

Orthosteric Control of Acidity Through Sulfate Binding in a Neutral Cyclo[8]pyrrole

Autorzy

Katarzyna Ślusarek-Zajac

Emilia Ganczar

Tadeusz Lis

Mateusz Waliczek

Marcin Stępień

Rok wydania

2026

CzasopismoAngewandte Chemie -
International EditionStrony

e2275817

DOI

10.1002/anie.2275817

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Acid–base equilibria can be shifted when binding events alter the local electrostatic and hydrogen-bonding environment of an ionizable site. Implementing such binding-linked acidity changes in a discrete synthetic system would enable regulation of proton activity without changing molecular composition or solvent. Here we describe a new naphthalimide-fused analogue of cyclo[8]pyrrole in which anion recognition dramatically shifts protonation equilibria. Whereas established cyclo[8]pyrroles preferentially form globally aromatic dicationic species, the electron-deficient macrocycle shows an unusual preference for a persistent neutral redox state, while simultaneously revealing exceptionally high Brønsted acidity in organic solvents. The neutral macrocycle retains key anion-recognition characteristics of dicationic cyclo[8]pyrroles, including strong sulfate affinity. Sulfate binding increases the effective first pK_a in DMSO by roughly four units, providing an orthosteric, anion-actuated acid switch and expanding the design space of switchable acidity beyond host–guest pK_a shifts and light-addressable photoacids.

Słowa kluczowe

anion receptors, Brønsted acidity, cyclo[8]pyrroles, sulfate binding, supramolecular chemistry

Adres publiczny<http://dx.doi.org/10.1002/anie.2275817>Strona internetowa wydawcyonlinelibrary.wiley.com