Corrosion in the Petrochemical Industry

TABLE OF CONTENTS

Forms of Corrosion in the Petrochemical Industry

General Corrosion 3

Localized Corrosion 14

Metallurgically Influenced Corrosion 25

Mechanically Assisted Degradation 34

Environmentally Induced Cracking 39

Corrosion Protection Methods for the Petrochemical Industry

Fundamentals of Corrosion Protection in Aqueous Solutions 77

Anodic and Cathodic Protection 80

Use of Inhibitors 88

Control of Environmental Variables in Water Recirculating Systems 9

Designing to Minimize Corrosion Materials Selection 113

Corrosion of Weldments 126

Design Details to Minimize Corrosion 151

Corrosion in the Chemical Processing Industry Corrosive Effects of Process and Environmental Variables 164

Cleaning Process Equipment 166

Corrosion Under Thermal Insulation 173

Corrosion by Sulfuric Acid 178

Corrosion by Nitric Acid 184

Corrosion by Organic Acids 186

Corrosion by Hydrogen Chloride and Hydrochloric Acid 191
Corrosion by Hydrogen Fluoride and Hydrofluoric Acid 196
Corrosion by Chlorine 201
Corrosion by Alkalies and Hypochlorite 204
Corrosion by Ammonia 212
Corrosion Failures of Pressure Vessels 214
Case Histories in Failure Analysis 225
Literature Sources 247
Corrosion in Petroleum Production Operations Causes of Corrosion 259
Corrosion Control Methods 266
Corrosion Control in Field Operations 278
Failures in Field Environments 291
Industry Standards 292
Case Histories in Failure Analysis 297
Literature Sources 313
Corrosion in Petroleum Refining and Petrochemical Operations Materials Selection 321
Low- and High-Temperature Corrosion 325
SCC and Embrittlement 334
Erosion-Corrosion 342
Corrosion Control 343
Case Histories in Failure Analysis 349
Literature Sources 363
Corrosion of Petrochemical Pipelines
Causes of Pipeline Corrosion 371
Corrosion Control and Prevention 372

Corrosion of Specific Types of Pipelines 375

Case Histories in Failure Analysis 379

Literature Sources 389

Corrosion Data 397

Glossary of Terms 453

Index 461