$$F^0/F' = \tau_f^0/\tau_f' = 1 + k_4\tau_f^0[\mathrm{C}] \qquad (11)$$

$$F'/F = \tau_f'/\tau_f = 1 + k_6\tau_f'[\mathrm{H}] \qquad (12)$$

scribes the relative fluorescence intensities of solutions containing constant concentrations of A and C but varying concentrations of H.[7] The ratio of quantum yields for the appearance of T in the presence of H to that without H, at constant light dose, is given by eq 13. Since the second term in both numerator and denominator is unaffected by xenon, the ratio of these terms in eq 13 is unity. Combining eq 11–13 gives eq 14, which predicts that a plot of $(F^0/F')(F'/F - 1)$ *vs.* $(Y_\mathrm{T}/Y_\mathrm{T}')(F'/F) - 1$ should be linear with slope Φ_{isc}. An important advantage of the present method over previous methods employing sensitized isomerization[2,8] is that neither the efficiency of energy transfer nor the triplet counter decay ratio need be known. In addition, only relative measurements with the same sensitizer are required if all samples are irradiated under identical conditions.[9]

$$Y_\mathrm{T}/Y_\mathrm{T}' = \frac{(k_5 + k_6[\mathrm{H}])\tau_f\left(\dfrac{k_8[\mathrm{C}]}{k_7 + k_8[\mathrm{C}]}\,\dfrac{k_{10}}{k_9 + k_{10}}\right)}{k_5\tau_f'\left(\dfrac{k_8[\mathrm{C}]}{k_7 + k_8[\mathrm{C}]}\,\dfrac{k_{10}}{k_9 + k_{10}}\right)} \qquad (13)$$

$$(F^0/F')(F'/F - 1) = \Phi_{\mathrm{isc}}[(Y_\mathrm{T}/Y_\mathrm{T}')(F'/F) - 1)] \qquad (14)$$

Figure 1 shows plots of eq 14 for anisole, mesitylene, and toluene. The lines shown were calculated by the method of least squares and linear correlation coefficients are 0.995 or greater in each case. Values of Φ_{isc} obtained from the slopes are listed in Table I, along with the corresponding fluorescence quantum yields. While the sum of Φ_{isc} and Φ_f is unity within experimental error for anisole, it is much less for mesitylene and toluene. We conclude that a significant fraction of excited singlets of mesitylene and toluene decay through pathways other than fluorescence and intersystem crossing.

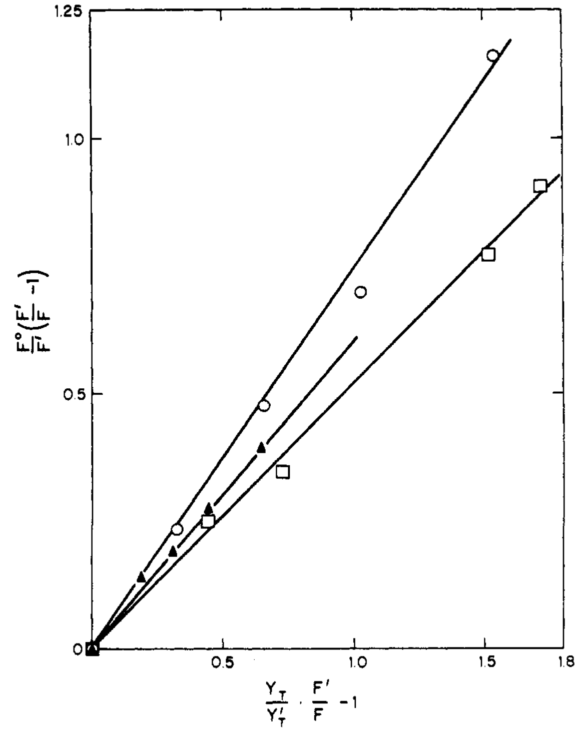

Figure 1. Determination of intersystem crossing quantum yields for anisole (○), mesitylene (▲), and toluene (□).

Table I. Intersystem Crossing and Fluorescence Quantum Yields in Deoxygenated Isooctane Solution

Compound	Φ_{isc}[a]	Φ_f[b]	Φ_{isc} (lit.)
Anisole	0.74 ± 0.04	0.24 ± 0.01	
Mesitylene	0.60 ± 0.03	0.13 ± 0.01	
Toluene	0.52 ± 0.03	0.14 ± 0.01	0.53,[c] 0.46,[d] 0.34[e]

[a] Determined from the slopes in Figure 1. The estimated errors primarily reflect uncertainties in relative fluorescence yields. [b] Quantum yields of fluorescence (254-nm excitation) determined relative to cyclohexane solutions of equal optical density: J. B Birks, "Photophysics of Aromatic Molecules," Wiley-Interscience. New York, N. Y., 1970, pp 98, 122. [c] Dilute cyclohexane solution: K. Sandros, *Acta Chem. Scand.*, **23**, 2815(1969). [d] Neat toluene.[8] [e] Reference 5.

We are currently determining intersystem crossing yields for other benzene derivatives by this technique. The method should also be useful in elucidation of the mechanisms of photochemical reactions which give products by both singlet and triplet pathways. In this case the products could function as singlet or triplet monitors.

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(8) R. B. Cundall and W. Tippett, *Trans. Faraday Soc.*, **66**, 350 (1970).

(9) Irradiations were conducted simultaneously at 254 nm in a merry-go-round apparatus[10] and were stopped at less than 4% conversion of C to T. Corrections for back reaction are small at such low conversions.

(10) F. G. Moses, R. S. H. Liu, and B. M. Monroe, *Mol. Photochem.*, **1**, 245 (1969).

(11) (a) National Science Foundation Predoctoral Fellow, 1969–1972; (b) National Science Foundation Trainee, 1968–1971.

Additions and Corrections

The Determination of Double-Bond Character in Cyclic Systems. VI. Anthracene. Evidence for Benzenoid Terminal Rings [*J. Amer. Chem. Soc.*, **87**, 1247 (1965)]. By John L. Ferrari,* I. Moyer Hunsberger, and

H. S. Gutowsky, Departments of Chemistry, Fordham University, New York, New York, University of Massachusetts, Amherst, Massachusetts, and University of Illinois, Urbana, Illinois.

On page 1251, in the fifth paragraph of the Experimental Section, the first sentence should begin as follows: If the reduction as described above is performed on an ammonium carbonate extract resulting from work-up of the Friedel–Crafts reaction of anisole with phthalic anhydride[31] and terminated after 7 hr, (4-methoxyphenyl)phthalide (72%, mp 117–118°) is obtained; . . . .

Heavy-Atom Solvent Effect on the Photoaddition of Acenaphthylene and Cyclopentadiene [*J. Amer. Chem. Soc.*, **93,** 2071 (1971)]. By B. F. Plummer* and D. M. Chihal, Trinity University, San Antonio, Texas 78212.

Due to an experimental error the product ratios reported in Table I for acetonitrile and cyclohexane are corrected respectively to (endo:exo:[2+2]): 0.66: 3.01:1 and 0.58:1.46:1. This does not change the major conclusions reached concerning the heavy-atom effect.

Oxidative Cleavage of Cobalt–Carbon Bonds in Organobis(dimethylglyoximato)cobalt Compounds [*J. Amer. Chem. Soc.*, **94,** 659 (1972)]. By Peter Abley, Edward R. Dockal, and Jack Halpern,* Department of Chemistry, The University of Chicago, Chicago, Illinois 60637.

The structure of compound **4** (eq 6 and footnote 11) was incorrectly assigned. The correct formulation of this compound is almost certainly $RON{=}C(CH_3)C(CH_3){=}NOH$, *i.e.*, the ether of dimethylglyoxime. S. N. Anderson, D. H. Ballard, and M. D. Johnson [*J. Chem. Soc., Perkin Trans. 2*, 311 (1972)] have recently reported that this compound is also one of the products of the reactions of halogens with benzylcobaloxime in acetic acid.

Reaction of Tetrasulfur Tetranitride with Strained Olefins [*J. Amer. Chem. Soc.*, **94,** 1550 (1972)]. By Max R. Brinkman and Christopher W. Allen,* Department of Chemistry, University of Vermont, Burlington, Vermont 05401.

Reference 5 should read: M. Becke-Goehring and D. Schläfer, *Z. Anorg. Allg. Chem.*, **356,** 234 (1968).

Axial Pseudoasymmetry in Sulfenamides. A Method for Assignment of Configuration to *meso* and *dl* Secondary Amines [*J. Amer. Chem. Soc.*, **94,** 2533 (1972)]. By Daniel Kost and Morton Raban,* Department of Chemistry, Wayne State University, Detroit, Michigan 48202.

On page 2533, column 2, the tenth line down from the figure should read: for interconversion of the *r* and *s meso* isomers.

Base-Catalyzed Nucleophilic Substitutions at Pentacoordinated Phosphorus [*J. Amer. Chem. Soc.*, **94,** 3531 (1972)]. By Fausto Ramirez,* Gordon V. Loewengart, Elefteria A. Tsolis, and Koa Tasaka, Department of Chemistry, State University of New York at Stony Brook, Stony Brook, New York 11790.

On page 3533, column 2, in the first and second lines fluoro alcohol should read fluoroalkoxy ligand. In the caption to Figure 1, at the end of line 9 $(CH_3)_2$ should read $(CF_3)_2$.

Emission Properties of Aromatic Amines in Solution. Phenoxazine System [*J. Amer. Chem Soc.*, **94,** 3755 (1972)]. By J. Robert Huber* and W. W. Mantulin, Department of Chemistry, Northeastern University, Boston, Massachusetts 02115.

On page 3759, column 2, lines 1–8 *from the bottom* should read: . . . . . B_1 in C_{2v} symmetry becomes A′′ in C_s.[25] ISC between A′′ states, involving the $H_{so}(R_x)$, is allowed. (N–O axis corresponds to the *z* direction, plane of symmetry is $\sigma(zy)$). . . . . Therefore, polarization of the phosphorescence is along the *x* axis.

These corrections have no effect on the conclusion.

*Book Reviews**

Annual Reports in Organic Synthesis—1970. Edited by John McMurry and R. Bryan Miller (University of California). Academic Press, New York and London. 1971. xvi + 339 pp. $7.50.

The seemingly endless expansion of the amount of published research has produced a variety of attempts to aid the individual chemist to keep track of what is new in his field. Some are designed to be primarily alerting devices, and others are meant to be permanent records with easy retrieval characteristics. The present volume is the first of a series on organic synthesis and attempts to satisfy both needs. Alerting is accomplished by rapid publication and retrieval by organization. Easy scanning is aided by relying almost entirely on structural formulas to convey information.

The editors have been reasonably successful in their aims, for material available to them through March 1971 has been incorporated in a book that appeared within the same calendar year. The organization is a natural one and is convenient to use. It involves subdivision into seven classes: Carbon–Carbon Bond Forming Reactions; Oxidations; Reductions; Synthesis of Heterocyclics; Protecting Groups; Useful Functional Group or Multistep Syntheses, and Completely Miscellaneous Reactions.

There are, of course, other books and serial publications in organic synthesis, a fact that the editors freely acknowledge; "Theilheimer" is perhaps the most similar. The advantage of the present series is the much lower price (achieved at the expense of some of the elaborateness of coverage of Theilheimer), which makes it feasible for the individual chemist to purchase it. It seems to fill a need.

N-Benzoylphenylhydroxylamine and Its Analogues. By A. K. Majumdar (Jadavpur University). Pergamon Press, Oxford. 1972. x + 211 pp. $20.00.

This is a monograph on the preparation of a class of analytical reagents and their application to separation and determination of

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* Unsigned book reviews are by the Book Review Editor.