Contents

Foreword by Victor F. Weisskopf vii

Preface by the Editor ix

1. Basic Concepts and the First Law 1

1. Thermodynamic variables 1
2. Concept of temperature 1
3. Quantity of heat 3
4. First law of thermodynamics 5
5. Thermodynamic changes of state 7
6. Mathematical formulation of the first law 9
7. Applications of the first law 10

2. The Second Law 17

8. Formulations of the second law 17
9. Quantitative predictions of the second law 18
10. Mathematical formulation of the second law 25
11. Axiomatic foundation of thermodynamics following Carathéodory 26
12. Free energy 34
13. Gibbs's function 36
14. Entropy of ideal gas mixtures 45
15. Gibbs's paradox 47
16. Remarks on the mixing laws 49

3. Equilibria 53

17. Van't Hoff's boxes 53
18. Gibbs's variational method 72

19. Applications (first variation) 73
20. Comments on the second variation 83
21. Thermoelectric problems 87

4. Nernst's Heat Theorem 90

22. Nernst's heat theorem 90
23. Unattainability of the absolute zero 92

5. Kinetic Theory of Gases 94

24. Calculation of the pressure 95
25. Velocity distribution 100
26. Mean free path and collisions 103
27. Transport phenomena ($d \gg l$) 107
28. Transport phenomena ($l \gg d$) 114
29. Virial concept 121
30. Applications 122

Bibliography 128

Appendix. Comments by the Editor 130

Index 133