SODIUM BOROHYDRIDE AS AN ELECTRON DONOR IN THE REACTION WITH AN ORGANIC CATION

A. S. Morkovnik, O. Yu. Okhlobystin,
and N. M. Dobaeva

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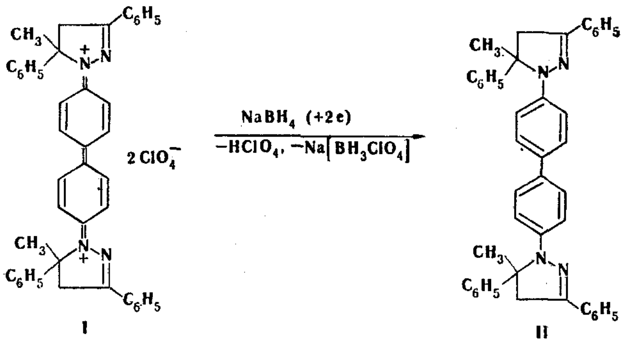
Organic cations are usually reduced by sodium borohydride to form hydrogenated derivatives, presumably by ionic hydrogenation. We assumed that the formal transfer of the hydride ion proceeds in fact in stages and starts with an electron transfer from a compound containing hydrogen with a high "hydride" mobility to a hydride-ion "acceptor" molecule, and decided to show that with organic cations, sodium borohydride can act as a donor of electrons only, but not of hydrogen. As a model we chose the perchlorate of 4,4'-di-(3,5-diphenyl-5-methyl-Δ^2-pyrazolinyl-1)diphenyl dication (I). We found that the reaction of salt of I with sodium borohydride leads to the formation of the product of the two-electron reduction of compound I, i.e., 4,4'-di-(3,4-diphenyl-5-methyl-Δ^2-pyrazolinyl-1)diphenyl (II).



The reaction was carried out at 15-20°C in acetonitrile in an argon atmosphere. The yield of compound II was 81%, mp 258-260°C. The IR spectrum of the compound was identical with that of an authentic sample.

The perchlorate of I was obtained analogously to the preparation of the hexachloroantimonate of 4,4'-di-(3,5-diphenyl-5-methyl-Δ^2-pyrazolinyl-1)diphenyl, by oxidizing compound II with ferric chloride nonahydrate (III) in acetonitrile. The data of the elementary analysis of compound I correspond to the empirical formula. By reducing perchlorate I with zinc dust, diphenyl II was reformed.

Thus, like dication I, the intermediately formed cation radical $II^{+\cdot}$ accepts from $NaBH_4$ electrons only.

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