

# CONTENTS

List of Contributors . . . . .	xv
Historical Introit. The Origins of Rational Thermodynamics . . . . .	1
Appendix to the Historical Introit. Failure of Carathéodory's Attempt to Set the House in Order . . . . .	49
Lecture 1. Thermodynamics of Homogeneous Processes . . . . .	59
Appendix 1A. Thermodynamics for Beginners . . . . .	82
Lecture 2. Internal Dissipation . . . . .	107
Appendix 2A. Foundations of the Clausius-Duhem Inequality by MARTIN FEINBERG & RICHARD LAVINE . . . . .	123
Lecture 3. Coleman's Theorem . . . . .	141
Appendix 3A. Internal Constraints by G. CAPRIZ & P. PODIO-GUIDUGLI . . . . .	159
Lecture 4. Wave Propagation in Dissipative Materials . . . . .	171
Appendix 4A. Thermodynamic Effects in Wave Propagation by PETER J. CHEN . . . . .	191
Appendix 4B. Discontinuous Thermokinetic Processes by C. M. DAFERMOS . . . . .	211
Lecture 5. Thermodynamics of Diffusion . . . . .	219
Appendix 5A. Diffusion Models Implied by the Theory of Mixtures by RAY M. BOWEN . . . . .	237
Appendix 5B. Thermodynamics of Mixtures of Fluids by I-SHIH LIU & INGO MÜLLER . . . . .	264
Appendix 5C. A Theory of Multiphase Mixtures by S. L. PASSMAN, J. W. NUNZIATO, & E. K. WALSH . . . . .	286
Appendix 5D. Applications of the Theory of Mixtures in Soil Physics by P. A. C. RAATS . . . . .	326
Appendix 5E. Foundations of Mixture Theory by WILLIAM O. WILLIAMS . . . . .	344
Lecture 6. Thermodynamics of Chemical Reactions . . . . .	353

Lecture 7. The Onsager Relations . . . . .	365
Appendix 7A. On the Symmetry of the Heat-Conduction Tensor by C.-C. WANG . . . . .	396
Appendix 7B. Phenomenological Onsagerism in Practice . . .	402
Prefatory Note, 1982, to Lectures 8, 9, and 10 . . . . .	405
Lecture 8. The Maxwell-Boltzmann Equation as a Constitutive Equation of Continuum Mechanics . . . . .	407
Appendix 8A. "Constitutive Relations" According to the Kinetic Theory of Gases . . . . .	426
Appendix 8B. Gross Determinism and Its Implications for the Kinetic Theory of Gases by ROBERT G. MUNCASTER . . . . .	433
Appendix 8C. Thermodynamics According to the Kinetic Theory of Gases . . . . .	441
Lecture 9. The Trend to Equilibrium According to the Kinetic Theory of Gases . . . . .	451
Lecture 10. Kinetic and Caloric Dissipation in Simple Shearing of a Maxwellian Gas . . . . .	461
General Appendices	
Appendix G1. Recent Research on the Foundations of Thermodynamics by BERNARD D. COLEMAN & DAVID R. OWEN . . .	479
Appendix G2. The Status of the Heat Equation by W. A. DAY . . . . .	494
Appendix G3. Thermodynamics and Stability of Equilibrium by J. L. ERICKSEN . . . . .	503
Appendix G4. Foundations of Thermodynamics by MORTON E. GURTIN & WILLIAM O. WILLIAMS . .	509
Appendix G5. The Kinetic Theory as a Prototype for Fine-Coarse Theory Pairs by ROBERT G. MUNCASTER . . . . .	517
Appendix G6. On the Axiomatic Foundations of Temperature by M. PITTERI . . . . .	522
Appendix G7. Thermodynamics of Cyclic Processes by MIROSLAV ŠILHAVÝ . . . . .	545
Index of Authors Mentioned . . . . .	557
Index of Subjects . . . . .	565