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Inorganic Photochemistry—State of the Art

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The articles in this issue of THE JOURNAL represent the talks given at the State-of-the-Art Symposium for Chemical Educators held on March 22–23, 1983 at the American Chemical Society National Meeting in Seattle, Washington. Sponsored by the Division of Chemical Education and jointly sponsored by the Division of Inorganic Chemistry, this Symposium was the seventh in a series dedicated toward bringing to chemical educators a knowledge of active research areas in chemistry that they may not obtain in their own teaching and research experience. The papers presented here are designed to serve as a resource for teachers, students, and textbook writers wishing to gain insight into *Inorganic Photochemistry* in a systematic, pedagogical manner. In this way, it is hoped that the principles and examples of this field will find greater inclusion in the courses we present and the textbooks we use. In a recent symposium on inorganic chemistry in the undergraduate curriculum, Tom Meyer[1] and Harry Gray[2] pointed out the many opportunities in general chemistry and upper level inorganic chemistry courses to present the concepts of electronic excited states, photon-induced substitution and redox, and fast kinetic processes. This Symposium presents the material for this goal to be achieved.

Inorganic Photochemistry, in its broadest sense, refers to the result of the interaction of photons with substances regarded as "inorganic". As with any broad area of research, complete coverage is not possible nor desirable in the context of the Symposium articles. For most practitioners in the field, *Inorganic Photochemistry* refers to the interaction of visible and ultraviolet light with metal complexes and organometallic compounds, largely but not exclusively in solution, and largely but not exclusively at room temperature. "Modern" inorganic photochemistry is now about 30 years old with the greatest activity over the past 10–15 years corresponding to the maturation of organic photochemistry and the knowledge of excited state behavior it has produced, the development of fast kinetic instrumentation and pulsed lasers, and the increasing interest in the storage and conversion of solar energy. Historically, the luminescence of minerals was known and reported 300 years ago. Luminescence in solution became known and the details established in the 19th century. By 1830, the photochemistry of ferrocyanide ion, ferrioxalate, and uranyl oxalate had been studied. Earlier in this century, quantitative examination of the photochemistry and photophysics of many metal complexes had been performed. The development of this research area has involved the incorporation of new experimental techniques, new theoretical understanding of spectroscopy and bonding, and new views of excited state energy levels.

This Symposium Issue is highly structured with the papers ranging from basic principles to specific systems to applications and directions for the future. The first three papers are devoted to "what you need to know" on which the later papers are built. The paper by **Porter** (p. 785) establishes the basic principles and techniques of photochemistry. **Crosby** (p. 791) discusses structure, bonding, and spectroscopy of inorganic complexes, and **Adamson** (p. 797) focuses on the properties of excited states. The following four papers deal with the pathways of decay of photo-produced excited states: physical (**Demas**, p. 803), electron transfer (**Sutin** and **Creutz**, p. 809), energy transfer (**Balzani** and **Scandola**, p. 814), and chemical (**Endicott**, p. 824). The next four papers are devoted to specific chemical systems examined with case study approaches: **Ford** on rhodium ammine complexes (p. 829), **Watts** on ruthenium polypyridyl complexes (p. 834), **Kirk** on chromium ammine complexes (p. 843), and **Serpone** and **Hoffman** on chromium polypyridyl complexes (p. 853). **Geoffroy** (p. 861) and **Whitten** (p. 867) examine the more general topics of organometallic and bioinorganic systems, respectively. The final three papers deal with some new applications and future directions of promise. **Fendler** (p. 872) discusses photochemistry in organized media, **Wrighton** (p. 877) presents recent developments in photoelectrochemistry, and **Kutal** (p. 882) examines the potential of inorganic compounds in solar energy conversion schemes.

An examination of THE JOURNAL for the past 15 years reveals that a number of interesting papers have been published on *Inorganic Photochemistry* dealing with theoretical concepts, experimental procedures, and instrumentation. This bibliography is presented here to serve as additional resource material.

Acknowledgment

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Previously Published Papers on Inorganic Photochemistry in the Journal of Chemical Education

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Kantrowitz, E. R., J. CHEM. EDUC., **51,** 202 (1974). Freshman class project on the photochemistry of oxalatobis(ethylenediamine)cobalt(III) ion.

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Ernhoffer, R., Kovacs, D., Subak, Jr., E., and Shephard, R. E., J. CHEM. EDUC., **55,** 610 (1978). Photogeneration of 2-methylpyrazinepentacyanoiron(II).

Calabro, D. C., and Lichtenberger, D. L., J. CHEM. EDUC., **59,** 686 (1982). Preparation of dicarbonyl(η^5-methylcyclopentadienyl)triphenylphosphinemanganese using sunlight.

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[1] Meyer, T. J., J. CHEM. EDUC., **57,** 763 (1980).
[2] Gray, H. B., J. CHEM. EDUC., **57,** 764 (1980).