

## CONTENTS

	Page
Preface	iii
1. Introduction	1
2. Physical Properties	2
3. Chemical Reactions	14
3.1 Polymerization	16
3.2 Oxidation	19
3.3 Halogenation / Hydrohalogenation	22
3.4 Alkylation	24
3.5 Hydration	27
3.6 Oligomerization	29
3.7 Oxo Reaction (Hydroformylation)	31
3.8 Conclusion	31
4. Uses and Markets	32
5. Storage, Shipping, and Handling	36
5.1 Storage of Ethylene	36
5.2 Transportation of Ethylene	48
5.3 Handling of Ethylene	60
6. Manufacture	62
6.1 Raw Materials	62
6.2 By-Products	65
6.3 Typical Feedstock Characteristics	69
6.4 Yields	71
6.5 Product Specifications and Characteristics	71
6.6 Manufacturing Processes	72
7. The Modern Ethylene Plant	78
7.1 Ethylene Process Technology	80
7.2 A Typical Ethylene Manufacturing Process	84
7.3 The Role of the computer	104
7.4 Plant Safety	106
8. The Pyrolysis of Hydrocarbons	109
8.1 Free Radical Mechanism	110
8.2 Single component Feedstocks	111
8.3 Naphthas and Gas Oils	113
8.4 Kinetics	117
8.5 Furnace Design Concepts	126
8.6 Heaters and Transferline Exchangers	128
9. Ethylene Plants and Petroleum Refineries	143
10. The Economics of Ethylene Manufacture	146
10.1 Economic Analysis of Ethylene Manufacturing Facilities	150
10.2 Elements of the Cost of Processing	151
10.3 Application of the Cost of Processing Method	155
10.4 Outlook	157
References	158
Index	166