

1. Record Nr.	UNINA9910830921903321
Autore	Comba Peter
Titolo	Molecular Modeling of Inorganic Compounds [[electronic resource]]
Pubbl/distr/stampa	Hoboken, : Wiley, 2009
ISBN	1-282-68809-X 9786612688096 3-527-62812-6 3-527-62813-4
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (346 p.)
Altri autori (Persone)	HambleyTrevor W MartinBodo
Disciplina	541.22015118
Soggetti	Chemical models Inorganic compounds --Mathematical models Inorganic compounds - Mathematical models Chemistry Physical & Theoretical Chemistry Physical Sciences & Mathematics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Molecular Modeling of Inorganic Compounds; Contents; Preface to the Third Edition; Preface to the Second Edition; Preface to the First Edition; Part I: Theory; 1 Introduction; 1.1 Molecular Modeling; 1.2 Historical Background; 2 Molecular Modeling Methods in Brief; 2.1 Molecular Mechanics; 2.2 Quantum Mechanics; 2.2.1 Hartree-Fock Calculations; 2.2.2 Semi-Empirical Approaches; 2.2.3 Density Functional Theory; 2.2.4 Methods and Basis Sets; 2.3 Other Methods; 2.3.1 Conformational Searching; 2.3.1.1 Stochastic Methods; 2.3.1.2 Molecular Dynamics; 2.3.2 Database Searching; 2.3.3 Cluster Analysis 2.3.4 Free Energy Perturbation2.3.5 QSAR; 3 Parameterization, Approximations and Limitations of Molecular Mechanics; 3.1 Concepts; 3.2 Potential Energy Functions; 3.2.1 Bond Length Deformation; 3.2.2 Valence Angle Deformation; 3.2.3 Torsion Angle Deformation; 3.2.4 Cross-Terms; 3.2.5 van der Waals Interactions; 3.2.6 Electrostatic

Interactions; 3.2.7 Hydrogen Bonding Interactions; 3.2.8 Out-of-Plane Deformation; 3.3 Force-Field Parameters; 3.3.1 Bond Length Deformation; 3.3.2 Valence Angle Deformation; 3.3.3 Torsion Angle Deformation; 3.3.4 Out-of-Plane Deformation  
3.3.5 Non-Bonded Interactions3.3.6 Electrostatic Interactions; 3.3.7 Hydrogen-Bonding Interactions; 3.4 Spectroscopic Force Fields; 3.5 Model and Reality; 3.6 Electronic Effects; 3.7 The Environment; 3.8 Entropy Effects; 3.9 Summary; 4 Computation; 4.1 Input and Output; 4.2 Energy Minimization; 4.2.1 The Simplex Method; 4.2.2 Gradient Methods; 4.2.3 Conjugate-Gradient Methods; 4.2.4 The Newton-Raphson Method; 4.2.5 Least-Squares Methods; 4.3 Constraints and Restraints; 5 The Multiple Minima Problem; 5.1 Deterministic Methods; 5.2 Stochastic Methods; 5.3 Molecular Dynamics  
5.4 Practical Considerations5.5 Making Use of Experimental Data; 6 Conclusions; Part II: Applications; 7 Structural Aspects; 7.1 Accuracy of Structure Prediction; 7.2 Molecular Visualization; 7.3 Isomer Analysis; 7.4 Analysis of Structural Trends; 7.5 Prediction of Complex Polymerization; 7.6 Unraveling Crystallographic Disorder; 7.7 Enhanced Structure Determination; 7.8 Comparison with Solution Properties; 8 Stereoselectivities; 8.1 Conformational Analysis; 8.2 Enantioselectivities; 8.2.1 Racemate Separation; 8.2.2 Stereoselective Synthesis; 8.2.3 Prediction of Enantioinduction  
8.3 Structure Evaluation8.4 Mechanistic Information; 9 Metal Ion Selectivity; 9.1 Chelate Ring Size; 9.2 Macrocycle Hole Size; 9.3 Preorganization; 9.4 Quantitative Correlations Between Strain and Stability Differences; 9.5 Conclusions; 10 Spectroscopy; 10.1 Vibrational Spectroscopy; 10.2 Electronic Spectroscopy; 10.3 EPR Spectroscopy; 10.4 NMR Spectroscopy; 10.5 QM-Based Methods; 11 Electron Transfer; 11.1 Redox Potentials; 11.2 Electron-Transfer Rates; 12 Electronic Effects; 12.1 d-Orbital Directionality; 12.2 The trans Influence; 12.3 Jahn-Teller Distortions; 13 Bioinorganic Chemistry  
13.1 Complexes of Amino Acids and Peptides

---

## Sommario/riassunto

After the second edition introduced first density functional theory aspects, this third edition expands on this topic and offers unique practice in molecular mechanics calculations and DFT. In addition, the tutorial with its interactive exercises has been completely revised and uses the very latest software, a full version of which is enclosed on CD, allowing readers to carry out their own initial experiments with forcefield calculations in organometal and complex chemistry.

---