

Synthesis of Arylseleno-1,2,3-triazoles via Copper Catalyzed 1,3-Dipolar Cycloadditions of Arylseleno Azides with Alkynes

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Keywords: Cycloaddition, 1,2,3- triazoles, selenides

INTRODUCTION

Organoselenium compounds are attractive synthetic targets because of their selective reactions¹ and association with biological activities.² Selenides or diselenides containing nitrogen atoms in their structure are a special class of these compounds and they have been employed in various organic transformations, for instance, asymmetric synthesis.³ Consequently, the search of new and efficient methods for the preparation of highly functionalized organoselenium compounds, remains a challenge in organic chemistry. Although the synthesis of selenium-containing triazole compounds has been reported,⁴ no reaction using a copper catalyzed protocol has been described so far. This fact encouraged us to explore the use of arylseleno azides **1** in the copper-catalyzed 1,3-dipolar cycloaddition with alkynes **2** to obtain arylseleno-1,2,3-triazoles **3**.

RESULTS AND DISCUSSION

Our initial studies have focused on the development of an optimum set of reaction conditions. Thus, a mixture of arylseleno azide **1a** and phenylacetylene **2a**, were reacted under air atmosphere, utilizing different copper catalyst, solvent systems and additives. The optimum conditions for this cycloaddition reaction were found to be the use of arylseleno azide **1** (0.25 mmol), phenylacetylene **2a** (0.25 mmol), Cu(OAc)₂ as catalyst (5 mol%), sodium ascorbate (NaAsc) as additive (10 mol%), in a mixture of THF/H₂O (1:1). The reaction was carried out at room temperature for 8 h under air atmosphere affording the desired arylseleno-1,2,3-triazole **3a** in excellent yield (Figure 1).

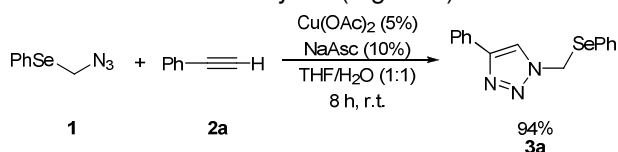


Figure 1. Optimized reaction condition

Under the optimized condition, a variety of terminal alkynes reacted smoothly with arylseleno azide **1** to produce arylseleno-1,2,3-triazoles **3a-j** in good to excellent yields (Table 1).

Table 1. Arylseleno-1,2,3-triazoles **3a-j** obtained.

Entry	Product (Yield) ^a	Entry	Product (Yield) ^a
1	 3a (94%)	6	 3f (85%)
2	 3b (80%)	7	 3g (78%)
3	 3c (75%)	8	 3h (91%)
4	 3d (87%)	9	 3i (90%)
5	 3e (91%)	10	 3j (85%)

^aYields are given for isolated products.

CONCLUSION

In summary, we have described the use of organoselenium compounds in the copper catalyzed synthesis of 1,2,3-triazoles. Arylseleno-1,2,3-triazoles **3** were prepared in good to excellent yields under mild conditions via reaction of arylseleno azides **1** with alkynes **2**.

ACKNOWLEDGEMENTS

CNPq, CAPES, FAPERGS (ARD 10/0130-3) and FINEP.

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