

## ABSTRACT

The unprecedented low valent metal compounds, highly active catalysts are the outcome of the stabilization offered by the appended carbenes to the metal centers. A modified version of NHCs named as cyclic(alkyl)(amino)carbenes (CAACs) discovered by Bertrand in 2005, have surpassed the notion of routine carbene chemistry due to more nucleophilic ( $\sigma$ -donating) as well as electrophilic ( $\pi$ -accepting) nature than those of diamino carbenes. The present work deals with the syntheses of adducts of Cyclic (Alkyl)(Amino)Carbene (CAACs) with HgX<sub>2</sub>salts. As an initial trial, when Hg(OAc)<sub>2</sub> was reacted with [CAACH]<sup>+</sup>[Cl]<sup>-</sup>—the ionic complex, [CAACH]<sup>+</sup>[HgCl<sub>3</sub>]<sup>-</sup> (1) was isolated. In subsequent attempts, the reaction of insitu generated free carbene was carried out with HgX<sub>2</sub>salts that smoothly yield the CAAC-Hg(II) adducts as [CAAC·HgCl( $\mu$ -Cl)]<sub>2</sub> (2), [CAAC·HgBr( $\mu$ -Br)]<sub>2</sub> (3), [CAAC·HgI( $\mu$ -I)]<sub>2</sub> (4). In an effort to substitute the halide with a weakly coordinating anion, a cationic mercury species, [(CAACcy)<sub>2</sub>Hg(H<sub>2</sub>O)]<sub>2</sub>+2[NO<sub>3</sub>]<sup>-</sup> (5) was also obtained. This product was isolated by reacting AgNO<sub>3</sub> with the previously synthesized complex by Singh and co-workers [CAACcy·HgBr( $\mu$ -Br)]<sub>2</sub> (3.1) in DMSO. When the same reaction was performed in dry THF a two coordinated cationic mercury complex, [(CAACcy)<sub>2</sub>Hg]<sub>2</sub>+ [Hg<sub>2</sub>Br<sub>6</sub>]<sup>2-</sup> (6) was isolated. After the successful synthesis of some of these adducts, their application in the hydroamination reactions between aromatic amines and terminal alkynes has been explored. The catalytic ability of [CAACcy·HgBr( $\mu$ -Br)]<sub>2</sub> (3.1) in intermolecular hydroamination has been explored in detail.