

MOLECULAR ADSORBATES SWITCH ON HETEROGENEOUS CATALYSIS: INDUCTION OF REACTIVITY BY N-HETEROCYCLIC CARBENES

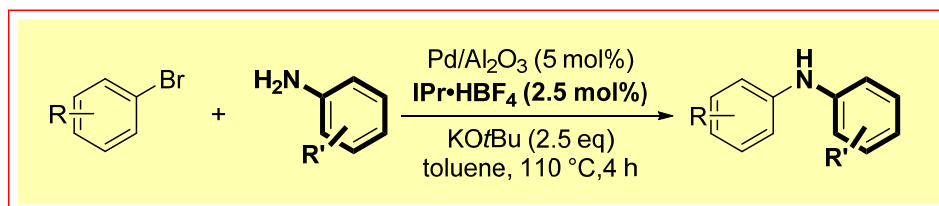
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N-Heterocyclic carbenes (NHCs) are a unique class of ligands which are extensively used in coordination chemistry. They are characterized by their electron-rich nature and superb ability to form strong bonds to transition metals.^[1-3] To accomplish selective activation of a previously bare and inactive heterogeneous catalyst, we envisioned to apply NHCs and to investigate the influence of NHCs as ligands on the activity of an alumina-supported palladium catalyst (Pd/Al₂O₃). Then we decided to apply our concept to a demanding reaction, the Pd-catalyzed Buchwald-Hartwig amination as this reaction is widely applied in academia and industry.^[4]



Detailed structural analysis of the catalyst proved the covalent binding of the NHC to the Pd-NPs and the pronounced electronic interaction between the NHC and the catalyst. In summary, NHCs can tune the electronic properties of heterogeneous catalysts by both strong sigma donating properties, but also by a coordination of the aromatic N-substituents to the surface. These properties and the extensive study reveal NHCs to be unique ligands for heterogeneous catalysts.

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