

A New Synthesis of Benzonitriles Catalyzed by Microwave Irradiation

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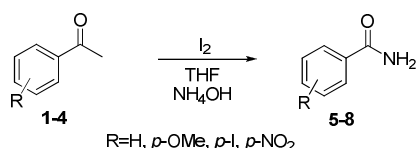
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INTRODUCTION

Aromatic and aliphatic nitriles are common intermediates in the industrial production of polyamides, pharmaceuticals, agrochemicals, dyes, pigments, and fine chemicals¹. Moreover, in organic synthesis the nitrile group serves as an important starting material for various transformations into other functional groups, such as amines, aldehydes, ketones, heterocycles². In this work a new way to synthesize benzonitriles is reported.

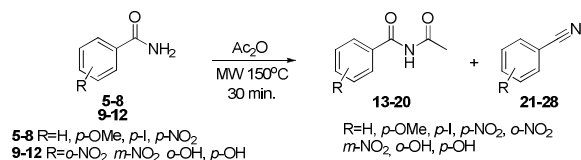
RESULTS AND DISCUSSION

The amides **5-8** were easily synthesized using a simple procedure already described in a literature employing THF dry and ammonium hydroxide according the literature from respective ketones (**1-4**)³ (Scheme 1).



Scheme 1. Synthesis of the amides **5-8** from ketones **1-4**.

The amides **9-12** were obtained commercially and used for the next reactions. The imides **13-20** and nitriles **21-28** were obtained by the reaction of the amides **5-12** with acetic anhydride in the microwave reactor at 140°C by 30 min (Scheme 2). In a two neck flask were added the respective amides **5-12** (100 mg) and acetic anhydride (2 mL) and subjected to microwave radiation for 30 min at 200 W.



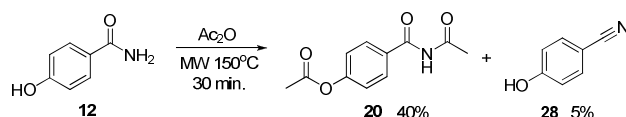
Scheme 2. Syntheses of imides **13-20** and nitriles **21-28** by microwave radiation.

A study was conducted with the intention of observing the influence of the group attached to the aromatic ring, as well as its position in the ring, as it can be observed in the table 1.

Table 1. Results obtained for the reaction of amides in the presence of acetic anhydride and MW.

Entry	Amides	Imides	Nitriles
Amides	R	Isolated Yields (%)	
5	H	10	84
6	<i>p</i> -OMe	4	7
7	<i>p</i> -I	7	32
8	<i>p</i> -NO ₂	30	26
9	<i>o</i> -NO ₂	11	26
10	<i>m</i> -NO ₂	-	35
11	<i>o</i> -OH	-	42
12	<i>p</i> -OH	40	5

It was obtained both the products, imides and nitriles with different yields. For the amide **12**, was obtained the product **20** (Scheme 3).



Scheme 3. Synthesis of the ester imide and nitrile.

The formation mechanism of nitrile is similar to that suggested by Narsaiah and Nagaiah⁴.

CONCLUSION

The reactions for the preparation of the amides provided good yields and these amides were transformed in a respective imides and nitriles by microwave irradiation in a short time and with different yields. This methodology showed to be efficient for the preparation of these compounds classes.

ACKNOWLEDGEMENTS

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