Synthesis of thiol esters promoted by copper oxide nanoparticle, in the presence of ionic liquid under microwave irradiation

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INTRODUCTION

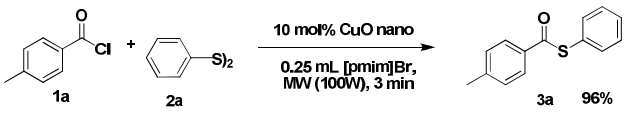
Thiol esters are versatile building blocks used for organic transformations. It can be used in C-C coupling, for the synthesis of various organic compounds and application in native chemical ligation for peptide bond formation, in natural product synthesis. They are biologically active substance and investigated *in vivo* tumor suppression and as anti-HIV agents.[1]

On the other hand, nanotechnology has become an attractive emerging field for catalysis. Nanoscale heterogeneous catalysts offer higher surface area and low-coordinated sites, which are responsible for the higher catalytic activity.[2]

In the present work, we have developed a new synthetic methodology for the synthesis of thiol esters, starting from acid chloride, diorganoyl disulfides and copper oxide nanoparticle as catalyst. In addition, we used ionic liquid as the solvent under microwave irradiation conditions. The work result in an environmentally friendly methodology for the synthesis of structurally diverse thiol esters, in which the use of bases or reducing agents were omitted.

RESULTS AND DISCUSSION

In order to optimize the reaction condition, 1 mmol of *p*-methyl benzoyl chloride **1a** and 0.5 mmol of diphenyl disulfide **2a** were reacted by using various concentration of CuO nanoparticle as catalyst and different ionic liquids. The optimum condition found for this reaction was 10 mol% CuO nano, 0.25 mL [pmim]Br for 3 minutes at 100 W of power (Scheme 1).



Scheme 1. Optimized reaction conditions.

To evaluate the scope and limitations of the developed method, we did a series of reactions using different acid chlorides and diorganoyl disulfides. (Figure 1).

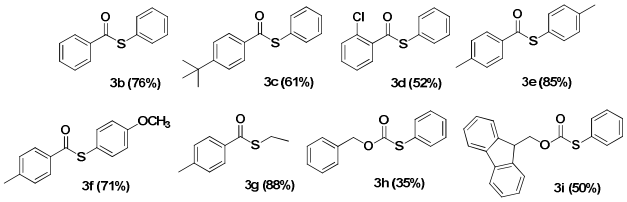


Figure 1: Thiol esters synthesized.

In the next stage, we studied the recyclability of ionic liquid [pmim] Br in the synthesis of **3a** and observed that it can be reused up to three times without significant loss in product yield. (Table 1).

Table 1. Study of the recyclability of the [pmim]Br .

Cycle	1	2	3	4
Yield (%)[a]	94	94	92	86

*product isolated by column.

CONCLUSION

We have developed a new methodology for the synthesis of thiol esters. All the products were obtained good to excellent yields. The important features of this protocol are: (1) recyclable CuO nanoparticle; (2) recyclable solvent; (3) mild reaction conditions.

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