group participation and which we include, therefore, under anchimeric acceleration. In the present case, neither the large rate factor, nor even the isotope factor,[15] are as convincing as the absence of products like V that hydrogen participation is occurring in the ionization step for III-OBs. Also, the geometry of III-OBs is such that it seems difficult for ionization to occur at Cα without some C–H electron delocalization in the transition state.

The solvolysis products from III-OBs apparently arise mostly from the rearranged norbornyl-type ion VI. However, the distinctly higher proportion of the VIII-structure in the products from III-OBs than from VII-OBs and VIII-OBs, suggests that some of the product arises at a stage earlier than ion VI. One of the simplest possibilities is that a hydrogen-bridged species such as IV intervenes between III-OBs and VI, and this intermediate can either lead to VIII-product or rearrange to VI, this in turn leading to its characteristic mixture of VII plus a little VIII.

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[15] (a) V. Prelog, *Chimia*, **11**, 257 (1957); (b) L. S. Bartell, *Tetrahedron Letters*, **6**, 13 (1960); (c) K. T. Leffek, J. A. Llewelyn and R. E. Robertson, *Chemistry and Industry*, 588 (1960).

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RECEIVED OCTOBER 27, 1960

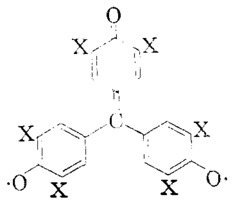
SYNTHESIS OF A STABLE BIRADICAL[1]

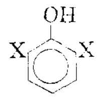
Sir:

We wish to report the analysis of a stable biradical (I) which differs from common organic biradicals.[2] Common organic biradicals, such as Chichibabin hydrocarbon, contain two uncoupled electrons in separate π-electron systems and the electrons are essentially independent of each other.[3] Compound I contains two uncoupled electrons in the same π-electron system. Therefore, it may exist in a triplet ground state, a postulate which is in agreement with preliminary MO calculation.[4,5]

Condensation of 2,6-di-*t*-butylphenol (II) with Compound III[6] in H_2SO_4–HOAc gave a mixture of tris-(3,5-di-*t*-butyl-4-hydroxyphenyl)-methane (IV) (Found: C, 82.33; H, 10.34; m.p. 240–241°; γ_{max} 3580 cm.$^{-1}$; λ_{max} 277 mμ, log ε 3.79) and its corresponding quinone methide (V) (Found: C, 82.13; H, 10.03; m.p. 278–279°, γ_{max} 3580 cm.$^{-1}$ and 1583 cm.$^{-1}$; λ_{max} 449 mμ, log ε 4.41). V is the oxidation product of IV by III during the condensation and it may be reduced quantitatively to IV by zinc and acetic acid. The oxidation of V with two equivalents of potassium ferricyanide gave I (Found: C, 83.01; H, 9.69). I crystallized from benzene in deep purple prisms with metallic luster, undergoes a series of color changes when heated and liquefies at 280°. Compound I exhibits an absorption maximum at 442 mμ in benzene (log ε 5.15), a strong infrared band at 1562 cm.$^{-1}$ which has been attributed to phenoxyl radical,[7] no absorption in the OH region and 1580–2800 cm.$^{-1}$ in the infrared, and no detectable proton magnetic resonance within ±2,500 τ,[8] indicating an abnormal shielding of the proton resonance by the uncoupled electrons. Hydrogenation of I in the presence of Adams catalyst consumed the calculated amount of hydrogen to give a mixture of IV and V in 96% yield. The reduction indicated no fragmentation during the ferricyanide oxidation, thus, the structure of I is confirmed.

X IS *t*-BUTYL GROUP


I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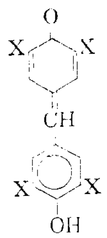
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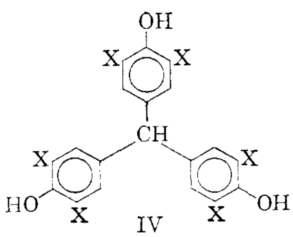
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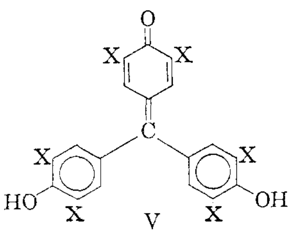
V

The paramagnetic properties and a detailed quantum mechanical calculation of I are being investigated, respectively, by Professor C. A. Hutchison, Jr., and Dr. D. Kearns at the University of Chicago.

The authors wish to thank Professors G. W. Wheland, K. D. Kopple, J. R. Platt and C. A. Hutchison, Jr., for many helpful discussions and Messrs. M. Lewis, I. Masnyk and A. Morduchowitz for assistance in the laboratory.

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RECEIVED OCTOBER 25, 1960

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[1] Supported by a PHS grant No. A-3444(A) from the National Institute of Arthritis and Metabolic Diseases, Public Health Service.

[2] For a review on common organic biradicals, see G. W. Wheland "Advanced Organic Chemistry," 3rd Edition, John Wiley and Sons, New York, N. Y., 1960, p. 813.

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[5] D. Kearns, unpublished result.

[6] M. S. Kharasch and B. Joshi, *J. Org. Chem.*, **22**, 1435 (1957).

[7] (a) C. D. Cook and B. E. Norcross, THIS JOURNAL, **78**, 3797 (1956); (b) G. M. Coppinger, *ibid.*, **79**, 501 (1957); and (c) I. E. Mueller, K. Ley and W. Kiedaisch, *Ber.*, **88**, 1819 (1955).

[8] G. V. D. Tiers, *J. Chem. Phys.*, **62**, 1151 (1958).

[9] Alfred P. Sloan Foundation Fellow.