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Can a base be turned into a super-acid? The magical effect of non-covalent interactions and other niceties

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X_2M alkaline earth derivatives (M = Be, Mg) yield very stable complexes when interacting with conventional Lewis bases [1], due to their electron-deficient nature. Nothing surprising in this statement; but what is really interesting is that these interactions trigger changes in the electronic density in the two interacting systems, which are reflected in **dramatic** variations in their intrinsic reactivity, in particular in the reactivity of the Lewis base, to the point that conventional bases become extra strong acids [2]. In a similar way they reinforce other non-covalent interactions [3,4], or favor the appearance of sigma holes [5]; but what is certainly more striking is that the interactions of bases with alkaline-earth derivatives can lead to the exergonic and barrierless formation of radicals [6] (see Figure 1).

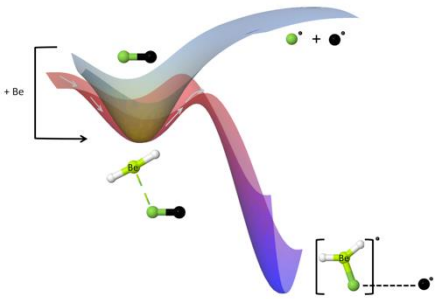

Figure 1. Potential energy curves associated with the dissociation of the FCl molecule and the dissociation of the F-Cl bond in the ClF: BeH_2 complex.

The electron-deficient nature of these derivatives is also behind the enormous electron and anionic affinity of some Be-containg derivatives, such as 1,8-diBeX-naphthalene compounds[7] through the formation of one-electro two centers and three centers bonds.

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[5] O. Brea, O. Mó, M. Yáñez, I. Alkorta, J. Elguero, Chem. Eur. J, 21, 2015, 12676.
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