Synthesis of di(benzotriazol-1-yl)methane derivatives by cobalt-catalyzed formation of C-C bonds

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The first example of $CoCl_2$-catalyzed reaction between 1,1'-carbonyldiazoles and carbonyl compounds was reported by Thé and Peterson in 1973, obtaining 2,2-di(pirazol-1-yl)propane from di(pyrazol-1-yl)methanone and acetone [1]. The study was extended to several other ketones and aldehydes and to methyl-substituted di(pyrazol-1-yl)methanone derivatives, with the isolation of the corresponding di(pirazol-1-yl)alkanes by elimination of CO_2. A reaction mechanism was subsequently proposed [2]. The synthetic approach was then extended to functionalized aldehydes, with the aim of preparing pyrazole-based ligands to be applied in coordination, supramolecular, bioinorganic and organometallic chemistry [3].

To the best of our knowledge, the cobalt-catalyzed reaction was never applied for the synthesis of di(benzotriazol-1-yl)methane derivatives, despite the fact that benzotriazole is considered an ideal synthetic auxiliary in organic chemistry [4]. For instance, di(benzotriazol-1-yl)phenylmethane was obtained following different synthetic approaches with variable selectivity [5]. In this communication we report the straightforward preparation of di(benzotriazol-1-yl)phenylmethane and di(benzotriazol-1-yl)pyridin-2-ylmethane from di(benzotriazol-1-yl)methanone and the proper aldehyde, using $CoCl_2$ as catalyst under neat conditions. The products were characterized spectroscopically and their solid structures were ascertained by single-crystal X-ray diffraction.

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