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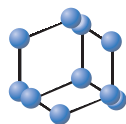
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SHORT COMMUNICATION

BENTHAM
SCIENCE

Transition Metal Catalyst, Solvent, Base Free Synthesis of Diaryl Diselenides under Mechanical Ball Milling

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Abstract: A convenient, efficient, and general procedure for the synthesis of diaryl diselenides has been developed by the reaction of aryl diazonium tetrafluoroborates and potassium selenocyanate on the surface of alumina under ball-milling in the absence of any solvent, transition metal catalyst, and base in room temperature. A wide range of functionalized diaryl diselenides are obtained in high purity and high yield by this procedure.

Background: Synthesis of diaryl diselenides was restricted into only a few Cu-catalyzed C-Se cross-coupling protocols where the use of ligands, high reaction temp, long reaction time were required.

Objectives: The objective of this study is to achieve a sustainable protocol for the synthesis of diaryl diselenides.

Method: Reaction of aryl diazonium fluoroborate with KSeCN was successfully performed under ball milling in the absence of any transition metal catalyst, ligands, base, and external heating to get diaryl diselenides.

Results: A library of diaryl diselenides were obtained in good yields with different functional groups.

Conclusion: First transition metal free protocol for the synthesis of diaryl diselenides has been developed successfully.

Keywords: Diaryl selenides, phenyl selenocyanate, diazonium salts, ball milling, green chemistry, transition metal catalysis.

1. INTRODUCTION

Diaryl diselenides are an important class of organic compounds as they are found as synthons for a large array of biologically and pharmaceutically active compounds [1-3]. The selenium counterpart of organic peroxides is sufficiently reactive to produce electrophilic, nucleophilic, and radicophilic species under mild conditions as they are air stable and easy to handle [3-6]. Diselenides have been employed for the synthesis of several important unsymmetrical diaryl/aryl-heteroaryl selenides (Fig. 1) via C-

Se cross-coupling under both transition metal catalysis [7-12], transition metal free conditions [13, 14] in the last decade. Despite large importance in synthetic organic chemistry, the scope of synthesis of diaryl diselenides is still very limited. Braga and co-workers have reported Cu(0) nanoparticles catalysed reaction of aryl iodides/bromides with selenium powder in the presence of KOH base in DMSO for the synthesis of diaryl diselenides [15].

Taniguchi has reported a CuI-bpy catalytic system for performing coupling between aryl iodides with Se(0) powder in the presence of Al or Mg for the synthesis of diaryl diselenides [16]. Recently Zhou and co-workers reported CuCl₂-phenanthroline catalysed reaction of aryl iodides and bromides with Se(0) powder in water using TBAF as phase transfer reagent [17]. In 2015, Beigi and co-workers used Cu

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