Copper Oxide Nanoparticles-Catalyzed Aziridine Ring Opening with Diaryl Diselenides Under Ionic Liquid as Reaction Medium

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Keywords: Aziridine ring opening, chiral β-seleno amine, CuO nanopowder catalyst

INTRODUCTION

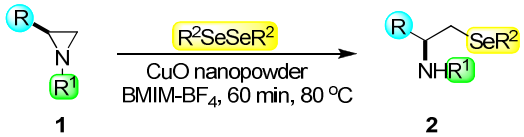
The development of new methods for the introduction of selenium-containing groups into organic molecules remains a significant challenge.[1] Moreover, chiral selenide- and diselenides containing ligands offer attractive and practical options in the development of asymmetric transformations. In this context, a straightforward synthesis of a new set of chiral *β*-seleno amine through a stereoselective aziridine ring opening with selenium nucleophiles, generated by reducing agents such as $NaBH_4$, $LiBHEt_3$, zinc or indium salts have been described by our group[2].

We herein report an ecofriendly procedure for the synthesis of chiral *β*-seleno amine under mild conditions, using selenium nucleophile generated by base in the presence of CuO nanopowder as a catalyst in ionic liquid BMIM[BF_4] as solvent.

RESULTS AND DISCUSSION

In order to evaluate the performance of the aziridine ring-opening reaction, we firstly used diphenyl diselenide (1.0 equiv) and Ts protected aziridines (2.0 equiv) derived from *L*-phenylalanine as standard reagent in the presence of 5 mol% of CuO nanopowder and KOH (2.0 equiv) as a base in ionic liquid (1.0 mL) for 60 min under 80 ºC (Table 1).

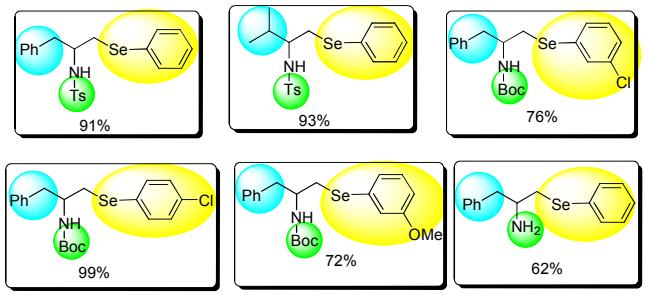
Table 1. Screening of reaction conditions



1 2

S.No	R	Solvent	Yield (%)
1	Bn	BMIM-BF_4	91
2	Bn	BMIM-PF_6	85
3	Bn	BMIM-NTF_2	72
4	Bn	Bpy-BF_4	64
5	Bn	BMMIM-BF_4	45

With the best conditions in hands, the scope and applications of this new methodology were examined and the products are shown below.



CONCLUSION

In summary, we have described a practical and concise synthesis of structurally diverse chiral *β*-seleno amines via ring opening reaction of protected and unprotected aziridines in ionic liquid by using copper nanoparticles as catalyst. By using this methodology, we recycled catalyst and ionic liquids, which were reused in the next four runs.

ACKNOWLEDGEMENTS

Higher Education Commission of Pakistan (HEC), CNPQ, CAPES, and FAPERGS.

REFERENCES

1. Braga, A. L.; Lüdtke, D. S.; Vargas, F.; Braga, R. C. *Synlett* **2006**, 1453.
2. (a) Braga, A. L.; Lüdtke, D. S.; Paixão, M. W.; Rodrigues, O. E. D. *Org. Lett*. **2003**, *5*, 2635; (b) Braga, A. L.; Paixão, M. W.; Marin, G. *Synlett* **2005**, 1675; (c) Braga, A. L.; Schneider, P. H.; Paixão, M. W.; Deobald, A. M.; Peppe, C.; Bottega, D. P. *J. Org. Chem*. **2006**, *71*, 4305. (d) Braga, A. L.; Schwab, R. S.; Alberto, E. E.; Salman, S. M. Vargas, J.; Azeredo, J. B. *Tetrahedron Lett*. **2009**, *50*, 2309.