

Table of Contents

Preface

I Fundamentals

I.1	Separation and Separator Efficiencies	3
I.2	Equilibrium Considerations	7
I.3	Effect of Inert Substances	9
I.4	Flow Rate Limitations	11
I.5	Energy and Power Considerations	12
I.6	DV Process Elements	17
I.7	Diffusion-Controlled DV	19
I.8	Staging	23
I.9	Foam-Induced DV	28
	References to Section I	31

II Equipment

II.1	Flash Evaporators and Falling Strand Devolatilizers – General Principles	35
II.2	Flash Evaporators and Falling Strand Devolatilizers – Designs and Uses	38
	References to Sections II.1 and II.2	50
II.3	Thin-Film Evaporators	51
	References to Section II.3	64
II.4	Vented Single-Screw Extruders	65
	References to Section II.4	77
II.5	Vented Twin-Screw Extruders	78
	References to Section II.5	85

III Transport Properties

III.1	Diffusion in Polymer Melts	89
III.1.1	Introduction	89
III.1.2	Qualitative Characteristics	90
III.1.3	Free-Volume Concepts	95
III.1.4	Prediction of Diffusion Coefficients	97
III.1.4.1	Infinitely Dilute Case	98
III.1.4.2	General Case	109
III.1.5	Diffusion in the Vicinity of the Glass Transition Temperature	119
III.1.6	Experimental Considerations	122
	References to Section III.1	124
III.2	Diffusion in Polymeric Solids	125
III.2.1	Diffusion of VCM in PVC	125

III.2.2	Application to Residual Manover Removal	128
III.2.3	Vapor Sorption Studies of PVC	132
III.2.3.1	Particle Size and Distribution	132
III.2.3.2	Free Volume and History Effects	135
III.2.3.3	Relaxation Effects	137
III.2.3.4	Effects of Probe Molecule Size	138
	References to Section III.2	141
IV	Separation Analysis by Gas Chromatography	
IV.1	Introduction	145
IV.1.1	Selectivity and Efficiency of GC Columns	147
IV.2	Chromatographic Separations	151
IV.2.1	Solvents	151
IV.2.2	Hydrocarbons	157
IV.2.3	Aromatics	160
IV.2.4	Vinyl Chloride	161
IV.2.5	Glycols	162
IV.2.6	Organic Acids	163
IV.2.7	Phenols	165
IV.3	Quantitative Gas Chromatography	169
IV.3.1	External Standard Calibration	169
IV.3.2	Internal Standard Calibration	170
IV.3.3	Method of Standard Additions	171
IV.4	Gas Chromatography in Analyses of Plastic Compositions	172
IV.4.1	Direct Injection of Polymer Solutions	172
IV.4.2	Examples of Direct Solution Injections	174
IV.5	Injection of Vapors over Plastic Compositions	181
IV.5.1	Examples of Headspace Polymer Analyses	184
IV.6	Special Analytical Techniques	192
IV.6.1	Discontinuous Gas Extraction	192
IV.6.2	Variable Loading Equilibration Technique	195
IV.6.3	Multiple Extraction Technique	198
IV.6.4	Thermal Desorption and Pyrolysis	198
IV.7	Post Scriptum	199
	References to Section IV	200
Index		203