Cooperative *N*-heterocyclic Carbene/Transition Metal Redox Catalysis

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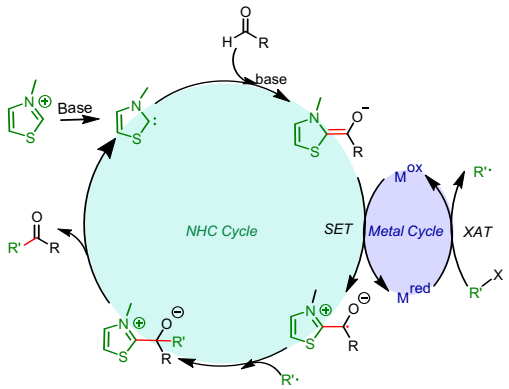
N-Heterocyclic carbenes (NHCs)[1] are well known organocatalysts. They are known for their umpolung reaction with aldehydes to produce Breslow intermediates.[2] These enols are then utilized in the formation of ketones by coupling with other electrophiles. There are two pathways for this reaction: anionic and radical. The reducing power of enolates are limited to redox accessible substrates (E > -2 V vs SCE).[3] NHCs can reduce alkyl halides such as primary and secondary alkyl iodides and bromides through both radical and ionic pathway, which are considered challenging substrates to activate.[4,5,6] However this method is still not possible in activating alkyl chlorides and tertiary alkyl bromides and iodides.

A possible strategy to activate redox inaccessible substrates is to run cooperative catalysis. Our group showed that tertiary alkyl iodides can be activated by NHC/Ni cooperative catalysis, via SET events.[7] Our approach involves starting with *N*-heterocyclic carbene (NHC) in conjunction with cobalt salen to facilitate the activation of alkyl chlorides, beginning with benzyl chloride as the model alkyl chloride.[8]

In future aim to synthesize metal complexes capable of activating more challenging alkyl chlorides.



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