Synthesis of β-enaminones catalyzed by nanoparticles of Fe_2O_3 in ultrasound and solvent-free approach.

Cristiane Regina Winck Hortelan (PG)[1,2], Ingridhy Ostaciana Maia Freitas da Silveira (PG)[2], Silvia Mendes de Souza (IC)[1], Adilson Beatriz (PQ)[2], Roberto da Silva Gomes (PQ)[2], Nelson Luís de Campos Domingues (PQ)[1].

[1]Federal University of Grande Dourados-Hybrid Materials Laboratory- HML
[2]Federal University of Mato Grosso do Sul, Institute of Chemistry
**cris_winck@hotmail.com*

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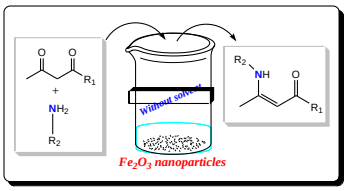
INTRODUCTION

Nowadays, there´s been growing the interest of some researches groups by nanosized metal particles due to their high catalytic activity compared to their bulk counterparts[1]. The result from the heterogenic catalysis using nanosized metal particles is environmentally desirable[2]. Furthermore, the solvent absence as well as the use of ultrasound make this methodology in accordance with the Green Chemistry protocols. Among the compounds nowadays synthesized, β-enaminones are the ones that present a great synthetic interest as building blocks or bioactives[3]. This way, the aim of this study is the synthesis of β-enaminones catalyzed by nanoparticles of Fe_2O_3 through a clean methodology (Scheme 1).



Scheme 1. General procedure for β-enaminones synthesis.

RESULTS AND DISCUSSION

Fe_2O_3 nanoparticle was synthesized as described by Pechini[4] method and characterized by electronic transmission electron microscopy. Figure 1 shows a nanosized scale about 100 ± 10 nm. It is also possible to observe the crystallinity of the synthesized material indicating the success of the synthesis methodology.

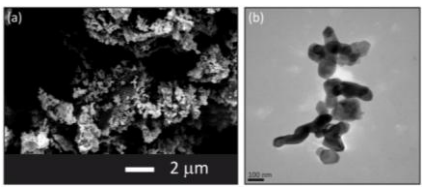


Figure 1. MET micrographs of Fe_2O_3 synthetized nanoparticles.

The nanosizes Fe_2O_3 was inserted on β-enaminones synthesis and the data are presented in table1.

Table 1. β-enaminone synthesis in the presence of Fe_2O_3 nanoparticles under ultrasonic irradiation.

Entry	Dicarbonyl compound	Amine	Yield* (%)
1	Ethyl acetoacetate	*p*-anisidine	87
2	Ethyl acetoacetate	Benzylamine	84
3	Ethyl acetoacetate	Butylamine	80
4	Ethyl acetoacetate	Cyclohexylamine	83
5	Ethyl acetoacetate	*p*-toluidine	91
6	Ethyl acetoacetate	aniline	56
7	acetylacetone	*p*-anisidine	86
8	acetylacetone	Benzylamine	60
9	acetylacetone	Butylamine	35
10	acetylacetone	Cyclohexylamine	64
11	acetylacetone	*p*-toluidine	92

*All products were characterized by RMN of ^1H and ^{13}C.

CONCLUSION

The methodology used in the synthesis of β-enaminones proved to be very efficient according to the high yields obtained, low reaction time and mild reaction conditions.

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