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5 Thermodynamics of Binary Solutions I: Basic Theory and Application to Gas Mixtures 5.1 Expressing Composition; 5.2 Total (Integral) and Partial Molar Quantities; 5.2.1 Relations between Partial and Integral Quantities; 5.2.2 Relation between Partial Quantities: the Gibbs-Duhem Equation; 5.3 Application to Gas Mixtures; 5.3.1 Partial Pressures; 5.3.2 Chemical Potentials in Perfect Gas Mixtures; 5.3.3 Real Gas Mixtures: Component Fugacities and Activities; Exercises; 6 Thermodynamics of Binary Solutions II: Theory and Experimental Methods; 6.1 Ideal Solutions; 6.1.1 Real Solutions 6.1.2 Dilute Solution Reference States 6.2 Experimental Methods; 6.2.1 Chemical Potential Measurements; Exercises; 7 Thermodynamics of Binary Solutions III: Experimental Results and Their Analytical Representation; 7.1 Some Experimental Results; 7.1.1 Liquid Alloys; 7.1.2 Solid Alloys; 7.2 Analytical Representation of Results for Liquid or Solid Solutions; Exercises; 8 Two-Phase Equilibrium I: Theory; 8.1 Introduction; 8.2 Criterion for Phase Equilibrium Between Two Specified Phases; 8.2.1 Equilibrium between Two Solution Phases 8.2.2 Equilibrium between a Solution Phase and a Stoichiometric Compound Phase 8.3 Gibbs's Phase Rule; Exercises; 9 Two-Phase Equilibrium II: Example Calculations; Exercises; 10 Binary Phase Diagrams: Temperature-Composition Diagrams; 10.1 True Phase Diagrams; 10.2  $T-x(i)$  Phase Diagrams for Strictly Regular Solutions; 10.2.1 Some General Observations; 10.2.2 More on Miscibility Gaps; 10.2.3 The Chemical Spinodal; 10.3 Polymorphism; Exercises; 11 Binary Phase Diagrams: Temperature-Chemical Potential Diagrams; 11.1 Some General Points; Exercises; 12 Phase Diagram Topology 12.1 Gibbs's Phase Rule

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### Sommario/riassunto

A timely, applications-driven text in thermodynamics Materials Thermodynamics provides both students and professionals with the in-depth explanation they need to prepare for the real-world application of thermodynamic tools. Based upon an actual graduate course taught by the authors, this class-tested text covers the subject with a broader, more industry-oriented lens than can be found in any other resource available. This modern approach: Reflects changes rapidly occurring in society at large-from the impact of computers on the teaching of thermodynamics in materials

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