Stable carbenes and related species: Powerful tools in organic, inorganic and organometallic chemistry

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The success of homogeneous catalysis can largely be attributed to the development of a diverse range of ligand frameworks that have been used to tune the behavior of the various catalysts. In the last decade, spectacular results in this area have been achieved using cyclic diaminocarbenes (NHCs) as strong donor ligands. We will discuss the preparation of novel ligands such as mesoionic carbenes A, phosphoryl nitrenes B, neutral and anionic boron derivatives C and D, respectively, which behave as even more electron-donating ligands than NHCs. Some examples of applications of these ligands for the stabilization of paramagnetic species and in catalytic reactions, such as the olefin metathesis and hydroamination of unactivated carbon-carbon multiple bonds, will be presented.

1 Rosenthal, A. J.; Donnadieu, B.; Parameswaran, P.; Frenking, G.; Bertrand, G. Science 2009, 326, 556.