

### Prof. Dr. Eszter Baráth

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## Catalysis in condensed phase: Transfer hydrogenation reactions on supported metals

Alkyl amines have a rich chemistry in terms of their synthesis methods and applications in widespread organic reactions. Within the present study hydrogen transfer (HT)<sup>1a-e</sup> reactions of alkenes with internal double bond and alkynes with phenyl and alkyl substituents were examined with tertiary alkyl amines as hydrogen donors.<sup>1a-e</sup> The saturation of a non-activated internal double bond containing compound, such as methyl oleate and *trans*-5-decene as substrates was observed in the presence of Pd/C, Pt/C and Rh/C (**Fig. 1A**).<sup>1a</sup> The pre-reduced catalyst samples showed high activity, partial to complete conversion was detected at 140 °C in *p*-xylene as solvent. Alkyl amines such as trimethylamine, tributyl-, tripropyl-, trihexylamine and *N,N*-diisopropylethylamine, as well as cyclic 1-ethylpyrrolidine and 1-ethylpiperidine was investigated as possible hydrogen donors. Cyclic amines and diisopropyl derivatives as H-sources produced the highest conversion (99%), while amines with longer alkyl chains showed minor activity.<sup>1a</sup>

The promising outcome of the alkene HT reactions encouraged us to extend our substrate scope to alkynes as well.<sup>1d</sup> Alkyl- and phenyl-substituted derivatives were examined in the presence of Pt/C and Pd/C (**Fig. 1B**). In case of substrate 1, 4 and 5 over-hydrogenation as a sequential reaction was observed under the given reaction conditions (Pt/C - (*i*Pr)<sub>2</sub>NEt) (**Fig. 1B**). In the presence of Pd/C - (*i*Pr)<sub>2</sub>NEt, Pd/C - 1-EPyr and Pt/C - 1-EPyr catalyst systems C-C single bond formation was not observed, while the dominance of the *cis*-alkene of substrate 1, 2, 4 and 5 was detected (*Z/E* ratio up to 9/1). The calculated very negative entropies suggest the presence of a highly ordered transition state, which points to the formation of a surface complex and to a concerted pathway.<sup>1a-e</sup>

During our ongoing studies we observed that, not only tertiary amines, but secondary amines are also very efficient H donors, furthermore, depending from the actual reaction conditions they are capable to promote internal isomerization reaction and with this effect supporting the formation of *trans* isomers selectively. A substrate itself can also function as a donor molecule.

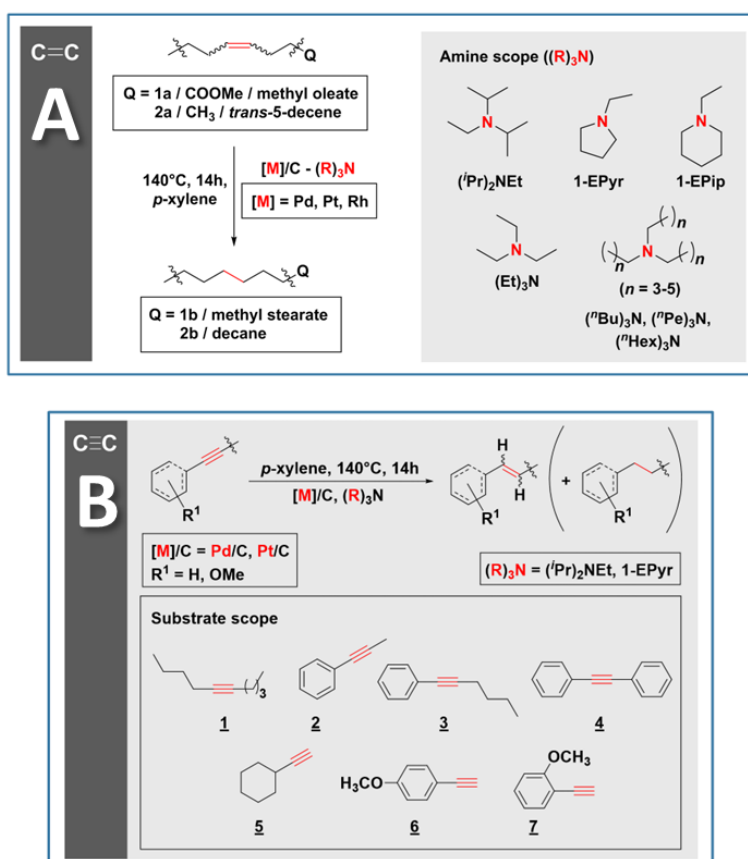


Fig. 1. HT reactions of alkenes, alkynes.

(1) (a) Yang, G.; Bauer, T. J.; Haller, G. L.; Baráth, E. *Org. Biomol. Chem.* **2018**, *16*, 1172. (b) Baráth, E. *Catalysts* **2018**, *8*, 671. (c) Baráth, E. *Synthesis* **2020**, *52*, 504. (d) Roeder, G. J.; Kelly, R. H.; Yang, G.; Bauer, T. J.; Haller, G. L.; Batista, V. S.; Baráth, E. *ACS Catal.* **2021**, *11*, 5405. (e) Li, K.; Kelly, R. H.; Franco, A. L.; Batista, V.; Baráth, E. *ACS Catal.* **2024**, *14*, 2883.

# Mathematisch-Naturwissenschaftlichen Fakultät

## Antrittsvorlesungen

Donnerstag, 6. November 2025, ab 17 Uhr im Hörsaal 1 der Physik | Albert-Einstein-Str. 24

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### **Prof. Dr. Mathilde Cordellier**

Institut für Biowissenschaften

#### **Arthropodomics – micro- and macro-evolutionary processes in earth's most diverse taxon**

This introductory lecture is giving an overview about the current research topics addressed in the group of Prof Cordellier. Population genomics and experimental approaches are used to understand the evolution of closely related species that hybridize but nevertheless maintain their species' identity. This might be caused by ecological divergence acting as a barrier and/or be enhanced by the genomic features specific to this group. Another research topic is the evolution of genomes and gene families through duplication events in spiders and insects, and the highly conserved sex chromosomal system in many spider species. Altogether, Prof. Cordellier is bridging the gap between various subfields of biology to better understand how biodiversity (at the genetic level) arises and is maintained.



Picture: male and female Daphnia carrying a resting egg