Int. J. Chem. Sci.: 9(4), 2011, 1625-1628
ISSN 0972-768X
www.sadgurupublications.com

MICROWAVE ASSISTED FACILE SYNTHESES OF SOME SUBSTITUTED 4H-1,4-BENZOTHIAZINES

KALPANA GUPTA

R. R. College, ALWAR (Raj.) INDIA

ABSTRACT

A microwave assisted synthesis of some substituted 4H-1, 4-benzothiazine by condensation of 2-aminobenzenethiol and diketones has been described with high yield using basic alumina as a solid support. The synthesized compounds have been characterized on the basis of elemental analyses and spectral studies. The purity of compounds was checked by TLC.

Key words: Alumina, 4H-1, 4-Benzothiazine, β-Ketoester.

INTRODUCTION

Microwave assisted synthesis of 4H-1, 4-benzothiazine has been reported by many workers[1-5]. These possess with diverse range of biological properties[6-14] such as anti-tumor, anti-convulsant, anti-inflammatory, antipyretic, diuretic, bactericidal and CNS depressant activity.

The most useful common method is condensation of 2-aminobenzenethiol and β-ketoester refluxing with dimethylsulfoxide[15]. However, this method has certain limitations mainly with respect to yield, toxicity of reagent and difficulties in product handling and isolation. Thus, a clean, mild and efficient method to synthesize substituted 4H-1,4-benzothiazine is developed. So microwave assisted reaction using inorganic support like silica, alumina, KFS clay etc. have attracted immense interest in organic synthesis. So ecofriendly microwave assisted synthesis in general is likely to have a large impact on synthetic organic chemistry compared to conventional method. It not only improves yield but also save significant time.

*Author for correspondence; Email: 27guptakalpna@gmail.com

EXPERIMENTAL

The reactions were monitored by TLC performed on silica gel 'G' coated glass plates. The infrared spectra were recorded on Nicolet-Magna FTIR 550 spectrophotometer in KBr discs. ^{1}H NMR spectra have been recorded on Jeol FX-90 QFT NMR spectrometer at 90 MHz in DMSO-d6/$CDCl_3$ using TMS as an internal standard. Melting points were taken in open capillaries and are uncorrected. Microwave irradiations were carried out using an IFB 800 W domestic oven. In continuation to above work, we have synthesized 4H-1, 4-benzothiazine by condensation of 2-aminobenzenethiol and β-ketoester/ β-diketones using basic alumina as solid support. The results are summarized in Table 1.

Table

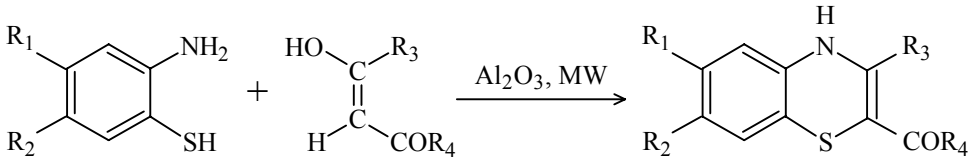
Product	Compound				Yield %		Irradiation time (min)	Molecular formula
	R_1	R_2	R_3	R_4	A	B		
3a	SO_3H	H	CH_3	-C_6H_4-Br (m)	30	69	4.5	$C_{16}H_{12}NO_4S_2Br$
3b	SO_3H	H	CH_3	-C_6H_4-OC_2H_5 (p)	35	75	4	$C_{18}H_{17}NO_5S_2$
3c	SO_3H	H	CH_3	-C_6H_4-C_2H_5 (p)	45	82	5	$C_{18}H_{17}NO_4S_2$
3d	H	OCH_3	CH_3	-C_6H_4-Br (m)	25	81	7	$C_{17}H_{14}NO_2SBr$
3e	H	OCH_3	CH_3	-C_6H_4-C_2H_5 (p)	50	84	8	$C_{19}H_{19}NO_2S$
3f	H	OCH_3	C_6H_5	-C_6H_4-F (p)	74	87	7	$C_{22}H_{16}FNO_2S$
3g	H	Cl	CH_3	-NHC_6H_4-Cl (p)	74	89	10	$C_{16}H_{12}Cl_2N_2OS$
3h	H	Cl	CH_3	-NHC_6H_4-OCH_3 (o)	86	90	9	$C_{17}H_{15}ClN_2O_2S$
3i	H	Cl	C_6H_5	-C_6H_4-F (p)	74	80	8	$C_{21}H_{13}ClFNOS$
3j	H	Br	C_6H_5	-C_6H_4Cl (p)	84	86	11	$C_{21}H_{13}ClBrNOS$

A: Conventional heating, **B**: MW irradiation

General procedure for synthesis of substituted 4H-1, 4-benzothiazine

A mixture of substituted 2-aminobenzenethiol **(1)** (.002 mole) and β-ketoester/β-diketones **(2)** (0.002 mole) was placed in a 100 mL beaker and dissolved in chloroform (5 mL). Now basic alumina (5 g) was added and swirled for sometime followed by removal of solvent under vacuum to make it free flowing powder. This free flowing powder was irradiated in MW using domestic oven at power 540 W for appropriate time (Table 1). The completion of the reaction was checked by TLC. The organic product **(3)** was extracted from

the inorganic solid support with acetone. The solvent was evaporated the product was dried over anhydrous Na_2SO_4 and purified by silica gel column chromatography eluting with cylcohexane/ethyl acetate 70 : 30 or crystallized from methanol (**Scheme 1**).



(1) **(2)** **(3a-j)**

Scheme 1

The structures of the products were confirmed by IR, ^{1}H NMR, elemental analysis and by comparison with authentic samples prepared according to literature methods.

RESULTS AND DISCUSSION

Considering that MW irradiation using domestic oven has been used to improve yield and remarkable reduction in reaction time, by accelerating organic synthesis. In order to determine the suitable condition for synthesis of 4H-1, 4-benzothiazine the effect of nature of inorganic support (K 10, KSF, acidic/basic alumina or silica gel) and irradiation time and power level of microwave was set up and was investigated. The most suitable support was found to be basic alumina. However, reaction time and yield vary according to substituent in 2-aminobenzenethiol.

So this procedure is a very useful and attractive alternative to the presently available methods. The reactions are completed in very short times, yields are generally higher, use of inexpensive and recyclable support make it an eco-friendly tool.

ACKNOWLEDGEMENT

Author is thankful to Rajasthan University for providing ^{1}H NMR & IR data and necessary facilities and L. B. S. Govt College, Kotputli & R. R. College, Alwar for providing laboratory facilities.

REFERENCES

1. A. Loupy (Ed.), Microwaves in Organic Synthesis, Wiley-VCH Verlag, Weinheim (2002).

2. B. L. Hayes, in Microwave Synthesis : Chemistry at the Speed of Light : CEM Publishing : Matthews, USA (2002).

3. P. Lidstrom, J. Tierney, B. Wathey and J. Westman, Tetrahedron, 9225 (2001).

4. K. Mogilaiah and N. V. Reddy, Synth. Commun., **33**, 1067 (2003).

5. Satya Paul, Rajive Gupta, Andre Loupy, Babita Rani and Anshu Dandia, Synthetic Commun., **31(5)**, 711-717 (2001).

6. R. R. Gupta (Ed.), Phenothiazines and 1,4-Benzothiazines-Chemical and Biomedical Aspects, Elsevier, Amsterdam (1988).

7. C. Studenik, R. Lemmens-Gruber and P. Heistraacher, Pharmazie, Chem. Abstr., **131**, 195 (1999).

8. H. Li and G. Dryhurst, J. Neurochem., **69(4)**, (1997).

9. B. Koidl, N. Miyawaki and H. A. Tritthart, Eur. J. Pharmacol., **322(2-3)**, (1997).

10. D. A. Oren, A. Zhang, H. Nesvadha, B. Rosenwirth and E. Arnold, J. Mol. Biol., **259(1)**, (1996).

11. S. K. Kwon and M. S. Park, Arznemittlelforschung., **46(10)**, (1996).

12. B. R. Chaudhari, D. B. Shinde, M. S. Shingare and Indian J. Heterocycl. Chem., **4(3)**, 187-90 (1995).

13. N. Kulkarni, E. Zang, G. Kelloff and B. S. Reddy, Carcinogenesis, **13(6)**, 995-1000 (1992).

14. D. Rai, V. Gupta and R. R. Gupt, Hererocycl. Commun., **2**, 273 (1996).

15. Bhupesh Kumar Sharma, Ph. D. Thesis, University of Rajasthan, Jaipur, India (2007).

Revised : 31.07.2011 *Accepted : 02.08.2011*