

Contents

Preface	ix
---------	----

Chapter 1 Introduction

Bibliography	2
--------------	---

Part I COMMERCIAL GLASSES

Chapter 2 Vitreous Silica

I. Introduction	7
II. Types and Impurity Compositions	7
III. Uses	9
IV. Methods of Manufacture	9
V. Structure	10
VI. Thermodynamic Properties	10
VII. Mechanical Properties	14
VIII. Thermal Properties	18
IX. Electrical Properties	19
X. Optical Properties	22
XI. Chemical Durability	24
XII. Diffusion	25
Bibliography	28

Chapter 3 Multicomponent Commercial Glasses

I. Introduction	31
II. Mechanical Properties	38
III. Temperature Dependence of Properties	42
IV. Optical Properties	43
Bibliography	45

Part II THERMODYNAMIC AND THERMAL PROPERTIES

Chapter 4 Density

I. Introduction	49
II. Tables and Figures	50
Bibliography	50

Chapter 5 Surface Tension

I.	Introduction	101
II.	Tables and Figures	102
	Bibliography	102

Chapter 6 Coefficient of Thermal Expansion

I.	Introduction	125
II.	Tables and Figures	127
	Bibliography	127

Chapter 7 Heat Capacity

I.	Introduction	179
II.	Tables, Figures, and Equations	180
	Bibliography	180

Chapter 8 Thermal Conductivity

I.	Introduction	207
II.	Tables and Figures	208
	Bibliography	208

Part III MECHANICAL PROPERTIES**Chapter 9 Viscosity**

I.	Introduction	223
II.	Tables and Figures	227
	Bibliography	227

Chapter 10 Elastic Properties

I.	Introduction	306
II.	Tables, Figures, and Equations	308
	Bibliography	308

Chapter 11 Microhardness

I.	Introduction	337
II.	Tables	337
	Bibliography	338

Chapter 12 Strength

I.	Introduction	363
II.	Testing Methods	364
III.	Strength Distributions	365
IV.	Surface Treatment, Temperature, and Strength	366
V.	Observations of Fracture Surfaces and Surface Damage	369
VI.	Plastic Deformation in Glass	371

VII.	Fatigue	372
VIII.	Life Prediction	374
	Bibliography	377

Part IV ELECTRICAL AND TRANSPORT PROPERTIES

Chapter 13 Electrical Conductivity

I.	Introduction	381
II.	Tables and Figures	385
	Bibliography	386

Chapter 14 Dielectric Properties

I.	Introduction	450
II.	Experimental Measurement	451
III.	Effect of Temperature	452
IV.	Tables and Figures	452
	Bibliography	452

Chapter 15 Ionic Diffusion

I.	Measurement of Ionic Diffusion	500
II.	Temperature Dependence	501
III.	Interionic Diffusion	501
IV.	Theories of Ionic Transport	503
V.	Tables and Figures	504
	Bibliography	504

Part V OTHER PROPERTIES

Chapter 16 Refractive Index and Dispersion

I.	Introduction	539
II.	Tables and Figures	540
	Bibliography	540

Chapter 17 Solubility, Permeability, and Diffusion of Gases in Glass

I.	Introduction	607
II.	Molecular Solubility	607
III.	Measurement of Molecular Permeation and Diffusion in Glass	608
IV.	Tables and Figures	610
	Bibliography	610

Chapter 18 Chemical Durability

I.	Introduction	646
II.	Reaction with Water	647
III.	Effects of Composition	649

IV.	Weathering	652
V.	pH and Durability	652
	Bibliography	656
Chapter 19 Estimation of Properties		
I.	Introduction	657
	Bibliography	658
APPENDIXES		
Appendix A	Glossary of Symbols for Data Tables of Laboratory Glasses	663
Appendix B	Physical Constants	665
Appendix C	Units	666
Appendix D	Table of Relative Atomic Masses	668
Systems–Property Index		671
Subject Index		678