Bisoxazoline-Fullerene Hybrid Systems for Asymmetric Catalysis

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Fullerene is the smaller member in the family of carbon nanoforms (CNFs) and it can be taken as a molecular model for other CNFs-based heterogeneous catalysts. The well-developed chemistry for C_{60} functionalization allows operating multiple additions on its cage, and this can be exploited for sensibly increasing catalyst loading or for adding different functionalities.[1] In this way, it is possible to explore synergistic or detrimental effects due to the close proximity of catalytic moieties. In addition, the peculiar solubility profile of C_{60}-derivatives may be used for recovering a homogeneous catalyst by simple precipitation.

Herein C_{60} was functionalized with a series of chiral bisoxazoline (BOX) ligands, widely used in asymmetric catalysis,[2] in order to form both the mono- and the hexa-adducts (Figure 1a). Monoadducts were also post-functionalized with ten 1,2-dimethylimidazolium moieties in order to get hybrid with a different solubility profile. All the C_{60}-BOX systems were employed, along with copper(II) salts as catalysts in asymmetric Henry and Diels-Alder reactions (Figure 1b). Furthermore, their ease separation from the reaction mixture can allow for a facile reuse in multiple cycles.

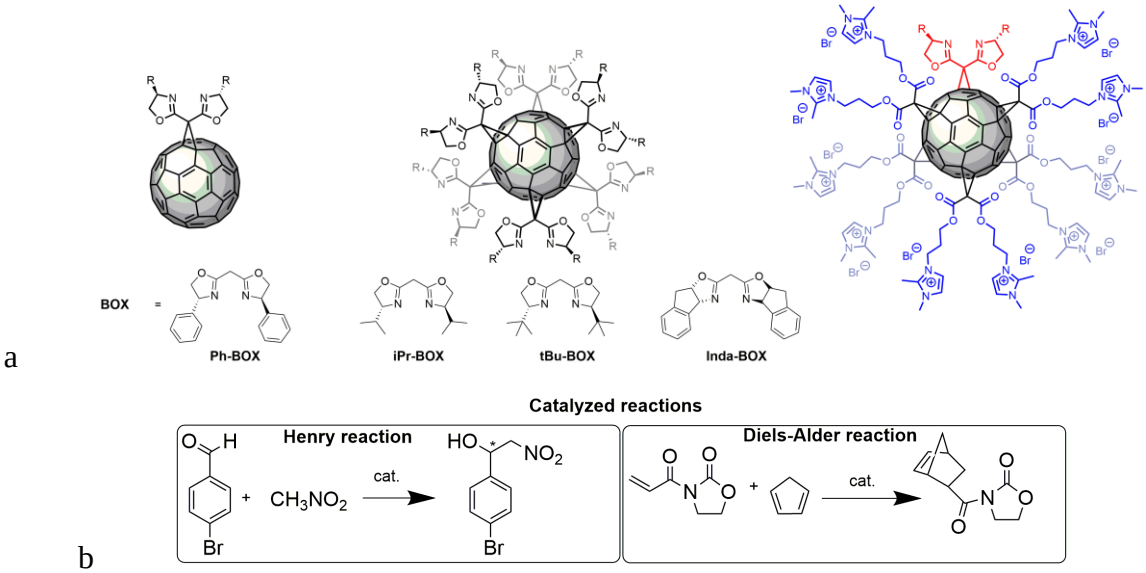

Figure 1 a) Fullerene and BOX based catalysts. b) Asymmetric Henry and Diels-Alder reactions.

References

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