

CONTENTS OF VOLUME 2, PART I

<i>Preface to Volume 2, Part I</i>	v
<i>Contributors to Volume 2, Part I</i>	vii
<i>Contents of Volume 1, Part I</i>	xv
<i>Contents of Volume 1, Part II</i>	xvii
<i>Partial Contents of Volume 1, Part III</i>	xix
<i>Partial Contents of Volume 2, Part II</i>	xxi
1. THE INTRINSIC PROPERTIES OF POLYMERS	1
<i>A. R. H. Tawn</i>	
1-1. Introduction	1
1-2. Primary Bond Structures and Properties of Polymers	3
1-3. Secondary Bonding in Polymers	6
1-4. Cohesive Energy	6
1-5. Polymer Crystallinity	8
1-6. The Glass Transition	10
1-7. Molecular Weights of Polymers	12
1-8. The Solubility of Polymers	14
1-9. Compatibility of Polymers	17
1-10. Viscosity in Dilute Solution	18
1-11. Effect of Concentration, Solvent, and Temperature on Dilute Solution Viscosity	20
1-12. Solution Viscosities at Higher Concentrations	22
1-13. Viscoelasticity and Mechanical Properties in General	22
List of Symbols	24
References	25
2. SURFACE AREAS	27
<i>David M. Gans</i>	
2-1. Surface Area and Particle Size	27
2-2. Methods	31
2-3. Sieving	32
2-4. Sedimentation	32

2-5. Permeability	36
2-6. Microscopy	37
2-7. Turbidimetry	38
2-8. Adsorption	39
2-9. Comparative Data	48
List of Symbols	53
References	54

3. ADHESION OF COATINGS 57

Armand F. Lewis and Lloyd J. Forrestal

3-1. Introduction	57
3-2. Adhesion Fundamentals	58
3-3. Measurements of Surface-Coating Adhesion	70
3-4. Specific Adhesion	79
3-5. The Adhesion of Thin Films	89
3-6. General Summary and Conclusions	92
List of Symbols	94
References	95

4. MECHANICAL PROPERTIES OF COATINGS 99

Percy E. Pierce

4-1. Introduction	99
4-2. Basic Principles	100
4-3. The Measurements of the Viscoelastic Behavior of Coatings	109
4-4. Practical Tests	119
4-5. The Influence of Composition Variables on the Mechanical Behavior of Coatings	122
4-6. General Observations on Testing	127
List of Symbols	128
References	129

5. THE ULTIMATE TENSILE PROPERTIES OF PAINT FILMS 131

Robert M. Evans

5-1. The Stress-Strain Curve of a Rubber	134
5-2. Stress-Relaxation of Rubbers	137
5-3. Effect of Rate on Ultimate Properties	139
5-4. Effect of Strain Rate on Properties of Coating Films	142
5-5. Effect of Temperature on Ultimate Properties	145
5-6. Effect of Plasticizers and of Water	145
5-7. The Effect of Copolymerization on Properties	148

5-8. Effect of Pigments on Film Properties	150
5-9. Critical Pigment-Volume Concentration	154
5-10. Effect of Internal Stresses	156
5-11. The Effect of Interior Aging	161
5-12. Prediction of Exterior Weathering from Tensile Properties	164
5-13. Prediction of Abrasion Resistance from Tensile Properties	178
List of Symbols	188
References	189

6. GAS CHROMATOGRAPHY	191
------------------------------	-----

J. K. Haken

6-1. Introduction	191
6-2. Retention Date	198
6-3. Qualitative Analysis	205
6-4. Quantitative Analysis	218
6-5. Analysis of Solvents, Monomers, and Plasticizers	221
6-6. Alkyd Resins	231
6-7. Resins and Their Components	238
6-8. Vegetable Oils	241
6-9. Pyrolysis Gas Chromatography	249
6-10. Examination of Films	262
References	263
List of Symbols	270

7. THERMOANALYTICAL TECHNIQUES	271
---------------------------------------	-----

Paul D. Garn

7-1. Introduction	271
7-2. Calorimetry	272
7-3. Differential Thermal Analysis	276
7-4. Applications of Temperature Measurements	282
7-5. Thermogravimetric Analysis	291
7-6. Analysis of Gaseous Decomposition Products	298
7-7. Choice of Experimental Conditions	300
7-8. Conclusion	305
References	305

8. MICROSCOPY IN COATINGS AND COATING INGREDIENTS	307
--	-----

W. K. Lind

8-1. Introduction	307
8-2. Tools of the Microscopist	308

8-3. Microscopical Examination of Pigments	330
8-4. Microscopical Examination of Paints	354
8-5. Microscopical Examination of Paint Films	360
8-6. Microscopical Study of Special Paints	368
References	370
List of Symbols	372
9. RADIOACTIVE ISOTOPES	373
<i>Gordon R. Coe</i>	
9-1. Introduction	373
9-2. Review of Fundamental Concepts	374
9-3. Radiation Detection	383
9-4. Applicability of Radiochemical Techniques	396
9-5. Radiation Effects on Organic Coatings	415
9-6. Activation Analysis	416
9-7. Licensing Requirements	420
9-8. Health Physics	421
Appendix	422
Definitions	423
References	423
Glossary	427
10. INFRARED SPECTROSCOPY	429
<i>Clara D. Smith</i>	
10-1. Introduction	429
10-2. Theory	431
10-3. Instrumentation	440
10-4. Qualitative Analysis	443
10-5. Quantitative Analysis	474
10-6. Monitoring Chemical Changes in Coatings Materials	478
10-7. Internal-Reflection Spectroscopy	484
10-8. Structural Analysis with Polarized Radiation	493
10-9. Automated Analysis	494
10-10. Infrared Spectroscopic References on Polymers by Chemical Class	495
List of Symbols	498
References	498
11. ULTRAVIOLET AND VISIBLE SPECTROSCOPY	501
<i>Frank Spagnolo and Edward R. Scheffer</i>	
Preface	502
Part I. Ultraviolet Spectroscopy	502
11-1. Introduction	502

11-2. Theory and Nomenclature	503
11-3. Absorption-Band Types	504
11-4. Basic Relationships for Quantitative Analysis	505
11-5. Instrumentation	506
11-6. Separation and Sample Pretreatment	508
11-7. Methods of Analysis	513
Part II. Visible Spectroscopy	557
11-8. Introduction	557
11-9. Instrumentation	558
11-10. Method of Separation and Sample Pretreatment	558
11-11. Methods	558
List of Symbols	561
References	562
12. COLOR OF POLYMERS AND PIGMENTED SYSTEMS	567
<i>George W. Ingle</i>	
12-1. Introduction	567
12-2. Theory of Color and Its Measurement	569
12-3. Color Measurements and Practice	576
12-4. Advances in Colorants	584
12-5. Color Styling	589
List of Symbols	594
References	594
13. PHOTOELASTIC COATINGS	597
<i>Alexandre Blumstein</i>	
13-1. Introduction	597
13-2. Physics of Photoelastic Coatings	599
13-3. Application of Photoelastic Coating to the Analysis of Stresses	611
List of Symbols	635
References	636
<i>Author Index</i>	639
<i>Subject Index</i>	655