

Abstract
Process Economics Program Report 69A
ACETAL RESINS
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Acetal resins, also known as polyacetals or polyoxymethylenes (POM) with characteristic building blocks $-\text{CH}_2\text{O}-$ (oxymethylene oxide), is a family of crystalline engineering plastics, known for their natural lubricity, dimensional stability, stiffness, fatigue endurance, creep and corrosion resistance, combined with regrind stability and ease of molding. They consist mainly of homopolymers and copolymers.

Homopolymers are produced by polymerizing formaldehyde and are produced by companies such as DuPont in the United States and Western Europe, and by Asahi Kasei in Japan. Copolymers, on the other hand, are produced by copolymerizing trioxane with a small amount of a co-monomer by companies such as Ticona (owned by Hoechst Celanese) and Ultraform (owned by BASF) in the United States and Western Europe; and by Asahi Kasei, Mitsubishi Gas Chemical and Polyplastics (Daicel and Hoechst Celanese joint venture) in Japan.

Growth of acetal resins has been driven by strong consumption in United States, Western Europe and Asia, as well as new grades in new uses in automobiles, electronics, medical devices, and sanitary sectors. Since the issue of PEP Report "Acetal Resins" (June 1971), main technology development efforts of the producers have been concentrated particularly on heat stabilization and tailor-made specialty grades/blends.

This report presents a comprehensive assessment of the status of the acetal resins industry, particularly homopolymers and copolymers. It provides a review of current patents and recent business/technology developments, and evaluates two major commercial processes. This report also presents updates of the techno-economics in the production of homopolymers from formaldehyde and copolymers from trioxane. Results of our economic analysis indicate that the homopolymerization process is somewhat more expensive in total fixed capital than the copolymerization process for producing acetal resins of comparable properties. Although the raw material costs for the homopolymer is lower, the higher cost of utilities and capital related fixed costs nonetheless result in product value that is about 15% higher than the copolymer.

Overall, this report encompasses the latest technology developments and process economics, and it provides a basis for insight into acetal resin's technology trends.

CONTENTS

1	INTRODUCTION	1-1
2	SUMMARY	2-1
	GENERAL/MARKET ASPECTS.....	2-1
	TECHNOLOGICAL DEVELOPMENTS	2-5
	Homopolymer Acetal Resins	2-7
	Copolymer Acetal Resins	2-7
	PROCESS ECONOMICS SUMMARY	2-8
3	INDUSTRY STATUS	3-1
	INTRODUCTION	3-1
	IMPORTANT CHARACTERISTICS	3-1
	MAJOR APPLICATIONS	3-3
	PRODUCTION AND CONSUMPTION.....	3-5
	United States	3-5
	Western Europe.....	3-6
	Japan	3-7
	Other Asia.....	3-7
	GLOBAL PRODUCERS AND CAPACITIES	3-7
	RECENT INDUSTRY DEVELOPMENT	3-10
	ENVIRONMENTAL ISSUES	3-10
4	CHEMISTRY AND PROPERTIES	4-1
	PROPERTIES.....	4-1
	HOMOPOLYMERS	4-2
	Polymerization of Formaldehyde.....	4-3
	Polymerization of Trioxane	4-5
	COPOLYMERS	4-6

CONTENTS (Continued)

5	STABILIZATION AND MODIFIED ACETAL RESIN PRODUCTS	5-1
	KINDS OF DEGRADATION	5-1
	STABILIZATION TECHNIQUES AND MODIFIED PRODUCTS.....	5-2
	Stabilization of Polymer End-Groups	5-2
	Copolymerization.....	5-4
	Additives	5-5
	Stabilization against Thermal/Oxidative Degradation	5-6
	Stabilization against Photo-Oxidative Degradation	5-7
	Nucleation.....	5-8
	Lubricants and Release Agents	5-9
	Fillers and Reinforcement Agents	5-10
	Colorants	5-11
	Elastomers.....	5-11
6	ACETAL HOMOPOLYMER RESIN FROM FORMALDEHYDE	6-1
	REVIEW OF PROCESSES	6-1
	Formaldehyde Synthesis	6-3
	Formaldehyde Purification.....	6-4
	Formaldehyde Polymerization	6-5
	Chain-End Stabilization	6-7
	Final Finishing/Processing.....	6-8
	PROCESS DESCRIPTION	6-9
	Formaldehyde Production (Section 100).....	6-9
	Formaldehyde Polymerization (Section 200)	6-9
	Chain-End Stabilization (Section 300).....	6-10
	Final Finishing (Section 400).....	6-10
	PROCESS DISCUSSION.....	6-25
	COST ESTIMATES	6-25

CONTENTS (Concluded)

Capital Costs	6-25
Production Costs	6-26
7 ACETAL COPOLYMER RESIN FROM TRIOXANE	7-1
REVIEW OF PROCESSES	7-1
Trioxane Production	7-3
Copolymerization	7-4
Catalyst Deactivation and Recovery of Unconverted Monomers	7-9
End-Group Stabilization	7-12
Final Processing/Finishing	7-16
PROCESS DESCRIPTION	7-16
Formaldehyde and Trioxane Productions (Section 100 and 200)	7-17
Copolymerization (Section 300)	7-17
Thermal Stabilization (Section 400)	7-17
Final Finishing (Section 500)	7-17
PROCESS DISCUSSION	7-30
COST ESTIMATES	7-31
Capital Costs	7-31
Production Costs	7-31
APPENDIX A: PATENT SUMMARY TABLES	A-1
APPENDIX B: DESIGN AND COST BASES	B-1
APPENDIX C: POLYMER PROPERTIES	C-1
APPENDIX D: CITED REFERENCES	D-1
APPENDIX E: PATENT REFERENCES BY COMPANY	E-1
APPENDIX F: PROCESS FLOW DIAGRAM	F-1

ILLUSTRATIONS

2.1	Consumption Pattern of Acetal Resins in Major Regions	2-2
3.1	Consumption Level of Acetal Resins in the Major Regions	3-6
6.1	Acetal Homopolymer Resin from Formaldehyde Alternative Processing Routes	6-2
6.3	Acetal Homopolymer from Formaldehyde Influence of Plant Design Capacity and Methanol Cost on the Total Production Cost of Acetal Homopolymer Resin	6-32
7.1	Acetal Mono- and Copolymer Resin from Trioxane Alternative Processing Routes	7-2
7.3	Acetal Copolymer from Trioxane Influence of Plant Design Capacity and Methanol Cost on the Total Production Cost of Acetal Copolymer Resin	7-39

TABLES

2.1	Production and Consumption for Acetal Resins by Major Regions, 2001	2-3
2.2	Major Acetal Resins Producers--Annual Capacity 2002	2-3
2.3	How to Improve Acetal Resins	2-6
2.4	What Buyers Want in Acetal Resins.....	2-6
2.5	Acetal Homopolymer and Copolymer Resins Process Economics Summary	2-9
3.1	General Properties of Acetal Resins	3-2
3.2	Major Acetal Resins Producers--Annual Capacity 2002	3-8
5.1	Stabilization of Acetal Resins Patent Summary.....	A-3
5.2	Degradation Rate with Ester- or Etherification and Addition of Additives	5-4
6.1	Polymerization of Formaldehyde Homopolymers Patent Summary.....	A-9
6.2	Acetal Homopolymer from Formaldehyde Design Bases and Assumptions.....	6-11
6.3	Acetal Homopolymer from Formaldehyde Stream Flows.....	6-12
6.4	Acetal Homopolymer from Formaldehyde Major Equipment	6-20
6.5	Acetal Homopolymer from Formaldehyde Utilities Summary.....	6-24
6.6	Acetal Homopolymer from Formaldehyde Total Capital Investment.....	6-27
6.7	Acetal Homopolymer from Formaldehyde Capital Investment by Section	6-28
6.8	Acetal Homopolymer from Formaldehyde Production Costs	6-30
7.1	Polymerization of Trioxane Copolymers Patent Summary.....	A-11
7.2	Acetal Copolymer from Trioxane Design Bases and Assumptions.....	7-19
7.3	Acetal Copolymer from Trioxane Stream Flows.....	7-20

TABLES (Concluded)

7.4	Acetal Copolymer from Trioxane Major Equipment	7-26
7.5	Acetal Copolymer from Trioxane Utilities Summary.....	7-29
7.6	Acetal Copolymer from Trioxane Total Capital Investment.....	7-33
7.7	Acetal Copolymer from Trioxane Capital Investment by Section	7-34
7.8	Acetal Copolymer from Trioxane Production Costs	7-37
C.1	Acetal Homopolymers and Copolymers Resins Polymer Properties	C-3