Cyclo(alkyl)(amino)carbenes (CAAC): synthesis of ligand salts and their selected metal complexes.

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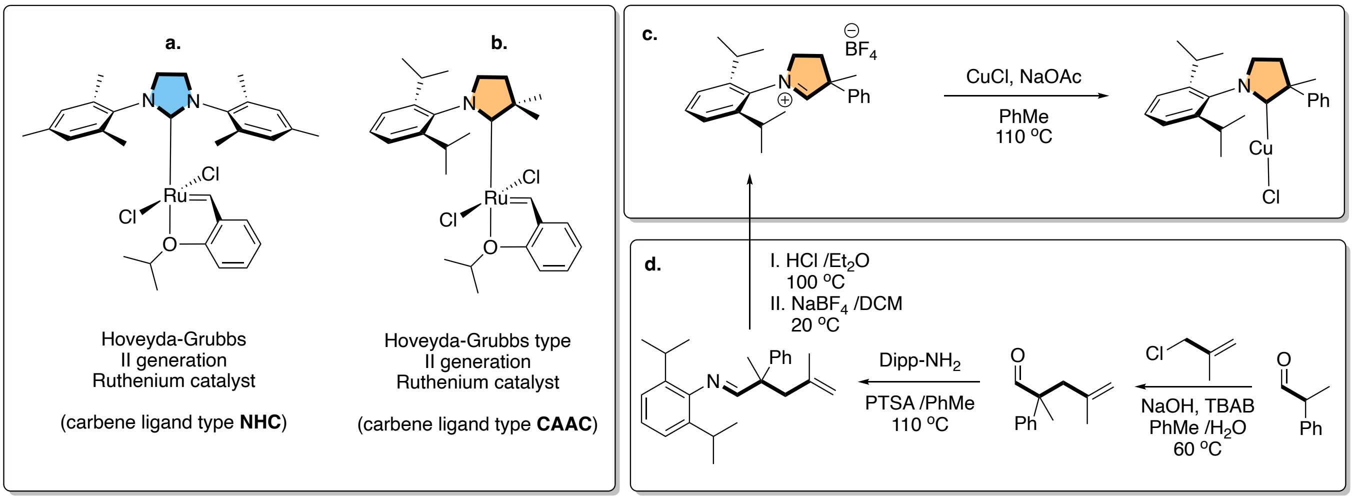
Carbenes are organic compounds containing a carbon atom bonded to two other monovalent groups (or one divalent group) and containing paired (so-called singlet carbenes) or unpaired (so-called triplet carbenes) two electrons. They are a group of organic compounds that have found applications in organometallic chemistry and industry synthesis [1]. The older generation of more stable *N*-heterocyclic carbenes (**NHC**s) has already established itself in the field of catalysis through the activity of Grubbs catalysts, which are still widely used in industry [2]. Starting with the so-called second generation, Grubbs catalysts, including the Hoveyda-Grubbs type (Fig. 1.a.), are ruthenium complex compounds in which one of the ligands is the **NHC** ligand, and their activity has been most extensively studied in the process of olefin metathesis [3]. The newer generation of carbenes – cyclo(alkyl)(amino)carbens (**CAAC**) – brought not only an increase in the activity of the existing Grubbs catalysts (Fig. 1.b.) or improvement of industrial parameters (increase of the TON factor, reduction of the process energy, etc.) [4] but also became a tool for understanding previously unknown areas: in catalysis ((**CAAC**)$_2$Fe^0 coordinating gaseous nitrogen in the synthesis of $N(SiMe_3)_3$ and even ammonia) [5], in coordination chemistry (bis-**CAAC** complex Be^0) [6] or in mechanistic studies (transition states of the 1,3-dipolar Huisgen cycloaddition reaction) [7]. The increased activity of **CAAC** ligands is naturally associated with their lower stability, referring to **NHC** ligands, which is caused by a smaller energy gap between the HOMO and LUMO levels in **CAAC** ligands [8]. Despite this, the synthesis of transition metal complexes with **CAAC** carbene is possible to perform by working on the so-called Schlenk lines, using, for example, the weak base method to generate a carbene from its salt in situ (Fig. 1.c.) [9]. However, the resulting complexes are unstable, so the most convenient way to work with **CAAC** complexes is to prepare their stable salts and synthesize the required complexes immediately before using them, for example, in catalytic reactions.



The poster will present synthetic pathways for five-membered **CAAC** carbene salts. The most convenient one (Fig. 1.d.), refined and routinely used by the authors, will be discussed in detail using examples of the obtained new **CAAC** ligand salts, with an emphasis on experimental aspects.

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