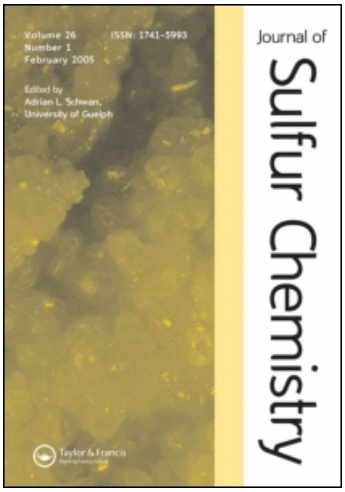

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A Review of: "*Bonding Energetics in Organometallic Compounds.* Edited by Tobin J. Marks. ACS Symposium Series No. 428, American Chemical Society, Washington, DC, 1990, xi 305pp., $ 64.95. ISBN 0-8412-1791-2."

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BOOK REVIEW

Bonding Energetics in Organometallic Compounds. Edited by Tobin J. Marks. ACS Symposium Series No. 428, American Chemical Society, Washington, DC, 1990, xi + 305 pp., $64.95. ISBN 0-8412-1791-2.

This book is a series of papers from a symposium sponsored by the Division of Inorganic Chemistry at the 198th National Meeting of the American Chemical Society, Miami Beach, Florida, September 1989. It consists of 19 chapters and is intended for all chemical researchers who are interested in a broad, in-depth survey of bonding energetics in organometallic molecules.

The first chapter given by T.J. Marks begins with a brief historical introduction to the subject, followed by a discussion of basic principles, experimental methology and issues. Based on the work by P.B. Armentrout with guided ion beam mass spectroscopy a discussion of the periodic trends in transition metal bonds to hydrogen, carbon and nitrogen is given in the second chapter. Chapter 3 written by P.A.M. van Koppen, M.T. Bowers, J.L. Beauchamp and D.V. Dearden presents organometallic reaction energies from product kinetic energy release distribution in relation to the potential energy surfaces associated with the formation and rupture of H-H, C-H and C-C bonds. B.S. Freiser discusses five different techniques involving Fourier transform mass spectroscopy for determining qualitative and quantitative metal ion-ligand bond energies in the next chapter and chapter 5 is a summary of thermochemical results from gas-phase cyclotron resonance studies of organometallic compounds and coordination complexes as presented by D.E. Richardson, C.S Crist, Jr., P. Shape, M.F. Ryan and J.R. Eyler. The foundation and development of ionization energy-bond energy in organometallic chemistry are given by D.L. Lichtenberger and A.S. Copenhaver, and J. Halpern uses chapter 7 to discuss the scope, limitations and results of the thermodynamics and kinetics of transition-metal homolytic bond dissociation processes. Cage pair intermediates and activation parameters for laser photolysis of diphenyl disulfide in decaline are put forward by T. Koenig, T.W. Scott and J.A. Franz. In chapter 9 A.A. Gonzales, K. Zhang, S.L. Mukerjee, C.D. Hoff, G.R.K. Khalsa and G.J. Kubas discuss the thermodynamics and kinetic studies of binding nitrogen and hydrogen to complexes of chromium, molybdenum and tungsten and this chapter is followed by a chapter in which B.B. Wayland, V.L. Coffin, A.E. Sherry and W.R. Brennen outline thermodynamic studies of the hydrogenation and reductive coupling of carbon monoxide by rhodium (II) porphyrins. Chapter 11 is devoted to metal and ancillary coordination effects on organolanthanide-ligand bond enthalpies and is presented by S.P. Nolan, D. Stern, D. Hedden and T.J. Marks. R.S. Drago uses a chapter to discuss new extensions of the electrostatic covalent approach and calorimetric measurements to organometallic systems. J.K. Klassen, M. Selke, A.A. Sorensen and G.K. Yang discuss in chapter 13 metal-ligand dissociation energies in $CpMn(CO)_2L$ and $Cr(CO)_5$(olefin) complexes and by using classical and non-classical (photoacoustic) reaction-solution calorimetry. Metal-carbon and metal-hydrogen bond dissociation energies are briefly analyzed in the next chapter by A.R. Dias, H.P. Diogo, D. Griller, M.E. Minas de Piedade and J.A. Martinho Simoes. Chapter 15 is a discussion by G.A. Samorjai of adsorbate-induced

restructuring of surfaces, followed by another surface study in which P.A. Stair gives an analysis of acid sites on chemically modified molybdenum surfaces. R.G. Pearson discusses from a theoretical point of view the use of absolute electronegativity, hardness and bond energies in predicting the sign of ΔH for exchange reactions. The gas-phase chemistry of first-row transition metal ions with nitrogen-containing compounds is, based on both theoretical and experimental investigations, presented in chapter 18 by A. Mavridis, K. Kunze, J.F. Harrison and J. Allison and the final chapter, written by T. Ziegler and V. Tschinke, deals with the use of density functional theory to discuss the periodic trends in the bond energies of transition metal complexes.

This book brings together leading experimental and theoretical chemists interested in organometallic bonding energies in the gas phase, in solution and on well-defined surfaces. It covers a wide range of aspects of the strengths of the bonds holding organometallic molecules together. This book is intended for chemists who are interested in a broad, in-depth survey of bonding energetics in organometallic molecules and can be recommended for mainly specialists in the field and researchers who want to be introduced to the field.

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