Sandwich Complexes of Functionalized Aromatic Aluminium Rings

Jose M. Mercero, Mario Piris, Jon M. Matxain, Xabier Lopez, and Jesus M. Ugalde

Kimika Fakultatea, Euskal Herriko Unibertsitatea and Donostia International Physics Center (DIPC), P.K. 1072, 20080 Donostia, Euskadi (Spain)

The incorporation of small aluminum rings into coordination sandwich-type complexes represents one encouraging goal that seems to be within reach in the recently opened chapter of all-metal aromatic rings. Earlier proposals, such as the $[\text{Ti}(\eta^4\text{Al}_4)]_2^{-2}$ metallocene like coordination complex, have been recognized to suffer from weak kinetic stability due to the tendency of aluminums to aggregate into larger units. Indeed, such a tendency to aggregation of small aluminum rings into large clusters was pointed out by Seo and Corbert, who emphasized that the kinetic stability of compounds containing Al rings will be enhanced largely by putting them as far apart from each other as possible. The "unprotected" aluminum atoms in $[\text{Ti}(\eta^4\text{Al}_4)]_2^{-2}$ are indeed very prone to aggregation, rendering a too labile molecular structure.

Functionalization of the aluminum rings by attaching covalent ligands to the aluminum atoms would be very desirable for it will serve two purposes, namely, it will provide the opportunity to separate and protect the aluminums against aggregation by virtue of bulky substituents and, it will also provide anchoring sites to fix the Al rings into large molecular entities.

In this communication we will introduce alene rings as likely robust ligands for metal complexation. Our computational studies, indicate that metal sandwich complexes based on the metal aromatic alene small rings, $[\text{M}(\eta^n\text{Al}_n\text{H}_n)]_q$ ($n = 3, 4$), in analogy to similar transition metal benzene complexes, represent a realistic experimental target and thus, they should provide an opportunity for the experimental study of these novel complexes.