a quintet attributed to the phenoxy radical of **2a** (a_H = 1.6 G),[11] suggesting that the Co–O_2 complex abstracts hydrogen from the phenol. When oxygen was bubbled through the resulting solution the signals of the phenoxy radical disappeared and those of the Co–O_2 complex appeared again. The vicissitudes of these ESR signals can be repeated several times, and the peroxy complex **3a** is obtained from the final solution. These results seem to suggest that the formation of **3** involves the radical combination between the phenoxy radical of **2** and the Co–O_2 complex as the reaction of the phenoxy radical with oxygen is very slow.[12] However, the reaction of the phenoxy radical of **2a** with the Co–O_2 complex under oxygen atmosphere leads to the predominant formation of bis(4-oxo-2,5-cyclohexadienyl) peroxide derivative together with a minor amount of **3a**, indicating that the reaction of the phenoxy radical prefers the para position to the ortho position.[13] Very recently, on the other hand, it has been found that the phenolate anion of **2** can be oxygenated only in associated form with the counter metal ion resulting in the quantitative formation of the hydroperoxide **4**. It should be therefore considered that the formation of **3** is preceded by the equilibrium involving electron transfer from Co(salpr) to the phenoxy radical of **2** affording the Co(III) complex of the phenolate of **2**, to which oxygen is inserted to give **3**. Actually, an ESR study revealed that the phenoxy radical of **2** is reduced by Co(salpr)[14] and the oxygenation of the solution in which the phenoxy radical of **2a** and Co(salpr) are mixed in advance under nitrogen afforded only **3a**.

It is interesting to know the chemical reactivity of the present peroxy complexes in connection with the biological oxygenation of phenols, which is currently investigated.

Acknowledgment. This research was supported by the Japan Society for the Promotion of Science.

References and Notes

(1) M. Nozaki in "Molecular Mechanisms of Oxygen Activation", O. Hayaishi, Ed., Academic Press, New York and London, 1974, p 135.

(2) T. Nakazawa, Y. Kojima, H. Fujisawa, M. Nozaki, O. Hayaishi, and T. Yamano, *J. Biol. Chem.*, **240**, 3224 (1965).

(3) G. A. Hamilton in ref 1, p 443.

(4) We previously reported the oxygenation of 2,4,6-tri-*tert*-butylphenol with Co(salpr) to give 1,3,5-tri-*tert*-butyl-4-oxo-2,5-cyclohexadienyldioxycobalt(III)(salpr); A. Nishinaga, K. Watanabe, and T. Matsuura, *Tetrahedron Lett.*, 1291 (1974).

(5) Satisfactory analytical data for all the complexes were obtained.

(6) The absorption shifts to a little longer wavelength region compared to that of the corresponding hydroperoxides (**4**) (ν_{CO} 1660 cm^{-1}) probably attributed to the coordination effect.

(7) A. Nishinaga and A. Rieker, *J. Am. Chem. Soc.*, **98**, 4667 (1976). The structure of all other hydroperoxides (**4b–4**h) are confirmed by the elemental analyses and by their spectral data.

(8) A. Nishinaga, T. Itahara, and T. Matsuura, *Tetrahedron Lett.*, 2467 (1974).

(9) A. Rieker, W. Rundel, and H. Kessler, *Z. Naturforsch. B*, **24**, 547 (1969).

(10) S. Koda, A. Misono, and Y. Uchida, *Bull. Chem. Soc. Jpn.*, **43**, 3143 (1970).

(11) A. Rieker and K. Scheffler, *Justus Liebigs Ann. Chem.*, **689**, 78 (1965).

(12) E. Müller, A. Schick, and K. Scheffler, *Chem. Ber.*, **92**, 474 (1959).

(13) A. Nishinaga, T. Shimizu, and T. Matsura, unpublished data.

(14) From a mixture (1:1) of Co(salpr) and the radical of **2a** in CH_2Cl_2 which was allowed to stand at 0 °C for 1 h under nitrogen **2a** was obtained in 40% yield.[13]

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Additions and Corrections

Stereochemistry of the Reaction of Strained Olefins with Iron Carbonyls [*J. Am. Chem. Soc.*, **96,** 1622 (1974)]. By Jean Grandjean, Pierre Laszlo,* and Armel Stockis, Institut de Chimie, Universite de Liège, Liege, Belgium.

In the matrix regrouping stereoisomers belonging to the trans series (p 1622), the third-line, first-row symbol should read SXTNS instead of SNTNS. We thank N. Dumont for calling this misprint to our attention.

Chain-Length Effects upon the Interaction of Remote Functional Groups. The Low Energy Electron Impact Mass Spectra of α,ω-Dialkoxyalkanes Examined by Ion Cyclotron Resonance Spectroscopy [*J. Am. Chem. Soc.*, **97**, 2355 (1975)]. By Thomas Hellman Morton* and J. L. Beauchamp, A. A. Noyes Laboratory of Chemical Physics, California Institute of Technology, Pasadena, California 91109, and Metcalf Research Laboratory, Brown University, Providence, Rhode Island 02912.

The formula for compound **7b** in Table III should read "$CH_3OCD_2(CH_2)_2CD_2OCH_3$".

The Mixed Valence State Based on μ-Cyanogen-bis(pentaammineruthenium) [*J. Am. Chem. Soc.*, **97,** 5310 (1975)]. By Glenn M. Tom and Henry Taube,* Department of Chemistry, Stanford University, Stanford, California 94305.

The title complex is by no means the first complex of cyanogen to have been reported as implied in the paper. Those which have been reported include the series $(CO)_5MlNCCNMt(CO)_5$ with Ml = Cr, Mo, W (J. F. Guttenberger, *Angew. Chem., Int. Ed. Engl.*, **6,** 1081 (1967)); $[RhCl(CN)_2(P(Ph)_3)_2C_2N_2$ and $RhClI_2(P(Ph)_3)_2C_2N_2$ (G. Favero, B. Corain, P. Rigo, and A. Turco, *Gazz. Chim. Ital.*, **103,** 297 (1973)).

Comparison of Equilibrium Reactions in the Gaseous and Liquid Phases. A New, Improved Theoretical Estimate [*J. Am. Chem. Soc.*, **98,** 2046 (1976)]. By Sidney W. Benson and G. David Mendenhall, Department of Thermochemistry and Chemical Kinetics, Stanford Research Institute, Menlo Park, California 94025.

In our treatment of the $N_2O_4 \rightleftharpoons NO_2$ equilibrium we overlooked a very detailed study of this system by P. Gray and P. Rathbone [*J. Chem. Soc.*, 3550 (1958)]. These workers obtained values of ΔH_1 = 17.8 kcal, ΔS_1 = 43.0 eu, and ΔG_1 = 5.3 kcal for the dissociation in liquid N_2O_4 as solvent. Our calculated values of $\Delta H_1{}^+$ = 16.6 kcal, $\Delta S_1{}^+$ = 41.3 eu, and $\Delta G_1{}^+$ = 4.3 kcal are in better agreement with their data than with data from other sources cited in our paper.

Inelastic Electron Tunneling Spectroscopy of Carbon Monoxide Chemisorbed on Alumina-Supported Transition Metals [*J. Am.*

Chem. Soc., **98,** 6064 (1976)]. By PAUL K. HANSMA, WILLIAM C. KASKA,* and R. M. LAINE, Department of Physics and Department of Chemistry, University of California, Santa Barbara, California 93106.

On page 6065, first column, line 17 should read: "... background subtraction shows that only the higher energy peak at 1935 ± 10 cm^{-1} appears at low rhodium coverages; the lower energy peak at 1730 ± 10 cm^{-1} appears only at higher rhodium coverages."

Orbitally Dependent Exchange in Two Sulfur-Bridged Binuclear Iron(II) Complexes. Magnetic Exchange in Transition Metal Complexes. 11 [*J. Am. Chem. Soc.*, **98,** 6958 (1976)]. By A. P. GINSBERG,* M. E. LINES,* K. D. KARLIN, S. J. LIPPARD,* and F. J. DISALVO, Bell Laboratories, Murray Hill, New Jersey 07974, and Department of Chemistry, Columbia University, New York, New York 10027.

Equation 28 should read:

$$\chi_A' = 1/6(\chi_x{}^{dim} + \chi_y{}^{dim} + \chi_z{}^{dim}) \tag{28}$$

The omitted factor of ½ in the printed equation was *not* omitted in our calculations; nothing else in the paper is affected by the omission.

*Book Reviews**

Chemotherapy. Volumes 2 and 3. Edited by J. D. WILLIAMS and A. M. GEDDES. Plenum Press, New York, N.Y. 1976. Volume 2: xiv + 442 pp. $35.00; Volume 3: xiv + 442 pp. $35.00.

These two volumes are part of the Proceedings of the 9th International Congress of Chemotherapy held in London in July 1975. Volume 2 is subtitled "Laboratory Aspects of Infections"; Volume 3 is subtitled "Special Problems in Chemotherapy". Each contains a large number of papers on original research, reproduced from the authors' typescripts. The papers are somewhat abbreviated in comparison to journal papers, most of them falling into the range 5 to 10 pages. There are no indexes.

Fine Particles: Aerosol Generation, Measurement, Sampling, and Analysis. Edited by B. Y. H. LIU. Academic Press, New York, N.Y. 1976. xiii + 837 pp. $34.50.

A symposium on the title subject was held in May 1975. This volume contains the technical papers presented, plus several others, for a total of 34. Some are reviews, and others are reports of original research, including experimental details. There are many figures, both graphic and photographic; some of the latter bear a remarkable resemblance to views of the Martian surface recently transmitted! The subject of the symposium is of obvious importance and timeliness. The usefulness of the volume is enhanced by the subject and author indexes included.

Organic Synthesis: Plenary Lectures. Edited by A. BRUYLANTS, L. GHOSEZ, and H. G. VIEHE. Butterworths, London. 1976. 271 pp. $35.00.

The first IUPAC International Conference on Organic Synthesis was held at the University of Louvain in 1974. The thirteen plenary lectures are reproduced in this volume; all are in English. The general flavor is that of methods and reagents, rather than spectacular individual syntheses. Some representative titles are: The Cyclopropanation of Silyl Enol Ethers; The Effect of Pressure on the Electronic States of Organic Solids; Singlet Oxygen; Industrial Synthesis of Terpene Compounds. The papers thus promise to have longer usefulness than those of many conferences. It is unfortunate that this potential usefulness is impaired by the lack of an index. For some reason not explained, the pagination begins with p 315, although the book is complete unto itself.

Fluorine Chemistry Reviews. Volume 7. Edited by PAUL TARRANT (University of Florida). Marcel Dekker, Inc., New York, N.Y. 1974. viii + 243 pp. $24.50.

Three Russian scientists have teamed to contribute two critical reviews which admirably fulfill the series objective of providing coverage of current research in fluorine chemistry. Two concise chapters are devoted to the chemistry of highly fluorinated aromatic and heteroaromatic compounds.

L. S. Kobrina has written Chapter One entitled, "Nucleophilic Substitution in Polyfluoroaromatic Compounds". This authoritative account is arranged according to the number of fluorine atoms in the system and discussed with emphasis on substituent effects on reactivity and orientation of nucleophilic aromatic substitution. A succinct section on solvent effects is included (189 references, 115 pp).

Chapter Two, "Preparation and Reactions of Polyfluorinated Aromatic Heterocycles", by G. G. Yakobson, T. D. Petrova, and L. S. Kobrina, is divided into two parts. Methods for preparing fluorinated aromatic heterocycles containing sulfur, oxygen, or nitrogen are thoroughly discussed while a close watch is kept on the fate of the ring system. The reactions of these systems are condensed in a well-written section highlighted by nucleophilic aromatic substitution and photochemical and thermal reactions (285 references, 110 pp).

Literature coverage is complete through 1970 with pertinent references from 1971 and 1972 added without discussion. A good author index and a short subject index are included.

Fluorine specialists will surely welcome this volume, and many others will find interest in the sections on nucleophilic aromatic substitution.

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Biophysics and Other Topics. Selected Papers by AHARON KATZIR-KATCHALSKY. Academic Press, New York, N.Y. 1976. xxviii + 579 pp. $34.50.

This book is a pleasure to read, in large measure because, as Herman Mark says in his foreword, "All work of Aharon has *style*."

A collection of papers from 1951 to 1973, but heavily weighted with more recent work, it is sorted into six categories, roughly: (1) polyelectrolytes—thermodynamic properties, interactions, cooperative transitions; (2) mechanochemistry, hysteresis, and memory; (3) irreversible thermodynamics, theory of membrane processes, and network thermodynamics; (4) amino acids, polypeptides, prebiotic synthesis; (5) surface activity of polyelectrolytes; (6) science and humanities.

Most are review articles, written in lucid style with consideration for the reader from a different discipline, in most cases quite suitable as teaching material on the advanced graduate level, or as introductions to the various subjects covered, for the nonspecialist. There is a certain amount of repetitiveness, where the same ideas are presented in two or more papers written toward different audiences or in different contexts; in most cases this adds to the usefulness of the book.

One of the hallmarks of Aharon Katchalsky's style is the manner in which he introduces the reader to his subject, placing it in perspective against the cosmic questions of life and molecular mechanisms, toward which much of this work is pointed.

Indeed, in reading this book, one becomes infected with the author's drive to know, to understand, because even in detail one is constantly aware of where one is trying to go.

A good anthology is more than a collection; it is greater than the

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* Unsigned book reviews are by the Book Review Editor.