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Nota di contenuto	CLASSICAL AND GEOMETRICAL THEORY OF CHEMICAL AND PHASE THERMODYNAMICS; CONTENTS; PREFACE; PART I INDUCTIVE FOUNDATIONS OF CLASSICAL THERMODYNAMICS; 1. Mathematical Preliminaries: Functions and Differentials; 1.1 Physical Conception of Mathematical Functions and Differentials; 1.2 Four Useful Identities; 1.3 Exact and Inexact Differentials; 1.4 Taylor Series; 2. Thermodynamic Description of Simple Fluids; 2.1 The Logic of Thermodynamics; 2.2 Mechanical and Thermal Properties of Gases: Equations of State; 2.3 Thermometry and the Temperature Concept; 2.4 Real and Ideal Gases 2.4.1 Compressibility Factor and Ideal Gas Deviations 2.4.2 Van der Waals and Other Model Equations of State; 2.4.3 The Virial Equation of State; 2.5 Condensation and the Gas-Liquid Critical Point; 2.6 Van der Waals Model of Condensation and Critical Behavior; 2.7 The Principle of Corresponding States; 2.8 Newtonian Dynamics in the Absence of

Frictional Forces; 2.9 Mechanical Energy and the Conservation Principle; 2.10 Fundamental Definitions: System, Property, Macroscopic, State; 2.10.1 System; 2.10.2 Property; 2.10.3 Macroscopic; 2.10.4 State; 2.11 The Nature of the Equilibrium Limit

3. General Energy Concept and the First Law 3.1 Historical Background of the First Law; 3.2 Reversible and Irreversible Work; 3.3 General Forms of Work; 3.3.1 Pressure-Volume Work; 3.3.2 Surface Tension Work; 3.3.3 Elastic Work; 3.3.4 Electrical (emf) Work; 3.3.5 Electric Polarization Work; 3.3.6 Magnetic Polarization Work; 3.3.7 Overview of General Work Forms; 3.4 Characterization and Measurement of Heat; 3.5 General Statements of the First Law; 3.6 Thermochemical Consequences of the First Law; 3.6.1 Heat Capacity and the Enthalpy Function; 3.6.2 Joule's Experiment

3.6.3 Joule-Thomson Porous Plug Experiment 3.6.4 Ideal Gas Thermodynamics; 3.6.5 Thermochemistry: Enthalpies of Chemical Reactions; 3.6.6 Temperature Dependence of Reaction Enthalpies; 3.6.7 Heats of Solution; 3.6.8 Other Aspects of Enthalpy Decompositions; 4. Engine Efficiency, Entropy, and the Second Law; 4.1 Introduction: Heat Flow, Spontaneity, and Irreversibility; 4.2 Heat Engines: Conversion of Heat to Work; 4.3 Carnot's Analysis of Optimal Heat-Engine Efficiency; 4.4 Theoretical Limits on Perpetual Motion: Kelvin's and Clausius' Principles; 4.5 Kelvin's Temperature Scale

4.6 Carnot's Theorem and the Entropy of Clausius 4.7 Clausius' Formulation of the Second Law; 4.8 Summary of the Inductive Basis of Thermodynamics; PART II GIBBSIAN THERMODYNAMICS OF CHEMICAL AND PHASE EQUILIBRIA; 5. Analytical Criteria for Thermodynamic Equilibrium; 5.1 The Gibbs Perspective; 5.2 Analytical Formulation of the Gibbs Criterion for a System in Equilibrium; 5.3 Alternative Expressions of the Gibbs Criterion; 5.4 Duality of Fundamental Equations: Entropy Maximization versus Energy Minimization; 5.5 Other Thermodynamic Potentials: Gibbs and Helmholtz Free Energy

5.6 Maxwell Relations

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#### Sommario/riassunto

Because it is grounded in math, chemical thermodynamics is often perceived as a difficult subject and many students are never fully comfortable with it. The first authoritative textbook presentation of equilibrium chemical and phase thermodynamics in a reformulated geometrical framework, Chemical and Phase Thermodynamics shows how this famously difficult subject can be accurately expressed with only elementary high-school geometry concepts. Featuring numerous suggestions for research-level extensions, this simplified alternative to standard calculus-based thermodynamics expositions is perfect

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