

CONTENTS

Chapter 9.	RIGID URETHANE FOAMS	451
I.	Introduction	452
II.	Raw Materials	456
III.	Foaming Processes	468
IV.	Properties	478
V.	Structure-Property Relationships	506
VI.	Applications	513
Chapter 10.	POLYSTYRENE AND RELATED THERMOPLASTIC FOAMS	525
I.	Market Situation	527
II.	Methods for Preparing Expandable-Styrene Polymers	531
III.	Composition of Expandable-Styrene Polymers	538
IV.	The Formation and Examination of Cells in Expandable Polystyrene	544
V.	Preexpansion Methods and Premolding Treatments	562
VI.	Molding and Posttreatment of Foams from Expandable Polystyrene	573
VII.	Expanded Beads as Functional Components	582
VIII.	Extruded Film and Sheet	585
IX.	Extruded Board	597
X.	Structural Foams	599
XI.	Properties of Polystyrene Foams	601
Chapter 11.	PHENOLIC FOAMS	639
I.	Introduction	640
II.	Raw Materials Used in Phenolic Foams	641
III.	Foaming Processes	647
IV.	Foam Properties	652
V.	Relationship of Structure to Properties	663
VI.	Applications	664
Chapter 12.	UREA-FORMALDEHYDE FOAMS	675
I.	Introduction	676
II.	Chemistry	676
III.	Foam Preparation	677
IV.	Modifications of U-F Foams	685
V.	Properties	689
VI.	Applications	693

Chapter 13.	EPOXY-RESIN FOAMS	701
I.	Introduction	702
II.	Raw Materials	702
III.	Foaming Processes	712
IV.	Properties	714
V.	Influence of Structure on Properties	728
VI.	Applications	728
Chapter 14.	NEW HIGH-TEMPERATURE-RESISTANT PLASTIC FOAMS	735
I.	Introduction	735
II.	Polyisocyanurate Foams	737
III.	Polybenzimidazole Foams	748
IV.	Polyimide Foams	751
V.	Applications	757
Chapter 15.	MISCELLANEOUS FOAMS	759
I.	Polyvinyl Carbazole Foams	760
II.	Pyranyl Foams	770
III.	Polyester Foams	777
IV.	Cellulose Acetate Foams	781
V.	Polyvinyl Alcohol-Formaldehyde Foams	782
VI.	Polyamide Foams	784
VII.	Irradiated Acrylic Foams	786
VIII.	Fluorocarbon Foams	790
IX.	Polysulfone Foams	792
X.	Ionomer Foams	793
XI.	Temperature-Adaptable Fabrics and Temperature-Reversible Foams	797
Chapter 16.	INORGANIC FOAMS	805
I.	Cellular Glass	806
II.	Metal Foams	811
III.	Cellular Refractories	815
IV.	Cellular Concrete	821
V.	Rigid Sulfur Foams	824
Chapter 17.	EFFECTS OF CELL GEOMETRY ON FOAM PERFORMANCE	831
I.	Introduction	831
II.	Foam Structures	832
III.	Correlations between Physical Structure and Properties	837
IV.	Discussion	852

Chapter 18.	THERMAL DECOMPOSITION AND FLAMMABILITY OF FOAMS	855
I.	Introduction	855
II.	Thermal Decomposition and Flammability Aspects	856
III.	Concepts of Flame Retardation	860
IV.	Flammability Tests and Geometric Classification	867
Chapter 19.	FOAMS IN TRANSPORTATION	879
I.	Introduction	879
II.	Markets	880
III.	Flexible and Semirigid Foams	896
Chapter 20.	ARCHITECTURAL USES OF FOAM PLASTICS	913
I.	Properties and Applications of Materials	913
II.	Structure Investigation	915
III.	Primary Structural Applications	917
IV.	Secondary Structural Applications	928
V.	Contributing Structural Applications	945
VI.	Summary of Conclusions	949
Chapter 21.	MILITARY AND SPACE APPLICATIONS OF CELLULAR MATERIALS	955
I.	Introduction	955
II.	Navy Applications	956
III.	Army Applications	966
IV.	Air Force and Space Applications	980
Author Index		987
Subject Index		1011