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BOOK REVIEW

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V. Balzano (ed), Electron transfer in chemistry, vols. 1–5

WILEY-VCH, Weinheim, New York, Chichester, Brisbane, Singapore, Toronto, 2001, 3912 p (ISBN 3-527-29912-2), €1599.00

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Electron transfer (ET) reactions are undoubtedly the most important chemical reactions, in both a quantitative and a qualitative sense. There is no subdivision of chemistry where electron transfer is not involved. It needed the advances of the last decades to envisage the general uniting aspects in electron transfer reactions. Thus it became possible to edit a handbook consisting of 5 volumes, 12 parts, and 78 chapters that give a rather comprehensive account of electron transfer reactions, at least on a level that spares the vast amounts of detail that have been collected throughout the years. The choice of topics must have been difficult and will have been dictated probably also by the availability and willingness of authors. It is certainly reasonable that the entire handbook is dominated by kinetic aspects; however, the reviewer would have liked to see more about the driving force of ET reactions, i.e. more about the thermodynamics involved. This is probably less modern, however, very basic for any research in electron transfer.

The 5 volumes are extremely useful, not only for electrochemists, but for every chemist. Biologists and physicists will also find it rewarding to consult these books. The quality of the contributions is very high. Misprints are rather rare. A distressing misprint in the author names of chapter 5, vol. 2, part 2, is an exception, where the institute's patron's name is printed as a co-author. Each volume can be used separately; however, the real value will be appreciated only by having them together. Of course, it cannot be expected that the individual chapters give the complete and necessary information to work in the special subject area. However, each chapter gives an overview and provides access to the topics. The handbook is highly recommendable and a must for any library. The content of the 5 volumes is summarized here:

Volume 1 contains the following in part 1 ''Principles and Theories'': theoretical models and computational implementation (M.D. Newton); adiabatic versus non-adiabatic ET (H. Sumi); single- and multi-electron transfer processes (S.S. Skourtis, D.N. Beratan); ET at electrodes and interfaces (D. Vanmaekelbergh); proton-coupled ET (S. Hammes-Schiffer); relationship between electron and electronic excitation transfer (P. Piotrowiak); charge-transfer excited states of transition metal complexes (J.F. Endicott); synthetic applications of photocatalytic oxidation and reduction reactions of organic reactants on irradiated semiconductor surfaces (M.A. Fox); radiative charge recombination and electroluminescence (A.-M. Andersson, R.H. Schmehl); electron transfer reactions in organic chemistry (S.F. Nelsen). In part 2 ''Methods and Techniques'' are treated: classical methods (A. Bakac); electrochemical techniques (S.U. Pedersen, K. Daasbjerg); radiation-chemical techniques (G.V. Buxton, Q.G. Mulazzani); photochemical techniques (K. Henbest, M.A.J. Rodgers).

Volume 2 ''Organic Molecules'' concerns: radical ions (M. Schmittel, M.K. Ghorai); ET in aliphatic and alicyclic compounds (H.D. Roth); ET chemistry of carbon–carbon bonds (N.L. Bauld, D. Gao); ET reactions of aromatic compounds (G. Gescheidt, M.N. Khan); ET chemistry of fullerenes (S. Fukuzumi, D.M. Guldi); ET reactions of heteroaromatic compounds (A. Albini, M. Fagnoni); ET reactions of amines (S. Das, V. Suresh); ET reactions of carbonyl compounds (A.G. Griesbeck, S. Schieffer); ET in radicals (M. Bietti, S. Steenken). Part 2 on ET reactions of ''Organometallic and Inorganic Molecules'' contains: reflections on the two-state electron-transfer model (B.S. Brunschwig, N. Sutin); CT interactions and ET-activated reactions of organometallic complexes (S.M. Hubig, J.K. Kochi); thermodynamics of organometallic systems (M. Tilset); ET reactions of electron-reservoir complexes and mono-electronic redox reagents (D. Astruc); ET in mononu-

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clear polypyridine-type metal complexes (A. Vlcek, Jr.); ET in catalytic dinitrogen reduction (A.E. Shilov); transition-metal complexes as models of hydrogenases (C.E. Forde, R.H. Morris); biomimetic ET chemistry of porphyrins and metalloporphyrins (S. Fukuzumi, H. Imahori); ESR spectroscopy of radicals (W. Kaim).

Volume 3 treats ET in ''Biological Systems'': ET in metalloproteins (H.B. Gray, J.R. Winkler); photosynthesis: bacterial reaction center (C.C. Moser, C.C. Page, P.L. Dutton); respiration: cytochrome oxidase (B.G. Malmström); heme-containing oxygenases and peroxidases (A.E. Pond, A.P. Ledbetter, M. Sono, D.B. Goodin, J.H. Dawson); ET and charge transport in DNA (F.D. Lewis). The part ''Artificial Supramolecular Systems'' contains chapters on: covalently linked systems (M.N. Paddon-Row); covalently linked systems containing porphyrin units (D. Gust, T.A. Moore, A.L. Moore); covalently linked systems containing metal complexes (F. Scandola, C. Chiorboli, M.T. Indelli, M.A. Rampi); ET in hydrogen-bonded donor–acceptor supramolecules (C.J. Chang, J.D.K. Brown, M.C.Y. Chang, E.A. Baker, D.G. Nocera); host–guest and cage-type systems (L. Fabbrizzi, M. Licchelli, A. Taglietti); ET in pseudorotaxanes (M. Venturi, A. Credi, V. Balzani); ET in rotaxanes and catenanes (R. Ballardini, M.T. Gandolfi, V. Balzani); metal-assembled catenanes, rotaxanes, and knots (N. Armaroli, J.-C. Chambron, J.-P. Collin, C. Dietrich-Buchecker, L. Flamigni, J.-M. Kern, J.-P. Sauvage); dendrimers (A. Juris).

Volume 4 contains in part 1 ''Catalysis of Electron Transfer'': fundamental concepts (S. Fukuzumi); redox modulation by molecular recognition (V. M. Rotello); homogeneous redox catalysis in CO_2 fixation (E. Fujita, B.S. Brunschwig); electrochemical and photochemical excitation of enzymes (E. Katz, A.N. Shipway, I. Willner); inter- and intraprotein ET (G. Tollin); novel organic synthesis through semiconductor photocatalysis (H. Kisch, M. Hopfner). Part 2 is devoted to ET in ''Heterogeneous Systems'': ET at semiconductor–electrolyte interfaces (K. Rajeshwar); dye sensitization of electrodes (P. Qu, G.J. Meyer); ET in zeolites (A.S. Vaidyalingam, M.A. Coutant, P.K. Dutta); ET in layered and intercalated compounds (V. Bhat, K. Domen); ET in organized molecular assemblies (R.S. Clegg, J.E. Hutchison); ET in self-organized systems of amphiphiles (J.K. Hurst, R.F. Khairutdinov). Part 3 concerns ET in ''Gas-phase Systems'': theoretical background (Y. Haas); ET involving atoms molecules and clusters (B. Soep, J.M. Mestdagh); TICT molecules (J. Herbich, B. Brutschy); exciplexes of large molecules (Y. Haas); isolated supermolecules (Y. Ohshima, O. Kajimoto, K. Fuke).

Volume 5 contains in part 1 ''Molecular-level Electronics'': wires based on metal complexes (J.-P. Launay, C. Coudret); optically controlled molecular switch (A.S. Lukas, M.R. Wasiliewski); photonic wires containing metal complexes (L.D. Cola, P. Belser); rectifiers (A.C. Brady, J.R. Sambles); logic gates (A. Prasanna de Silva, N.D. McClenaghan, C.P. McCoy); antennas (S. Campagna, S. Serroni, F. Puntoriero, C. di Pietro, V. Ricevuto), memories (M. Irie, K. Matsuda); nonlinear optics (S. Houbrechts, E. Hendrickx, T. Verbiest, K. Clays, A. Persoons). Part 2 covers ''Imaging and Information'': ET in silver halide photography (J.R. Fyson, P.J. Twist, I.R. Gould); electrophotography (D.S. Weiss, J.R. Cowdery, R.H. Young); photorefractive materials (D.P. West, M.D. Rahn); photoinduced ET initiating systems for free-radical polymerization (J. Paczkowski, D.C. Neckers). Part 3 is devoted to ''Energy and the Environment'': solar energy conversion (M. Grätzel, J.-E. Moser); batteries (C. Arbizzani, M. Mastragostino, F. Soavi); semiconductor-assisted photocatalysis for waste remediation (M.C. Thurnauer, T. Rajh, N. Dimitrijevic).