

## ABSTRACT

# N-FUNCTIONALISED HETEROCYCLIC CARBENE COMPLEXES AND THEIR CATALYTIC PROPERTIES

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*N*-heterocyclic carbene (NHC) ligands become increasingly popular in both organometallic chemistry and homogeneous catalysis over the past 20 years. While the majority of NHCs employed as ligands are based on an imidazole core, analogues with fused six- and seven-membered a chiral bicyclic skeleton has attracted attention, as it has been established that they possess quite different properties from the five-membered derivatives, most notably an enhanced basicity/nucleophilicity and greater steric demand.

There are two main synthetic routes to bicyclic NHC precursors, which are derived from camphoric acid via a Schmidt reaction with sodium azide yielding (1*R*,2*S*)-diamino-1,2,2-trimethylcyclopentane (**1**, *R,S*-tmcp). The first route involves the initial modification of the diamine through alkylation of the nitrogen proceeded by ring closure. The second involves an initial ring closure and subsequent introduction of the exo *N*-alkylation.

Finally, the novel PEPPSI-type chiral palladium complexes (**9a-f**) have been prepared by heating their precursor chiral azolium salts with PdCl<sub>2</sub> and K<sub>2</sub>CO<sub>3</sub> in neat pyridine and examined complex of **9a** catalytic activity in the Asymmetric Suzuki-Miyaura cross-coupling reaction and Asymmetric Allylic Alkylation reaction. The structure of synthesized the novel compounds were characterized using spectroscopic techniques; also the single crystal structures of **7**, **9a**, **9b**, **9d** and **9e** were determined by X-ray analysis.

**Keywords:** *N*-Heterocyclic carbene (NHC), fused a chiral bicyclic skeleton, chiral PEPPSI-type palladium complexes