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Preface

Recent developments in the organometallic chemistry of *N*-heterocyclic carbenes

Although known for many decades, it is only in the last few years that *N*-heterocyclic carbenes (NHCs) have come to occupy a central position in the armory of organometallic chemists. In analogy with phosphorus donor ligands, they constitute a sterically and electronically tunable ligand set that supports catalysis when coordinated to the usual catalytically active metals. In contrast with phosphorus donor ligands, the principles regulating their structures and properties are as yet little developed—we have no equivalent of the Tolman steric/electronic map, for example.

Polly Arnold and coworker describe the chemistry of abnormal NHCs, in which the metal is bound not at C2 but at C4(5). These are stronger electron donors but somewhat more easily cleaved from the metal compared with their normal NHC analogues. Andreas Danopoulos treats pincer versions of NHCs, a ligand type that has been very fruitful in terms of catalytic complexes. One of the most popular methods of introducing NHCs into metal complexes is the Ag_2O metallation procedure of Ivan Lin, whose review covers silver NHC complexes.

Moving to catalysis, Steven Diver discusses recent advances in enyne metathesis with NHC complexes. Asymmetric catalysis continues to be of intense interest and a number of asymmetric NHCs have been developed; Richard Douthwaite discusses metal-mediated asymmetric alkylation using chiral NHCs derived from chiral amines, while Lutz Gade and coworker's review deals with oxazoline-modified NHCs. Perhaps the most striking application of NHCs in catalysis has been the modified Grubbs catalysts. Frédéric Lamaty and coworkers review this field while Valerian Dragutan and coworkers review other aspects of ruthenium NHC catalysis. Miguel Esteruelas and coworkers look at a related element, osmium, and its carbene chemistry. Eduardo Peris and coworkers review some ligands with NHCs in bidentate and tripod configurations, together with their catalytic properties. Supported catalysis has always been a center of attention, but this area has only recently involved NHC ligands to a significant extent, as discussed by Marcus Weck and coworker.

Steve Nolan and Silvia Diez-Gonzalez discuss the important problem of developing a set of reliable stereoelectronic parameters for NHC ligands and understanding how these effects affect metal-catalyzed reactions.

Wiley Youngs and coworkers show us how NHC complexes may be much more broadly applicable than hitherto imagined. Silver NHC complexes, including pincer versions, prove to have useful antimicrobial activity. Encapsulation of such complexes in a polymer mat results in sustained delivery of silver ions, useful in wound care. A caffeine-derived NHC proves useful against numerous resistant respiratory pathogens in cystic fibrosis.

Although no special issue could cover all of this rapidly expanding field, we hope the selection presented here will be useful in showing some of the possibilities that NHCs open up, as well as suggesting ideas for future work. NHCs therefore seem to be a timely topic for a special issue of *Coordination Chemistry Reviews*.

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