Reduced N-Heterocyclic Carbene Radical Anion Species: Isolation and Characterisation

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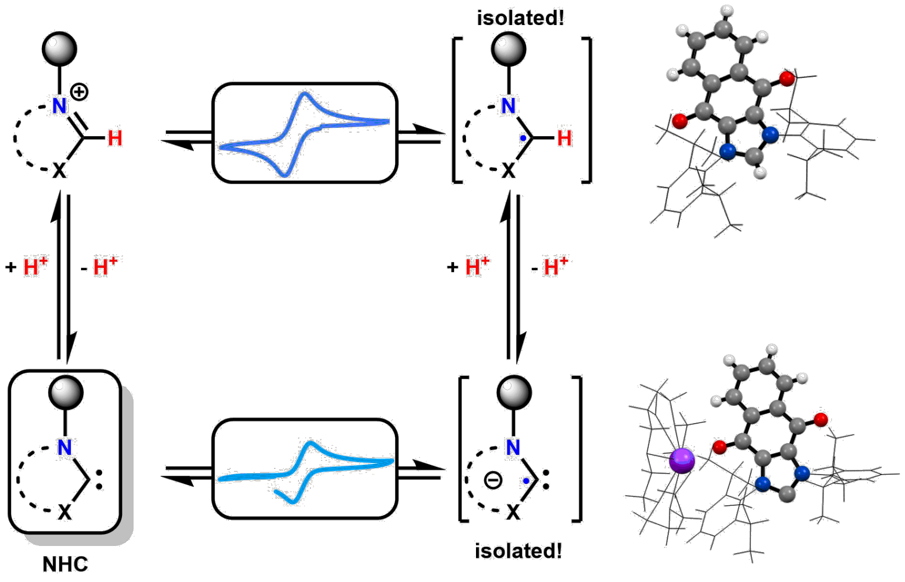
N-Heterocyclic carbenes (NHCs), popular species with applications as ligands or organocatalysts,[1] have been given relatively little attention to their explicit redox properties. Although electrogeneration of carbenes by reduction of their parent imidazolium salts is well known,[2] only 1 example of direct observation of a reduced carbene radical anion species has been reported previously.[3] Other efforts have been largely limited to transient methods or analysis of decomposition products, due to the instability of the reduced products.[4]

We present an exploration of the intrinsic electronic properties hindering the stabilisation of the reduced form of NHCs within progressively more delocalised frameworks and identify several potentially isolable radical anion species. These efforts are then crowned with our recent success in the isolation and crystallization of the first stable singly reduced carbene radical anion. Finally, through reactivity studies, the potential applications of this species are investigated.



References

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