

Title: **Synthesis of chiral functionalized porphyrins for organo- and photoredox catalysis**

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Substituted porphyrins might be a suitable answer to catalyse organic reactions that involve formation of C–C or C–Heteroatom bonds in a greener way. As porphyrins have photoredox activity, a small organic molecule linked to a porphyrin scaffold generates a bifunctional catalyst, meaning that can act as both photoredox and organocatalyst. Both photoredox and organocatalysis will be introduced to understand interest on bifunctional catalysts.

This work will focus on how to synthesize a bifunctional catalyst, giving a general survey of the synthesis of functionalized porphyrins and describing the synthesis of (S)-N-Boc-homoprolinal, which would be added to a porphyrin moiety to act as the organocatalyst.

The synthetic pathways of (S)-N-Boc-homoprolinal that are compiled and analysed start from L-proline as the initial reagent and they are classified in four routes that include different intermediates. Each route involves one or more methods that lead from one to the subsequent intermediate and are also detailed. All stages are analysed and compared using yield and atom economy as green metrics and considering reaction conditions and duration too.

Keywords: Amino aldehydes, organocatalysis, photochemistry, photoredox catalysis, porphyrin, sustainable chemistry