

[2.2]Paracyclophane-4,7,12,15-tetrone,

[2.2](1,4)naphthalenophane-4,7,14,17-tetrone, and 1,4,8,11-pentacenetetrone radical anions - A comparative ESR study

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Three types of tetrone radical anions in which two 1,4-benzoquinone units are connected by ethano (1⁻, 2⁻), [2.2]paracyclophane (3⁻, 4⁻), and anthracene bridges (5⁻, 6⁻) have been studied by ESR and ENDOR spectroscopy. The displacement of the unpaired electron over the two C_6O_2 moieties in the [2.2]cyclophane radical anions 1⁻---4⁻ and the marked difference between the first and second reduction potentials, $\Delta E = |E_2^\circ - E_1^\circ| \approx 0.20 \text{ V}$, are evidence for a substantial intramolecular electronic interaction between the two electrophores. Similar ΔE data for the syn- (3) and anti-naphthalenophanes (4) indicate that most of the intramolecular electronic interaction takes place through the [2.2]paracyclophane bridge. When ion pairing is inhibited by complexation of the cation, the unpaired electron in 5⁻ and 6⁻ is also delocalized over the whole pentacenetetrone system at temperatures as low as 160 K.