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| Nota di contenuto       | Handbook of Hydrogen Storage: New Materials for Future Energy Storage; Foreword; Contents; Preface; List of Contributors; 1 Storage of Hydrogen in the Pure Form; 1.1 Introduction; 1.2 Thermodynamic State and Properties; 1.2.1 Variables of State; 1.2.2 T-s-Diagram; 1.2.2.1 Joule-Thomson Coefficient; 1.2.3 Properties; 1.3 Gaseous Storage; 1.3.1 Compression and Expansion; 1.3.2 Tank Systems; 1.3.3 High Pressure Infrastructure; 1.4 Liquid Storage; 1.4.1 Liquefaction; 1.4.2 Thermodynamic Analysis; 1.4.2.1 Pressure Build-Up; 1.4.2.2 Boil-Off; 1.4.2.3 Cooling and Filling; 1.4.2.4 Back-Gas<br>1.4.3 Tank Systems1.4.4 Distribution Facilities; 1.5 Hybrid Storage; 1.5.1 Supercritical Storage; 1.5.2 Hydrogen Slush; 1.6 Comparison of Energy Densities; 1.7 Conclusion; References; 2 Physisorption in Porous Materials; 2.1 Introduction; 2.2 Carbon Materials; 2.3 Organic Polymers; 2.4 Zeolites; 2.5 Coordination Polymers; 2.6 Conclusions; References; 3 Clathrate Hydrates; 3.1 Introduction; 3.2 Clathrate Hydrate Structures; |

3.3 Hydrogen Clathrate Hydrate; 3.4 Kinetic Aspects of Hydrogen Clathrate Hydrate; 3.5 Modeling of Hydrogen Clathrate Hydrates; 3.6 Future of Hydrogen Storage; References

4 Metal Hydrides 4.1 Introduction; 4.2 Elemental Hydrides; 4.2.1 Ionic or Saline Hydrides; 4.2.2 Covalent Hydrides; 4.2.3 Metallic Hydrides; 4.3 Thermodynamics of Metal Hydrides; 4.3.1 Introduction; 4.3.2 Low Concentration; 4.3.3 High Concentration; 4.4 Intermetallic Compounds; 4.4.1 Thermodynamics; 4.4.1.1 Miedema's Model; 4.4.1.2 Semi-Empirical Band Structure Model; 4.4.2 Crystal Structure; 4.4.3 Electronic Structure; 4.5 Practical Considerations; 4.5.1 Synthesis; 4.5.2 Activation; 4.5.3 Hysteresis; 4.5.4 Plateau Slope; 4.5.5 Reversible Capacity; 4.5.6 Hydrogenation Kinetics

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5.2.11 Zinc Borohydride Zn(BH<sub>4</sub>)<sub>2</sub>

## Sommario/riassunto

Owing to the limited resources of fossil fuels, hydrogen is proposed as an alternative and environment-friendly energy carrier. However, its potential is limited by storage problems, especially for mobile applications. Current technologies, as compressed gas or liquefied hydrogen, comprise severe disadvantages and the storage of hydrogen in lightweight solids could be the solution to this problem. Since the optimal storage mechanism and optimal material have yet to be identified, this first handbook on the topic provides an excellent overview of the most probable candidates, highlighting bo