Ferrocene-Imidazole Dyads at the Service of the Ions Recognition

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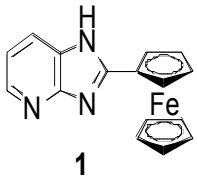
Among the various abiotic receptors reported in the literature, those containing a pyrrolic NH group as anion-binding motif have attracted considerable attention very recently. In this sense, In this line, it seems to be of interest to study how the binding properties of the imidazole core may be not only modulate but also changed by linear annelation to aza-heterocycles leading to p-expanded imidazole derivatives bearing several binding sites. Introduction of an additional N atom in the six-membered ring of the benzimidazole ring, in compound **1** imparts an interesting behavior as the pyridine-like N atom of the six-membered ring could cooperate with the basic N atom of the imidazole ring to promote the binding affinity toward metal cations.[1] In compound **2**, the benzobisimidazole architecture features two linearly opposed imidazole rings. An important consequence of this arrangement is that the two ferrocene are embodied within the system. The insertion of the redox subunits within the ditopic heteroaromatic core represents an important "added value" to this class of receptors.[2] In compound **3**, a nitrogen-rich policyclic system (metal transition binding site) is linked to a ferrocene unit through an imidazole ring (anion binding site). The multiresponsive character of the receptor and the ability to act as favorable binding for cations and anions in the recognition event are the most noteworthy.[3] The guanidine unit in the guise of 2-aminoimidazole in compound **4** acts as a binding site for anions through an unusual redox ratiometric fashion and spectroscopic measurements. Its monoprotonated form is able to selectively sense the less basic anions.[4] Compound **5** behaves as a host-separated ion pair receptor. A salient feature is the presence of only one receptor site, the imidazole ring, which is able simultaneously to recognize an anion and a cation.[5]



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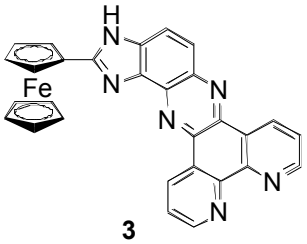

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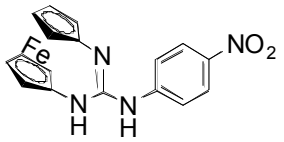

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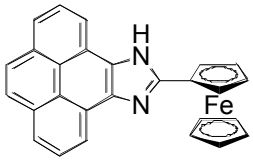

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[1] a) Zapata, F.; Caballero, A.; Espinosa, A.; Tarraga, A.; Molina, P. *Org. Lett*. **2008**, *10*, 41-44. b) Zapata, F.; Caballero, A.; Espinosa, A.; Tarraga, A.; Molina, P. *J. Org. Chem*. **2009**, *74*, 4787-4796.
[2] Zapata, F., Caballero, A.; Tarraga, A.; Molina, P. *J. Org. Chem*. **2010**, *75*, 162-169.
[3] Alfonso, M., Tarraga, A.; Molina, P. J. Org. Chem. **2011**, *76*, 939-947.
[4] Sola, A.; Orenes, R. A. Garcia, M. A., Claramunt, R. M.; Alkorta, I.; Elguero, J.; Tarraga, A.; Molina, P. *Inorg. Chem*. **2011**,*50*, 4212-4220
[5] Alfonso, M.; Espinosa, A.; Tarraga, A.; Molina, P. *Org. Lett*. **2011,** *13*, 2078-2081