

1. Record Nr.	UNINA9910790750703321
Autore	Bini Roberto
Titolo	Materials under extreme conditions : molecular crystals at high pressure // Roberto Bini, Vincenzo Schettino, University of Florence, Italy
Pubbl/distr/stampa	London : , : Imperial College Press, , [2014] 2014
ISBN	1-78326-431-4 1-84816-306-1
Descrizione fisica	1 online resource (xvii, 354 pages) : illustrations (some color)
Collana	Gale eBooks
Disciplina	543
Soggetti	High pressure chemistry Materials at high pressures Molecular crystals
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface; Foreword; Acknowledgments; Contents; 1. Introduction; 2. Historical Survey; 3. Elasticity and Equation of State; 3.1 Stress and strain; 3.2 Elasticity and anisotropy in molecular crystals; 3.2.1 Elastic constants; 3.2.2 Temperature and pressure dependence of the elastic constants; 3.2.3 Single crystals and polycrystals; 3.2.4 Variation of crystal parameters with pressure; 3.3 Parametric equations of state; 4. High-pressure Technical Survey; 4.1 The piston-cylinder device; 4.1.1 Large volume piston-cylinder apparatus; 4.2 The opposed anvil devices; 4.3 Multi-anvil devices 4.4 The diamond anvil cell 4.4.1 Diamonds; 4.4.2 Gasket; 4.4.3 Loading techniques; 4.4.4 Compression media; 4.5 High- and low-temperature techniques; 4.5.1 Low-temperature devices; 4.5.2 Resistive heating; 4.5.3 Laser heating; 4.6 Pressure measurement; 4.7 Probing techniques based on electromagnetic radiation; 4.7.1 Optical spectroscopy; 4.7.1.1 Infrared spectroscopy; 4.7.1.2 Raman and Brillouin spectroscopy; 4.7.1.3 Non-linear optical techniques; 4.7.2 X-ray diffraction; 4.7.3 Neutron diffraction; 4.7.4 Nuclear magnetic resonance; 5. Principles of Chemical Reactivity Under Pressure

5.1 Pressure effects on chemical equilibria; 5.2 Pressure effects on reaction rates; 5.3 Environmental effects at high pressure; 5.4 Effects of high pressure on the electronic structure; 6. Chemical Reactions in Molecular Crystals; 6.1 Reversible reactions; 6.1.1 Solid nitrogen at high pressure: the archetypal energetic material; 6.1.2 Red oxygen; 6.1.3 Carbon dioxide: a multiform solid; 6.1.4 Formic acid; 6.1.5 Sulphur. Polymeric and molecular phases; 6.1.6 Symmetry breaking and ionization at high pressures; 6.1.7 Metallization at high pressures; 6.2 Irreversible reactions
6.2.1 Unsaturated hydrocarbons; 6.2.2 Aromatics and heteroaromatics; 6.2.3 Miscellanea; 6.2.4 Energetic materials; 6.2.5 Photochemistry at high pressures; Bibliography; Appendix A; Index

Sommario/riassunto

High-pressure materials research has been revolutionized in the past few years due to technological breakthroughs in the diamond anvil cell (DAC), shock wave compression and molecular dynamic simulation (MD) methods. The application of high pressure, especially together with high temperature, has revealed exciting modifications of physical and chemical properties even in the simplest molecular materials. Besides the fundamental importance of these studies to understand the composition and the dynamics of earth and planets' interior, new materials possessing peculiar characteristics of hardness
