Reversible Redox Reactions Of Antiaromatic Expanded Isophlorins

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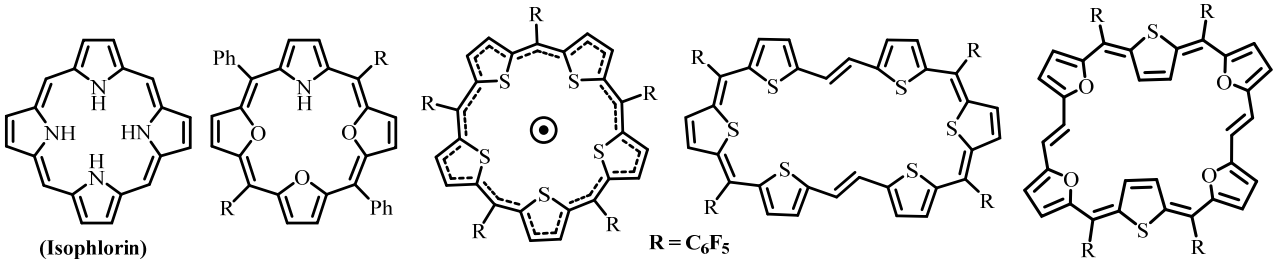
Abstract: Stable antiaromatic molecules are attractive synthetic targets for their electronic and redox properties. The hypothetical isophlorin structure provides a unique template to synthesize antiaromatic macrocycles. We have developed synthetic methodologies to obtain similar π-conjugated stable 4nπ systems. Expanding the π-conjugation of antiaromatic isophlorin gives access to a variety of macrocycles with 4nπ electrons. Reaction of thiophene with pentafluoro benzaldehyde under Rothemund reaction conditions yielded a 25π air-stable neutral radical, along with a host of other expanded isophlorins. The radical exhibits reversible one-electron redox to form antiaromatic cation and an aromatic anion. All the three states were characterized comprehensively to confirm their aromatic properties. Other antiaromatic π-expanded isophlorins, bearing 32, 40 and 48 π-electrons can also be synthesized from heterocycles such as thiophene and furan, which exhibit reversible two-electron oxidation. These macrocycles were unambiguously characterized by a variety of analytical techniques to confirm their (anti)aromatic behavior. In this presentation, syntheses, redox properties and the structural aspects of antiaromatic expanded isophlorins will be highlighted.



References and Notes:

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