

Table of Contents

<i>1 Genuine Plastics and Other Natural Products</i>	1
<i>2 In the Beginning was the Deed</i>	6
2.1 From Rubber to Elastomers	6
2.2 Cotton and Its Children	9
2.3 The First Plastics	11
<i>3 How Big is Big?</i>	14
3.1 Atoms and Molecules	14
3.2 Chemical Elements and Compounds	18
3.3 Valences and Bonds	20
3.4 Isotopes	23
3.5 Masses and Molar Masses	23
<i>4 False Doctrines</i>	26
4.1 The Discovery of Polymerizations	26
4.2 Carbon Chains	29
4.3 What is a Polymer?	31
4.4 Necessity Fathers Inventions	36
<i>5 The Mysterious Crazy Glue</i>	40
5.1 Macromolecules Step by Step	40
5.2 The Art of High Conversions	44
5.3 Macromolecules in One Stroke	50
5.4 Giants and Their Functionalities	54
<i>6 Corn Syrup and Hi-Tech</i>	59
6.1 Grass and Card-Board	59
6.2 Sweet Potatoes and Tough Meat	61
6.3 Plastics Waste and Electronics	65
<i>7 Engine Oils and Vanilla Sauces</i>	69
7.1 Leftists are Less Preferred	69
7.2 Coils	71
7.3 Secrets of Engine Oils	78
	XI

8	<i>Screwing Up Things</i>	82
8.1	Deterministic Coincidences	82
8.2	Tactful Molecules	84
8.3	Helices and No End	89
8.4	Expedient Packaging	95
8.5	Foaming Spaghetti and Bursting Eggs	98
8.6	TV Dinners and Stale Bread	100
9	<i>Spiders, Weavers, and Webs</i>	102
9.1	Silk, Artificial Silk, and Polyester	102
9.2	Wool, Cotton, and Acrylics	110
9.3	Paper and Leather	115
10	<i>How to Iron Correctly</i>	119
10.1	Glasses and Glass Transitions	119
10.2	Ironing and Shaving	123
10.3	Plasticizers	125
11	<i>From Cheap Substitutes to High Performance Materials</i>	127
11.1	Thermoplastics and Thermosets	127
11.2	Stronger than Steel	132
11.3	Unity Creates Strength	136
12	<i>Everything Flows</i>	139
12.1	Deborah and the Tennis Rackets	139
12.2	Entangled Knee-Joints	142
12.3	Rubbers, Gums, and Elastomers	145
12.4	Physical Vulcanizations	149
13	<i>In and Out</i>	155
13.1	From Moses to Marmelade	155
13.2	Dreaming of Better Foams	162
13.3	All the Things One Packages	164
13.4	Sticking Together and Holding Apart	170
14	<i>Charges and Currents</i>	173
14.1	Siemens Inverts Ohm	173

14.2 Insulators and Xerox	175
14.3 How to Convert Insulators into Conductors . . .	179
<i>Suggested Readings</i>	184
<i>Appendix</i>	185
SI Prefixes and Common Names of Numbers	185
Physical Units in the SI System	186
Conversion of Some Anglo-Saxon Units	187
Symbols, Names, Atomic Numbers, and Relative Atomic Masses of Chemical Elements	188
Some Trade Names and Trivial Names of Polymers . .	190
<i>Subject Index</i>	193