by Section	5-11
5.6	Capital Investment for Selective Acetylene Hydrogenation/ Single-Stage Extraction and Two-Stage Extraction	5-12
5.7	Selective Acetylene Hydrogenation/Butadiene Extraction Process Production Costs	5-13
5.8	Butadiene Production by Selective Acetylene Hydrogenation/Butadiene Extraction and Two-Stage Extraction Processes	5-15
6.1	Butadiene Hydrogenation Patent Summary	A-3

## TABLES (Continued)

6.2	Equilibrium Distribution of Normal Butenes	6-6
6.3	Operating Conditions for Two-Stage Selective Butadiene Hydrogenation	6-7
7.1	Selective Butadiene Hydrogenation Design Basis	7-5
7.2	Case 1: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Minimum Isomerization Stream Flows	7-8
7.3	Case 2: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Maximum Isomerization Stream Flows	7-9
7.4	Case 3: Selective Butadiene Hydrogenation to Produce 500 ppm Butadiene in Product with Isomerization Stream Flows	7-10
7.5	Case 1: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Minimum Isomerization Major Equipment	7-11
7.6	Case 2: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Maximum Isomerization Major Equipment	7-12
7.7	Case 3: Selective Butadiene Hydrogenation to Produce 500 ppm Butadiene in Product with Isomerization Major Equipment	7-13
7.8	Case 1: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Minimum Isomerization Utilities Summary	7-14
7.9	Case 2: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Maximum Isomerization Utilities Summary	7-15
7.10	Case 3: Selective Butadiene Hydrogenation to Produce 500 ppm Butadiene in Product with Isomerization Utilities Summary	7-16
7.11	Case 1: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Minimum Isomerization Total Capital Investment	7-20

## TABLES (Concluded)

7.12	Case 2: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Maximum Isomerization Total Capital Investment	7-21
7.13	Case 3: Selective Butadiene Hydrogenation to Produce 500 ppm Butadiene in Product with Isomerization Total Capital Investment	7-22
7.14	Selective Butadiene Hydrogenation Capital Investment	7-23
7.15	Case 1: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Minimum Isomerization Production Costs	7-24
7.16	Case 2: Selective Butadiene Hydrogenation to Produce 0.2 wt% Butadiene in Product with Maximum Isomerization Production Costs	7-26
7.17	Case 3: Selective Butadiene Hydrogenation to Produce 500 ppm Butadiene in Product with Isomerization Production Costs	7-28
7.18	C <sub>4</sub> Olefins Product Cost	7-30
7.19	Effect of Steam Cracker C <sub>4</sub> s Value on C <sub>4</sub> Olefins Product Cost	7-31
7.20	MTBE Price: U.S. Gulf Coast	7-32
8.1	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Design Basis	8-2
8.2	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Stream Flows	8-4
8.3	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Major Equipment	8-5
8.4	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Utilities Summary	8-6
8.5	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Total Capital Investment	8-10
8.6	Total Steam Cracker C <sub>4</sub> Hydrogenation Process Production Costs	8-11