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# ELASTOMERS AND PLASTOMERS

*Edited by*

R. HOUWINK

EXTERNAL LECTURER IN THE TECHNICAL UNIVERSITY AT DELFT  
(NETHERLANDS)

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R. HOUWINK

EXTERNAL LECTURER IN THE TECHNICAL UNIVERSITY AT DELFT  
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# CONTENTS

Page

## 1. PHENOL-FORMALDEHYDE PLASTOMERS

by R. HOUWINK (*Wassenaar, Netherlands*).

|       |                                                                                                               |    |
|-------|---------------------------------------------------------------------------------------------------------------|----|
| § 1.  | Introduction . . . . .                                                                                        | 1  |
| § 2.  | Raw materials . . . . .                                                                                       | 1  |
| § 3.  | Manufacture of the resins . . . . .                                                                           | 5  |
| § 4.  | Hardening of the resins . . . . .                                                                             | 10 |
|       | a. <i>The phenol- and cresol formaldehyde resins</i> . . . . .                                                | 10 |
|       | b. <i>The aniline resins</i> . . . . .                                                                        | 15 |
| § 5.  | P. F. Resins for varnishes, paints and lacquers<br>by C. P. A. KAPPELMEIER ( <i>Sassenheim, Netherlands</i> ) |    |
|       | a. Introduction . . . . .                                                                                     | 17 |
|       | b. <i>Classification of phenolic resins for the varnish industry</i> . . . . .                                | 19 |
|       | c. <i>Rosin modified phenolic resins</i> . . . . .                                                            | 19 |
|       | d. <i>Alkyl phenolic resins (Oil-reactive phenolics)</i> . . . . .                                            | 22 |
|       | e. <i>Pure phenolic setting resins (Resols)</i> . . . . .                                                     | 23 |
|       | f. <i>Plasticised and/or elasticised phenolic setting resins</i> . . . . .                                    | 25 |
|       | g. <i>Pure phenolic non-setting resins (Novolaks)</i> . . . . .                                               | 27 |
|       | h. <i>Mixed phenolic resin esters</i> . . . . .                                                               | 27 |
|       | i. <i>Terpene phenolic resins</i> . . . . .                                                                   | 27 |
|       | j. <i>Combinations of phenolic resins with other synthetic resins</i> . . . . .                               | 28 |
|       | k. <i>Application of phenolic resins in the varnish industry</i> . . . . .                                    | 28 |
|       | l. <i>Practical applications of phenolic resin based varnishes</i> . . . . .                                  | 28 |
|       | m. <i>Conclusion and prospects</i> . . . . .                                                                  | 29 |
| § 6.  | The applications of straight phenol-formaldehyde resins . . . . .                                             | 29 |
|       | a. <i>Adhesives</i> . . . . .                                                                                 | 30 |
|       | b. <i>Cast resins</i> . . . . .                                                                               | 30 |
|       | c. <i>Straight resin moulding materials</i> . . . . .                                                         | 30 |
|       | 1. <i>Phenol-formaldehyde resins</i> . . . . .                                                                | 32 |
|       | 2. <i>Based on anilin resins</i> . . . . .                                                                    | 32 |
| § 7.  | Moulding components . . . . .                                                                                 | 34 |
|       | a. <i>The fillers</i> . . . . .                                                                               | 34 |
|       | b. <i>Manufacture of moulding powders</i> . . . . .                                                           | 37 |
|       | c. <i>Flow properties and hardening velocity</i> . . . . .                                                    | 39 |
|       | d. <i>The moulding process</i> . . . . .                                                                      | 43 |
|       | e. <i>Extrusion (jet moulding)</i> . . . . .                                                                  | 49 |
| § 8.  | Properties of the moulded products . . . . .                                                                  | 49 |
| § 9.  | Making of laminated materials . . . . .                                                                       | 56 |
|       | a. <i>Raw materials</i> . . . . .                                                                             | 56 |
|       | b. <i>Manufacture</i> . . . . .                                                                               | 58 |
| § 10. | Properties of laminated materials . . . . .                                                                   | 62 |
| § 11. | Machining . . . . .                                                                                           | 71 |
|       | References . . . . .                                                                                          | 73 |

## 2. SYNTHETIC RESIN ION EXCHANGERS

by A. VAN ROYEN (*Delft, Netherlands*).

|      |                               |    |
|------|-------------------------------|----|
| § 1. | Introduction . . . . .        | 76 |
| § 2. | Structures . . . . .          | 77 |
|      | a. <i>Wofatit P</i> . . . . . | 78 |
|      | b. <i>Wofatit C</i> . . . . . | 79 |

|                                                                                             | Page |
|---------------------------------------------------------------------------------------------|------|
| c. Wofatit KS . . . . .                                                                     | 79   |
| d. Wofatit M . . . . .                                                                      | 79   |
| e. Dowex . . . . .                                                                          | 80   |
| § 3. Properties . . . . .                                                                   | 81   |
| § 4. Applications . . . . .                                                                 | 84   |
| References . . . . .                                                                        | 87   |
| <br>3. UREA AND MELAMINE RESINS                                                             |      |
| <i>by G. WIDMER and K. FREY (Basle, Switzerland).</i>                                       |      |
| § 1. General . . . . .                                                                      | 88   |
| § 2. Basic raw materials . . . . .                                                          | 88   |
| a. Urea . . . . .                                                                           | 88   |
| b. Thiourea . . . . .                                                                       | 89   |
| c. Aminotriazine (Melamine) . . . . .                                                       | 90   |
| § 3. The course of the condensation reactions . . . . .                                     | 91   |
| a. General. . . . .                                                                         | 91   |
| b. Urea. . . . .                                                                            | 92   |
| c. Thioureas . . . . .                                                                      | 97   |
| d. Melamine . . . . .                                                                       | 97   |
| § 4. Properties and technical production of carbamide and<br>aminotriazine resins . . . . . | 99   |
| a. Raw materials and first applications . . . . .                                           | 99   |
| b. Moulding compounds . . . . .                                                             | 99   |
| c. Laminated products. . . . .                                                              | 107  |
| d. Adhesives for wood . . . . .                                                             | 107  |
| e. Lacquers based on urea and melamine resins . . . . .                                     | 111  |
| f. Applications in the textile field . . . . .                                              | 112  |
| g. Applications in the paper industry . . . . .                                             | 114  |
| h. Diverse applications . . . . .                                                           | 115  |
| 1. Tanning agents. . . . .                                                                  | 115  |
| 2. Cork bonding agents . . . . .                                                            | 115  |
| 3. Core banding agents . . . . .                                                            | 116  |
| 4. Stiffening caps for shoes . . . . .                                                      | 117  |
| 5. Foam materials. . . . .                                                                  | 117  |
| References . . . . .                                                                        | 118  |
| <br>4. POLYMERS FROM ETHYLENE DERIVATIVES                                                   |      |
| <i>by H. T. NEHER (Philadelphia, U.S.A.).</i>                                               |      |
| § 1. Introduction . . . . .                                                                 | 119  |
| § 2. Preparation of the monomers . . . . .                                                  | 120  |
| a. Styre . . . . .                                                                          | 120  |
| b. Ethylene and isobutylene . . . . .                                                       | 121  |
| c. Vinyl esters . . . . .                                                                   | 122  |
| d. Vinyl ethers . . . . .                                                                   | 124  |
| e. Heterocyclic vinyl compounds . . . . .                                                   | 124  |
| f. Vinyl ketones . . . . .                                                                  | 125  |
| g. Allyl compounds . . . . .                                                                | 125  |
| h. Acrylic and methacrylic acid compounds . . . . .                                         | 127  |
| § 3. Polymerization . . . . .                                                               | 130  |
| a. Polymerization catalysts . . . . .                                                       | 130  |

|                                                                                                                                       | Page |
|---------------------------------------------------------------------------------------------------------------------------------------|------|
| b. <i>Polymerization methods</i> . . . . .                                                                                            | 133  |
| c. <i>Copolymerization</i> . . . . .                                                                                                  | 137  |
| § 4. <i>Chemical conversion of polymers</i> . . . . .                                                                                 | 140  |
| § 5. <i>Physical treatment of polymers</i> . . . . .                                                                                  | 141  |
| § 6. <i>The individual resins and their applications.</i> . . . .                                                                     | 142  |
| a. <i>Polystyrene</i> . . . . .                                                                                                       | 142  |
| b. <i>Polyvinyl carbazole, Polyvinyl ethers</i> . . . . .                                                                             | 146  |
| c. <i>Polyethylene, Polyisobutylene</i> . . . . .                                                                                     | 147  |
| d. <i>Organic polyvinyl esters</i> . . . . .                                                                                          | 148  |
| e. <i>Inorganic polyvinyl esters and copolymers</i> . . . . .                                                                         | 148  |
| f. <i>Reaction products of polyvinyl esters</i> . . . . .                                                                             | 153  |
| g. <i>Allyl polymers</i> . . . . .                                                                                                    | 156  |
| h. <i>Acrylic resins</i> . . . . .                                                                                                    | 157  |
| References . . . . .                                                                                                                  | 164  |
| 5. THE CELLULOSE DERIVATIVES                                                                                                          |      |
| by V. E. YARSLEY ( <i>Ewell, England</i> ), H. KITCHEN<br>( <i>Birmingham, England</i> ), and W. J. GRANT ( <i>London, England</i> ). |      |
| § 1. <i>The structure of cellulose</i> . . . . .                                                                                      | 167  |
| § 2. <i>The cellulose esters and ethers</i> . . . . .                                                                                 | 173  |
| A. <i>General</i> . . . . .                                                                                                           | 173  |
| a. <i>Cellulose esters</i> . . . . .                                                                                                  | 173  |
| b. <i>Cellulose ethers</i> . . . . .                                                                                                  | 173  |
| c. <i>Cellulose ether-esters</i> . . . . .                                                                                            | 174  |
| B. <i>The cellulose esters of inorganic acids</i> . . . . .                                                                           | 175  |
| a. <i>Cellulose nitrate.</i> . . . .                                                                                                  | 175  |
| b. <i>Miscellaneous esters.</i> . . . .                                                                                               | 176  |
| 1. <i>Cellulose sulphate</i> . . . . .                                                                                                | 177  |
| 2. <i>Cellulose phosphate</i> . . . . .                                                                                               | 177  |
| C. <i>The cellulose esters of organic acids.</i> . . . .                                                                              | 177  |
| a. <i>Cellulose formate</i> . . . . .                                                                                                 | 178  |
| b. <i>Cellulose acetate</i> . . . . .                                                                                                 | 178  |
| c. <i>Cellulose propionate</i> . . . . .                                                                                              | 179  |
| d. <i>Cellulose butyrate</i> . . . . .                                                                                                | 180  |
| e. <i>Higher aliphatic acid esters</i> . . . . .                                                                                      | 181  |
| f. <i>Miscellaneous esters</i> . . . . .                                                                                              | 181  |
| D. <i>The mixed esters of cellulose</i> . . . . .                                                                                     | 181  |
| a. <i>Cellulose acetate-nitrate</i> . . . . .                                                                                         | 181  |
| b. <i>Mixed esters of organic acids</i> . . . . .                                                                                     | 182  |
| 1. <i>Cellulose acetate-propionate</i> . . . . .                                                                                      | 182  |
| 2. <i>Cellulose acetate-butyrate</i> . . . . .                                                                                        | 182  |
| c. <i>Miscellaneous mixed esters</i> . . . . .                                                                                        | 183  |
| E. <i>The cellulose ethers</i> . . . . .                                                                                              | 184  |
| a. <i>Methyl cellulose</i> . . . . .                                                                                                  | 184  |
| b. <i>Ethyl cellulose</i> . . . . .                                                                                                   | 186  |
| § 3. <i>Solvation and plasticisation of cellulose derivatives</i> . . . . .                                                           | 189  |
| a. <i>Solvation</i> . . . . .                                                                                                         | 189  |
| b. <i>Plasticisation.</i> . . . .                                                                                                     | 191  |

|                                                                                          | Page |
|------------------------------------------------------------------------------------------|------|
| § 4. The manufacture and processing of plastics from cellulose derivatives . . . . .     | 195  |
| a. <i>The manufacture of the plastic composition</i> . . . . .                           | 195  |
| b. <i>The manufacture of sheets</i> . . . . .                                            | 196  |
| c. <i>The manufacture of rods and tubes</i> . . . . .                                    | 200  |
| d. <i>The manufacture of films and foils</i> . . . . .                                   | 202  |
| 1. <i>Preparation of solution</i> . . . . .                                              | 203  |
| 2. <i>Filtration of solution</i> . . . . .                                               | 203  |
| 3. <i>Deaeration of solution</i> . . . . .                                               | 203  |
| 4. <i>The casting process</i> . . . . .                                                  | 203  |
| 5. <i>After-drying, reeling and slitting</i> . . . . .                                   | 204  |
| e. <i>The moulding of cellulose plastics</i> . . . . .                                   | 205  |
| 1. <i>Compression moulding</i> . . . . .                                                 | 205  |
| 2. <i>Transfer moulding</i> . . . . .                                                    | 205  |
| 3. <i>Injection moulding</i> . . . . .                                                   | 206  |
| f. <i>Manufacture of lacquers, coating and impregnating compositions</i> . . . . .       | 206  |
| g. <i>Miscellaneous products and processes; sponges and cellular materials</i> . . . . . | 208  |
| § 5. The properties and applications of the commercial cellulose plastics . . . . .      | 208  |
| a. <i>Mechanical properties</i> . . . . .                                                | 209  |
| 1. <i>Tensile strength</i> . . . . .                                                     | 209  |
| 2. <i>Impact strength</i> . . . . .                                                      | 212  |
| b. <i>Thermal properties</i> . . . . .                                                   | 213  |
| 1. <i>Softening temperature</i> . . . . .                                                | 213  |
| 2. <i>Flow temperature</i> . . . . .                                                     | 214  |
| c. <i>Electrical properties</i> . . . . .                                                | 215  |
| d. <i>Optical properties</i> . . . . .                                                   | 215  |
| e. <i>Stability</i> . . . . .                                                            | 215  |
| 1. <i>Water resistance</i> . . . . .                                                     | 215  |
| 2. <i>Temperature resistance</i> . . . . .                                               | 216  |
| 3. <i>Weathering</i> . . . . .                                                           | 217  |
| § 6. Analysis of cellulose plastics . . . . .                                            | 218  |
| a. <i>Identification</i> . . . . .                                                       | 218  |
| b. <i>Separation of plasticiser</i> . . . . .                                            | 219  |
| c. <i>Acetyl content of cellulose acetate</i> . . . . .                                  | 219  |
| d. <i>Nitrogen content of cellulose nitrate</i> . . . . .                                | 219  |
| e. <i>Alkoxyl and free hydroxyl content of cellulose ethers</i> . . . . .                | 220  |
| § 7. Applications . . . . .                                                              | 220  |
| a. <i>Rayon fibres</i> . . . . .                                                         | 220  |
| 1. <i>Viscose</i> . . . . .                                                              | 221  |
| 2. <i>Cuprammonium</i> . . . . .                                                         | 222  |
| 3. <i>Acetate rayon</i> . . . . .                                                        | 222  |
| 4. <i>Miscellaneous</i> . . . . .                                                        | 223  |
| 5. <i>Staple fibre</i> . . . . .                                                         | 224  |
| b. <i>Moulded plastics</i> . . . . .                                                     | 224  |
| c. <i>Sheets, films and foils</i> . . . . .                                              | 225  |
| d. <i>Lacquers, coating and impregnating compositions</i> . . . . .                      | 227  |

|                                                                                       | Page |
|---------------------------------------------------------------------------------------|------|
| e. <i>Adhesives and cements</i> . . . . .                                             | 229  |
| f. <i>Miscellaneous uses</i> . . . . .                                                | 230  |
| References . . . . .                                                                  | 231  |
| 6. PROTEIN PLASTICS                                                                   |      |
| <b>Part. I. Protein pastics other than fibres.</b>                                    |      |
| <i>by A. D. WHITEHEAD and S. H. PINNER (Manningtree, England).</i>                    |      |
| § 1. Introduction . . . . .                                                           | 240  |
| § 2. General chemistry of the proteins . . . . .                                      | 241  |
| § 3. Proteins of a special interest to the plastics and spinning industries . . . . . | 247  |
| a. Casein . . . . .                                                                   | 247  |
| b. Soya protein . . . . .                                                             | 250  |
| c. Zein and zeinin . . . . .                                                          | 252  |
| d. Arachin and conarachin . . . . .                                                   | 256  |
| e. Keratin . . . . .                                                                  | 257  |
| f. Fibrinogen . . . . .                                                               | 258  |
| g. Egg albumin . . . . .                                                              | 260  |
| h. Biological waste products . . . . .                                                | 261  |
| § 4. Theories of hardening of proteins with formaldehyde . . . . .                    | 262  |
| a. Reaction of formaldehyde with specific functional groups . . . . .                 | 262  |
| b. The analysis of protein-formaldehyde reaction products . . . . .                   | 263  |
| c. The hardening reaction . . . . .                                                   | 264  |
| d. The diffusion factor . . . . .                                                     | 265  |
| e. Reaction kinetics . . . . .                                                        | 267  |
| § 5. Modifying agents . . . . .                                                       | 268  |
| a. Chemical modification . . . . .                                                    | 268  |
| b. Waterproofing agents . . . . .                                                     | 270  |
| c. Waterproofing of zein . . . . .                                                    | 272  |
| d. Plasticisers . . . . .                                                             | 272  |
| e. Fillers . . . . .                                                                  | 273  |
| f. Clarifiers . . . . .                                                               | 274  |
| § 6. Manufacture and manipulation of casein plastics . . . . .                        | 274  |
| a. The hardening process . . . . .                                                    | 278  |
| b. Drying and finishing operations . . . . .                                          | 280  |
| § 7. Properties and uses of casein plastics . . . . .                                 | 281  |
| References . . . . .                                                                  | 283  |
| <b>Part. II. Fibres from proteins.</b>                                                |      |
| <i>by C. DIAMOND (Coventry, England).</i>                                             |      |
| § 1. Introduction . . . . .                                                           | 287  |
| § 2. Theory of fibre structure as it relates to proteins . . . . .                    | 288  |
| § 3. Chain length . . . . .                                                           | 290  |
| § 4. Constitution of proteins used in synthetic fibre processes . . . . .             | 291  |
| § 5. The fibre-spinning solution . . . . .                                            | 292  |
| § 6. Fibre-coagulation processes . . . . .                                            | 293  |

|                                                                      | Page |
|----------------------------------------------------------------------|------|
| a. <i>The Lanital (casein) process</i> . . . . .                     | 293  |
| b. <i>Arachis protein fibre</i> . . . . .                            | 295  |
| c. <i>Soybean protein fibre</i> . . . . .                            | 295  |
| d. <i>Zein fibre</i> . . . . .                                       | 296  |
| e. <i>Egg albumen fibres</i> . . . . .                               | 296  |
| f. <i>Fish protein fibres</i> . . . . .                              | 297  |
| § 7. <i>After-treatments of the coagulated fibre</i> . . . . .       | 297  |
| a. <i>Hardening and insolubilising</i> . . . . .                     | 297  |
| b. <i>After-treatments with metallic salts</i> . . . . .             | 299  |
| § 8. <i>Physical properties</i> . . . . .                            | 299  |
| § 9. <i>General properties</i> . . . . .                             | 306  |
| a. <i>Dyeing</i> . . . . .                                           | 308  |
| b. <i>Felts and other uses</i> . . . . .                             | 310  |
| References . . . . .                                                 | 311  |
| 7. SYNTHETIC POLYAMIDES                                              |      |
| <i>by L. F. SALISBURY (Wilmington, Del., U.S.A.).</i>                |      |
| § 1. <i>Introduction</i> . . . . .                                   | 313  |
| § 2. <i>Chemical reactions</i> . . . . .                             | 313  |
| § 3. <i>Commercial processes</i> . . . . .                           | 315  |
| § 4. <i>Properties and applications</i> . . . . .                    | 320  |
| References . . . . .                                                 | 327  |
| 8. SILICONE POLYMERS                                                 |      |
| <i>by J. R. ELLIOTT (Schenectady, N.Y., U.S.A.).</i>                 |      |
| § 1. <i>Introduction</i> . . . . .                                   | 330  |
| § 2. <i>Chemistry of silicones and their intermediates</i> . . . . . | 331  |
| a. <i>General remarks</i> . . . . .                                  | 331  |
| b. <i>Preparation of intermediates</i> . . . . .                     | 333  |
| 1. <i>Coupling reactions</i> . . . . .                               | 333  |
| 2. <i>Direct synthesis</i> . . . . .                                 | 334  |
| § 3. <i>Properties and applications</i> . . . . .                    | 335  |
| a. <i>Silicone oils</i> . . . . .                                    | 335  |
| b. <i>Silicone rubber</i> . . . . .                                  | 339  |
| c. <i>Silicone resins</i> . . . . .                                  | 340  |
| d. <i>Water repellent films from silicones</i> . . . . .             | 345  |
| References . . . . .                                                 | 346  |
| 9. ALKYD RESINS                                                      |      |
| <i>by J. R. PATTERSON (Schenectady, N.Y., U.S.A.).</i>               |      |
| § 1. <i>Introduction</i> . . . . .                                   | 347  |
| § 2. <i>Raw materials</i> . . . . .                                  | 348  |
| a. <i>The acids</i> . . . . .                                        | 348  |
| b. <i>The alcohols</i> . . . . .                                     | 349  |
| § 3. <i>Resinification</i> . . . . .                                 | 351  |
| § 4. <i>Applications</i> . . . . .                                   | 357  |
| § 5. <i>Large scale manufacturing</i> . . . . .                      | 359  |
| References . . . . .                                                 | 362  |

## 10. NATURAL RESINS AND THEIR DERIVATIVES

by C. CLARE (*Wilmington, Del., U.S.A.*).

|      |                                                                     |     |
|------|---------------------------------------------------------------------|-----|
| § 1. | Classification; Production . . . . .                                | 363 |
| § 2. | Natural resins . . . . .                                            | 364 |
| a.   | <i>Physical properties and chemical nature in general</i> . . . . . | 364 |
| b.   | <i>Dammers</i> . . . . .                                            | 365 |
| c.   | <i>East Indias</i> . . . . .                                        | 365 |
| d.   | <i>Manila copal</i> . . . . .                                       | 365 |
| e.   | <i>Congo copal</i> . . . . .                                        | 369 |
| f.   | <i>Thermal processing</i> . . . . .                                 | 369 |
| g.   | <i>Kauri copal</i> . . . . .                                        | 371 |
| h.   | <i>Miscellaneous resins</i> . . . . .                               | 372 |
| i.   | <i>Esters and other derivatives</i> . . . . .                       | 373 |
| § 3. | Rosin . . . . .                                                     | 374 |
| a.   | <i>Methods of production</i> . . . . .                              | 375 |
| 1.   | <i>Gum rosin</i> . . . . .                                          | 375 |
| 2.   | <i>Wood rosin</i> . . . . .                                         | 375 |
| b.   | <i>Chemical structure of rosin</i> . . . . .                        | 376 |
| c.   | <i>Derivatives of rosin</i> . . . . .                               | 379 |
| d.   | <i>Modified rosins</i> . . . . .                                    | 380 |
| 1.   | <i>Hydrogenated rosin</i> . . . . .                                 | 380 |
| 2.   | <i>Polymerized rosin</i> . . . . .                                  | 381 |
| 3.   | <i>Disproportionated (dehydrogenated) rosin</i> . . . . .           | 382 |
| e.   | <i>Resinates</i> . . . . .                                          | 383 |
| f.   | <i>Esters of rosin</i> . . . . .                                    | 385 |
| g.   | <i>Other rosin derivatives</i> . . . . .                            | 387 |
| h.   | <i>Physical properties</i> . . . . .                                | 387 |
| 1.   | <i>Viscosity</i> . . . . .                                          | 387 |
| 2.   | <i>Electrical properties</i> . . . . .                              | 388 |
| 3.   | <i>Optical rotations and crystallinity</i> . . . . .                | 388 |
| 4.   | <i>Fluorescence and light absorption</i> . . . . .                  | 389 |
| i.   | <i>Vinsol</i> . . . . .                                             | 389 |
| § 4. | Lac and Shellac . . . . .                                           | 390 |
| a.   | <i>Commercial lacs</i> . . . . .                                    | 390 |
| 1.   | <i>Seed lac</i> . . . . .                                           | 390 |
| 2.   | <i>Shellac</i> . . . . .                                            | 391 |
| 3.   | <i>Button lac</i> . . . . .                                         | 392 |
| 4.   | <i>Garnet lac</i> . . . . .                                         | 392 |
| 5.   | <i>Bleached shellac</i> . . . . .                                   | 392 |
| b.   | <i>Physical properties of shellac</i> . . . . .                     | 392 |
| 1.   | <i>Solubility and viscosity</i> . . . . .                           | 393 |
| 2.   | <i>Thermal properties</i> . . . . .                                 | 394 |
| 3.   | <i>Electrical properties</i> . . . . .                              | 394 |
| 4.   | <i>Optical properties</i> . . . . .                                 | 395 |
| c.   | <i>Chemical composition of shellac</i> . . . . .                    | 396 |
| d.   | <i>Chemical derivatives</i> . . . . .                               | 398 |
|      | References . . . . .                                                | 398 |

## 11. DERIVATIVES OF NATURAL RUBBER

by T. R. DAWSON (*Croydon, England*).

|      |                        |     |
|------|------------------------|-----|
| § 1. | Introduction . . . . . | 402 |
|------|------------------------|-----|

|                                                                          | Page |
|--------------------------------------------------------------------------|------|
| § 2. Sulphur derivatives (vulcanised rubber) . . . . .                   | 402  |
| § 3. Rubber isomers . . . . .                                            | 404  |
| a. Constitution . . . . .                                                | 404  |
| b. Properties and applications . . . . .                                 | 404  |
| § 4. Oxidation and hydrogenation derivatives . . . . .                   | 408  |
| § 5. Halogenated rubbers . . . . .                                       | 410  |
| a. Mechanism of chlorination . . . . .                                   | 410  |
| b. Chlorination processes in bulk . . . . .                              | 411  |
| c. Properties of chlorinated rubber . . . . .                            | 412  |
| d. Applications of chlorinated rubber . . . . .                          | 416  |
| e. Other rubber halides . . . . .                                        | 417  |
| § 6. Rubber hydrochloride . . . . .                                      | 418  |
| a. Constitution . . . . .                                                | 418  |
| b. Manufacture . . . . .                                                 | 418  |
| c. Properties . . . . .                                                  | 418  |
| d. Applications . . . . .                                                | 420  |
| § 7. Addition products with acrylonitrile and maleic anhydride . . . . . | 422  |
| § 8. Miscellaneous derivatives . . . . .                                 | 423  |
| References . . . . .                                                     | 424  |
| 12. SYNTHETIC RUBBERS                                                    |      |
| by W. J. S. NAUNTON ( <i>Manchester, England</i> ).                      |      |
| § 1. Introduction . . . . .                                              | 426  |
| § 2. History of synthetic rubber . . . . .                               | 426  |
| § 3. Types of rubber-like material . . . . .                             | 429  |
| a. Polymers of butadiene . . . . .                                       | 430  |
| b. Copolymers of butadiene . . . . .                                     | 430  |
| c. Polymers and copolymers of chloroprene . . . . .                      | 431  |
| d. The ester rubbers . . . . .                                           | 431  |
| e. Thioplasts . . . . .                                                  | 431  |
| f. Polyisobutylene . . . . .                                             | 432  |
| g. Butyl rubber . . . . .                                                | 432  |
| h. Vinyl polymers . . . . .                                              | 432  |
| i. Ethylene polymers . . . . .                                           | 433  |
| j. Other elastic resins . . . . .                                        | 433  |
| § 4. Chemistry of the monomers . . . . .                                 | 433  |
| a. Butadiene . . . . .                                                   | 433  |
| 1. Production from alcohol . . . . .                                     | 433  |
| 2. Production from petroleum . . . . .                                   | 434  |
| 3. Production from acetylene . . . . .                                   | 436  |
| b. Chlorbutadiene (chloroprene) . . . . .                                | 437  |
| c. Methylbutadienes . . . . .                                            | 437  |
| d. Isobutylene . . . . .                                                 | 438  |
| e. Copolymers components: styrene . . . . .                              | 438  |
| f. Acrylic nitrile . . . . .                                             | 439  |
| § 5. Polymerisation . . . . .                                            | 439  |
| a. Room temperature polymerisation . . . . .                             | 444  |
| b. Warm polymerisation . . . . .                                         | 445  |

|                                                                                                        | Page |
|--------------------------------------------------------------------------------------------------------|------|
| c. <i>High-pressure polymerisation</i> . . . . .                                                       | 445  |
| d. <i>Low temperature polymerisation</i> . . . . .                                                     | 445  |
| e. <i>Polymerisation with alkali metals</i> . . . . .                                                  | 445  |
| f. <i>Emulsion polymerisation</i> . . . . .                                                            | 447  |
| § 6. <i>Properties of the synthetic rubbers</i> . . . . .                                              | 452  |
| § 7. <i>The properties of the individual synthetic rubbers</i> . . . . .                               | 454  |
| a. <i>Butadiene-styrene copolymers (GR-S, Buna S, Butadiene S, Chemigum IV and H car TT)</i> . . . . . | 454  |
| b. <i>Chloroprene polymers and copolymers</i> . . . . .                                                | 458  |
| 1. <i>Oil resistance</i> . . . . .                                                                     | 461  |
| 2. <i>Heat resistance</i> . . . . .                                                                    | 462  |
| 3. <i>Water resistance</i> . . . . .                                                                   | 463  |
| 4. <i>Permeability to gases</i> . . . . .                                                              | 464  |
| 5. <i>Flame resistance</i> . . . . .                                                                   | 464  |
| 6. <i>Good weathering</i> . . . . .                                                                    | 465  |
| § 8. <i>The processing of the individual synthetic rubbers</i> . . . . .                               | 465  |
| a. <i>Neoprene</i> . . . . .                                                                           | 465  |
| 1. <i>Mixing</i> . . . . .                                                                             | 465  |
| 2. <i>Calendering</i> . . . . .                                                                        | 465  |
| 3. <i>Extruding</i> . . . . .                                                                          | 466  |
| 4. <i>Building-up operations</i> . . . . .                                                             | 466  |
| 5. <i>Moulding</i> . . . . .                                                                           | 466  |
| 6. <i>Bonding to metals</i> . . . . .                                                                  | 466  |
| 7. <i>Spreading and dipping solutions</i> . . . . .                                                    | 466  |
| 8. <i>Vulcanisation</i> . . . . .                                                                      | 467  |
| 9. <i>Coloured articles</i> . . . . .                                                                  | 467  |
| b. <i>Butadiene-acrylonitrile copolymers</i> . . . . .                                                 | 468  |
| 1. <i>Mixing</i> . . . . .                                                                             | 470  |
| 2. <i>Calendering</i> . . . . .                                                                        | 470  |
| 3. <i>Extrusion</i> . . . . .                                                                          | 471  |
| 4. <i>Building-up operations</i> . . . . .                                                             | 471  |
| 5. <i>Bonding to metals</i> . . . . .                                                                  | 471  |
| 6. <i>Spreading and dipping solutions</i> . . . . .                                                    | 471  |
| 7. <i>Use as plasticiser</i> . . . . .                                                                 | 471  |
| c. <i>Butadiene polymers</i> . . . . .                                                                 | 471  |
| d. <i>Isobutylene-diene copolymers</i> . . . . .                                                       | 472  |
| e. <i>The thioplasts</i> . . . . .                                                                     | 473  |
| 1. <i>Mixing</i> . . . . .                                                                             | 474  |
| 2. <i>Calendering</i> . . . . .                                                                        | 475  |
| 3. <i>Extrusion</i> . . . . .                                                                          | 475  |
| 4. <i>Making-up operations</i> . . . . .                                                               | 475  |
| 5. <i>Moulding</i> . . . . .                                                                           | 475  |
| 6. <i>Solutions</i> . . . . .                                                                          | 475  |
| 7. <i>Vulcanisation</i> . . . . .                                                                      | 475  |
| f. <i>Ester rubbers</i> . . . . .                                                                      | 475  |
| g. <i>Thermoplastic substitutes for rubber</i> . . . . .                                               | 476  |
| § 9. <i>Synthetic rubber latices</i> . . . . .                                                         | 476  |
| § 10. <i>The application of the synthetic rubbers</i> . . . . .                                        | 478  |
| a. <i>GR-S (Buna S)</i> . . . . .                                                                      | 478  |
| b. <i>Neoprenes</i> . . . . .                                                                          | 478  |

|                                                          | Page |
|----------------------------------------------------------|------|
| c. <i>Perbunan (Hycar O R)</i> . . . . .                 | 480  |
| d. <i>Butyl rubber</i> . . . . .                         | 480  |
| e. <i>Thioplasts</i> . . . . .                           | 481  |
| f. <i>Polyvinylchloride and its copolymers</i> . . . . . | 482  |
| § 11. Economic aspects . . . . .                         | 482  |
| § 12. Conclusion . . . . .                               | 483  |
| References . . . . .                                     | 484  |

## 13. ASPHALTS

by R. N. TRAXLER (*Port Neches, Texas, U.S.A.*).

|                                                            |     |
|------------------------------------------------------------|-----|
| § 1. Sources . . . . .                                     | 486 |
| § 2. Chemical composition . . . . .                        | 487 |
| § 3. Rheological properties . . . . .                      | 488 |
| a. <i>Viscosimeters employed</i> . . . . .                 | 488 |
| b. <i>Rheological diagrams and types of flow</i> . . . . . | 488 |
| § 4. Colloidal properties . . . . .                        | 491 |
| § 5. Applications . . . . .                                | 495 |
| a. <i>Road building</i> . . . . .                          | 495 |
| b. <i>Roofing asphalts</i> . . . . .                       | 496 |
| c. <i>Miscellaneous</i> . . . . .                          | 496 |
| References . . . . .                                       | 498 |
| INDEX . . . . .                                            | 499 |

# CHAPTER 1. PHENOL-FORMALDEHYDE PLASTOMERS

by  
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## § 1. Introduction.

In this chapter such artificial materials are discussed as are manufactured from Phenols (in which name the *cresols* are included). In so far as they are condensed with formaldehyde, they are often designated as P.F. resins. As further representatives, also the *aniline* resins are classified in this group, although they might be considered as amides.

The phenol-formaldehyde resins belong to the most prominent polymers. They owe this particularly to the fact that they are capable of hardening rapidly, which property is owned in the same degree by the amino plastics. The consumption of phenol-formaldehyde resins in the U.S.A. during 1947 is estimated<sup>1</sup> to be 100,000 tons as against the urea and melamine resins, 45,000 tons and polystyrene 40,000 tons. Moulding materials absorbed in 1946 60% of the resin, laminates 11%, adhesives 6% and all other applications 23%.

It may be brought to mind \*) here that the fundamental hardening reaction of the phenol-formaldehyde resins is the following:

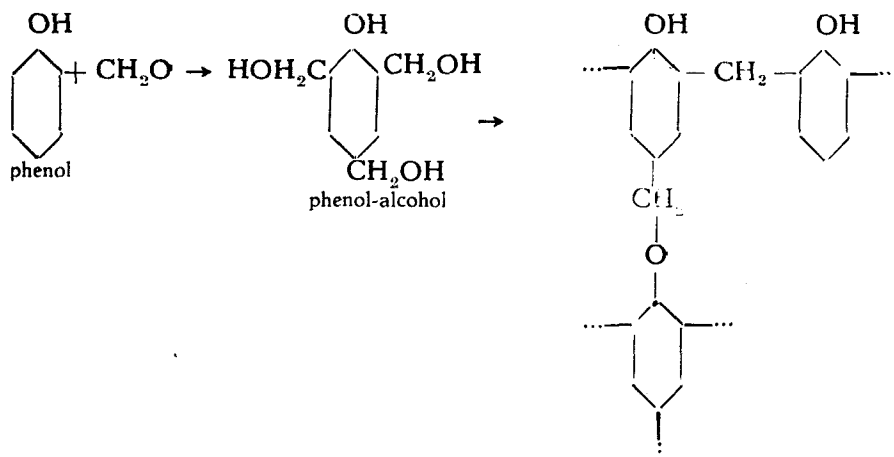


Fig. 1. Hardening of P.F. resins.

## § 2. Raw Materials.

*Phenol, cresols and aniline* are obtained from coal-tar. A first separation of the tar into its components is carried out by means of distillation; 4 principal groups are obtained, viz:

- Light oil*, evaporating up to a distillation temperature of 180°C (356°F). It contains 60-65% of benzene and its homologues.

\*) See Volume I, Chap. 2; See for an extensive description: T. S. Carswell, *Phenoplasts*, New York 1947.