Direct Cyanation of Protected Amines Using Water as Solvent and Utilizing Sunlight to Drive Electrochemical Reactions

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Abstract

Direct cyanation of protected amines will be achieved using electrochemical method in water. Sunlight will be utilised as a source of energy thus making the reaction sustainable and green. Oxidation reactions are powerful synthetic tools because they allow us to selectively increase the functionality of a molecule. For this reason, a wide variety of oxidation protocols affecting an impressive range of transformations have been developed. However, many of them utilise stoichiometric amount of metal oxidants which are environmentally unfriendly. Electrochemical oxidation is among a few methods that solve this problem by use of non-metal oxidants. In my previous work, I have shown that \( \alpha \)-oxidation of cyclic amines can be prepared by this method. Unfortunately, the process is not environmentally friendly since it utilises energy generated sometimes from fossil fuels or nuclear source and more so uses non green solvents. If the energy can be generated from a renewable source, then it will be a plus, unfortunately, it is difficult to know the source of industrial electricity. Thus, use of sunlight will be an excellent alternative. However, this has been a challenge due to different seasons in a year. Fortunately, my research will be based at the equator where sunlight is available 365 days a year. Moreover, this work has already been pioneered by Moeller et al.