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CU(II) COMPLEX OF DENDRITIC AMINO POLYMER AS AN EFFICIENT CATALYST FOR STRECKER REACTION IN MILD CONDITIONS

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Abstract: A general method for efficient two steps Strecker reaction of various Schiff base compounds were developed using Cu(II)-Schiff base complex decorated on a dendritic amino polymer as a heterogeneous nano-catalyst. A series of α-aminonitriles were obtained in high to excellent yields (81–99%). The transformations occur in water as a solvent at room temperature as a mild and eco-friendly conditions. The nano-catalyst can be simply recovered from the reaction mixture and reused for several times without any significant loss in the activity.

Keywords: Dendrimer, Cooper complex, α-Aminonitriles, Schiff base, Strecker reaction, Heterogeneous catalyst

1. INTRODUCTION

The Strecker synthesis is a significant transformation in organic syntheses and can grant access to a wide range of interesting compounds such as α-aminonitriles [1]. α-Aminonitriles are key precursors as chiral building blocks in the pharmaceutical industry, particularly in the preparation of α-amino acids, and other various nitrogen or sulphur containing heterocycles [2]. α-Aminonitriles are usually prepared by the nucleophilic addition of the cyanide anion to an imine in the presence of a homogeneous acid catalyst [3]. Traditional catalytic processes using homogeneous catalysts are highly efficient, however they involved several disadvantages, such as the use of expensive or toxic catalytic systems, difficulty in separation, tedious work-up and waste discarding [4]. In this point of view, heterogeneous catalyses showed promising alternative, reducing the waste production, providing a straightforward and simple separation/recovery of the catalysts. To this time, various heterogeneous systems either containing transition metals or strong acid sites have been developed in the Strecker reaction, and high yields of α-aminonitriles can also be achieved in the presence of those solid catalysts. The representative catalysts are molecular sieves [5, 6], natural polymer sulfuric acid [7, 8], nanomaterials [9, 10], sulfated tungstate [11], MOF [12], immobilized complexes [13–15], and hetero-polyacids [16].

With green chemistry becoming a central issue in both academic and industrial research in the 21st century [17] the development of environmentally benign and clean synthetic procedures has become the goal of present day organic synthesis. Thus, there is a need for developing nucleophilic addition of cyanide anion to the imines (Strecker reaction) in water with a recyclable catalyst and without the use of any harmful organic solvents because water is a safe, economical, and environmentally benign solvent. On the other hand, due to high aspect ratio and the potential of the nano catalysts, they attracted a large volume of attentions from organ chemists in order to catalysis of various reactions in organic synthesis.

Dendrimers are a kind of spherical, highly branched nanoscale macromolecular. For its unique structure, dendrimers have broad application prospects in the fields of catalysis, medical science, nanometer-composite material and other functional materials [18]. Therefore, the synthesis of, characterization of and theoretical studies on the dendrimers have made great progress in the last 20 years [19]. To achieve these ideal conditions, the best choice appeared to be through nano-catalysis involving dendrimers with water as a solvent. Herein we served a Cu(II) complex of a dendritic amino polymer as a nano-

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