

Additions and Corrections

Rate-Limiting Formation of Diazonium Ions in the Aqueous Decomposition of Primary Alkanediazoates [*J. Am. Chem. Soc.* **1994**, *116*, 6611–6621]. JIAN HO AND JAMES C. FISHBEIN*

Page 6615: In the last line of the second paragraph, trifluoroethane should be trifluoroethanol.

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Book Reviews *

The Fullerenes. Edited by Harold W. Kroto (University of Sussex), John E. Fischer (University of Pennsylvania), and David E. Cox (Brookhaven National Laboratory). Pergamon Press: Oxford, U.K. 1993. vi + 318 pp. \$53.95. ISBN 0-08-042152-0.

Buckminsterfullerenes. Edited by W. Edward Billups and Marco A. Ciufolini (Rice University). VCH: New York. 1993. xv + 339 pp. \$59.00. ISBN 1-56081-608-2.

The burgeoning fullerene literature clearly warrants book-length overviews. Both of these volumes summarize the key pioneering developments, mainly pre-1993, but with important differences in emphasis; over one-half of *The Fullerenes* is devoted to solid-state chemistry and physics, whereas *Buckminsterfullerenes* offer a complementary in-depth review of early theoretical work.

Part 1 of *The Fullerenes* consists of articles from a special issue of the journal *Carbon*. In the introduction, Kroto presents a thorough and concise summary of the events leading to the discovery and identification of fullerenes. Krätschmer and Huffman then describe their landmark studies which produced the first macroscopic samples of fullerene extract. Curl outlines work carried out from 1985–1990, in the “pre-isolation period”, which provided mass-spectrometric and theoretical evidence for the now-accepted structure and physical properties of C₆₀. Campbell and Hertel discuss other molecular-beam work done prior to and soon after the discovery of the Krätschmer–Huffman production and extraction process, focusing on laser desorption, photophysics, and gas-phase and surface collision behavior. Parker and co-workers summarize their early investigations of fullerene synthesis and controlled extraction procedures for giant fullerenes. Howard et al. review the production of fullerenes from benzene/oxygen flames.

The focus then shifts to chemical and physical properties and materials science. Olah et al. describe some general aspects of C₆₀ chemical reactivity. Fagan and coauthors elaborate on fullerene studies involving organometallics, free radicals, and halogens. Dunne and co-workers analyze fullerenes in relation to other carbon networks such as amorphous carbons and carbon blacks. Fowler et al. present a highly-detailed theoretical treatment of the Stone–Wales isomerization, which may grow in significance as higher fullerenes become more readily available. Terrones and MacKay’s article is an imaginative foray into complex, as-yet-unknown fullerene-related carbon allotropes. The last two articles deal with superconductivity (Whetten and Holczer) and neutron scattering (Prassides et al.).

Part 2, covering fullerene solid-state chemistry and physics, derives from a special issue of the *Journal of Physics and Chemistry of Solids*. Murphy and co-workers describe superconducting alkali metal-doped phases of C₆₀. Heiney reviews the orientational ordering transition- and solid-state equilibrium structures of C₆₀, C₆₀O, and C₇₀. Neutron scattering and powder X-ray diffraction of C₆₀ and alkali metal-doped derivatives are presented by Copley et al. and by Zhou and Cox. The raman- and infrared-active vibrational modes of pristine and doped C₆₀ films are discussed by Ecklund et al. Lucas contributes work on electron energy loss spectra (EELS) of C₆₀ films, complemented by Gensterblum and co-workers’ HREELS studies of C₆₀ epitaxial films grown on GaSe. Weaver discusses optical and electronic spectroscopy

of C₆₀ and C₇₀ and their alkali metal derivatives. Wudl details the doping of C₆₀ with an organic donor to form an organic ferromagnet. Oshiyama et al. present results of band structure calculations for C₆₀ and related materials, including carbon microtubules. Finally, Schlüter et al. discuss the rationale and theory of superconductivity in alkali-intercalated C₆₀.

The first three chapters of *Buckminsterfullerenes* focus on fullerene discovery and production. Curl describes mass-spectroscopic measurements of carbon clusters; this review extends the author’s article in the Kroto volume by discussing fullerenes and the diffuse interstellar bands. Kroto et al. in turn present a general overview of this research, encompassing production, isolation, and chemistry (halogenation and phenylation), physical measurements and cluster experiments, solid-state studies, alkali metal doping, carbon fibers, and as in Curl’s chapter, speculation about fullerenes in the interstellar medium. Thilgen, Deiderich, and Whetten then present their early work on the isolation and characterization of higher fullerenes, as well as a comparison of fullerene production methods and theoretical considerations pertaining to fullerene isomers.

The next five chapters summarize theoretical approaches. Schmalz and Klein’s review of fullerene structures addresses construction via graphical methods, resonance, strain, stability, and symmetry. The authors then consider higher fullerenes, tubes and tori, and speculate on the mechanism of fullerene formation. Scuseria reviews ab initio calculations on equilibrium structures of C₆₀, hydrogenated and fluorinated derivatives, C₇₀, giant fullerenes, C₂₈, and negative-curvature fullerenes. White et al. describe theoretical work on fullerene geometry, electronics and photoelectron line shapes, molecular dynamics of fullerene impacts with surfaces and rare gas atoms, fullerene formation and compression, and the properties of tubules. Haddon and Raghavachari discuss the pyramidalization of fullerene carbons and analyze the effects of the unique curvature on fullerene electronic structures. Cohen and Crespi continue with theoretical treatment of alkaline metal intercalation and superconductivity. Erwin presents electronic structure theory for alkali-intercalated, endohedral, and metal-surface-adsorbed fullerenes.

The remaining chapters return to experimental work. Schwarz and co-workers discuss the gas-phase production and mass-spectroscopic analysis of exo- and endohedral complexes of fullerene ions with metals and noble gases. Wilson et al. present a concise overview of the solution electrochemistry of C₆₀, C₇₀, organic and organometallic derivatives, higher fullerenes, and films. Olah and co-workers offer a short review similar to their article in *The Fullerenes*. Finally, Wudl discusses the chemical derivatization of C₆₀, emphasizing versatile dipolar cycloadditions and potential applications of the products in materials science.

With new results appearing in the literature at an astounding rate, both of these volumes are already somewhat dated. Nonetheless, they offer the best comprehensive reviews of early research on fullerenes and related materials; as such, the books will prove invaluable to investigators confronted with literally thousands of citations.

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*Unsigned book reviews are by the Book Review Editor.