

CONTENTS

1	Introduction	1
2	Physical Properties	3
3	Chemical Properties	11
4	Chlor-Alkali Process	19
4.1	Brine Supply	24
4.2	Electricity Supply	26
5	Mercury Cell Process	29
5.1	Principles	30
5.2	Mercury Cells	37
5.3	Operation	40
6	Diaphragm Process	51
6.1	Principles	51
6.2	Diaphragm Cells	56
6.3	Operation	66
7	Membrane Process	77
7.1	Principles	77
7.2	Process Specific Aspects	83
7.3	Membrane Cells	95
8	Electrodes	109
8.1	Anodes	109
8.2	Activated Cathode Coatings	114
9	Comparison of the Processes	117
9.1	Product Quality	117
9.2	Economics	119
9.3	Sodium Hydroxide and Potassium Hydroxide	122

10	Other Production Processes	133
10.1	Electrolysis of Hydrochloric Acid	133
10.2	Chemical Processes	135
11	Chlorine Purification and Liquefaction	139
11.1	Cooling	139
11.2	Chlorine Purification	140
11.3	Drying	142
11.4	Transfer and Compression	142
11.5	Liquefaction	143
11.6	Chlorine Recovery	145
12	Chlorine Handling	147
12.1	Storage Systems	147
12.2	Transport	148
12.3	Chlorine Discharge Systems	151
12.4	Chlorine Vaporization	152
12.5	Treatment of Gaseous Effluents	153
12.6	Materials	154
12.7	Safety	155
13	Quality Specifications and Analytical Methods	157
13.1	Quality Specifications	157
13.2	Analytical Methods	157
14	Uses of Chlorine	159
14.1	Use of Elemental Chlorine	160
14.2	Inorganic Nonmetal Chlorides	166
14.3	Metal Chlorides	174
14.4	Silicon	177
14.5	Phosgene	180
14.6	Chlorinated Aliphatic Hydrocarbons	184
14.7	Chlorinated Aromatic Hydrocarbons	205
14.8	Chlorine Balances	209
14.9	Environmental Aspects	211
15	Economic Aspects	223
16	Toxicology	227

17	Chlorine-the Past and the Future	229
18	References	231
19	Subject Index	245