Int. J. Chem. Sci.: 14(4), 2016, 2641-2644
ISSN 0972-768X
www.sadgurupublications.com

SYNTHESIS AND BIOLOGICAL ACTIVITY OF 1-THIOCARBOXAMIDO-3-METHYL-4-(4-ARYLHYDRAZONO) -5-(5-BROMOPYRIDIN-2-YL) IMINO-4,5-DIHYDRO PYRAZOLE DERIVATIVES

PETER R. RODRIGUES[a*] and SATISH M. BHALEKAR[b]

[a]Department of Chemistry, Sant Rawool Maharaj Mahavidyalay, Kudal,
SINDHUDURG – 416520 (M.S.) INDIA
[b]Department of Chemistry, S. I. W. S. College, Wadala, MUMBAI – 400031 (M.S.) INDIA

ABSTRACT

1-Thiocarboxamido-3-methyl-4-(4-arylhydrazono)-5-(5-bromopyridin-2-yl) imino-4,5-dihydro pyrazole derivatives have been synthesized using conventional method and microwave irradiation. The structure of the synthesized compounds have been confirmed by IR and NMR Spectroscopy. These compounds were evaluated for their biological efficacy.

Key words: 1-Thiocarboxamido-3-methyl-4-(4-arylhydrazono)-5-(5-bromopyridin-2-yl) imino-4,5-dihydro pyrazole derivatives, Microwave irradiation, Biological activity.

INTRODUCTION

Pyrazole exhibits pharmacological properties such as anticancer[1], analgesic[2], antiinflammatory[3] and antimicrobial[4] activities. Further pyridine derivatives are found to exhibit fungicidal[5], insecticidal[6] activities. Synthesis of 1-Thiocarboxamido-3-methyl-4-(arylhydrazono)-2-pyrazolin-5-ones (3) has been reported[7].

In continuation of our work on synthesis of new heterocycles[8], we are hereby reporting heterocycles having pyrazole and pyridine moiety. We treated compounds 3(a-h) with 5-Bromo-2-aminopyridine to get 1-thiocarboxamido-3-methyl-4-(4-arylhydrazono)-5-(5-bromopyridin-2-yl) imino-4,5-dihydro pyrazole derivativatives 4(a-h).

The synthesis of 4(a-h) has been carried out using conventional method as well as by using microwave irradiation.

*Author for correspondence; E-mail: peter.r.rodrigues@gmail.com

EXPERIMENTAL

Melting points were determined in open capillaries and are uncorrected.

IR spectra were recorded in KBr on Shimadzu Corporation, IR Affinity-I and PMR on a Agilant Technology 400/54 premium shielded using TMS as internal standard (chemical shift in δ ppm).

The reactions were monitored on TLC.

1-Thiocarboxamido-3-methyl-4-(4-nitrophenylhydrazono)-5-(5-bromopyridin-2-yl) imino-4, 5-dihydro pyrazole (4 g)

Conventional method

Compound 3 g (0.015 mol) and 5-bromo-2-aminopyridine (0.015 mol) were refluxed in 15 mL of DMF for 2 hrs. After completion of reaction, the reaction mixture was cooled and poured in to crushed ice with stirring. The solid obtained was filtered, washed with water and then recrystallized from ethanol.

Microwave assisted synthesis

Compound 3 g (0.002 mol) and 5-Bromo-2-aminopyridine (0.002 mol) were refluxed in 10 mL of DMF for 12 min. After completion of reaction, the reaction mixture was cooled and poured in to crushed ice with stirring. The solid obtained was filtered, washed with water and then recrystallized from ethanol.

Other compounds were obtained by the same method.

Compound 4g: IR (KBr): 1104 cm^{-1} (C=S str.), 1332 cm^{-1} (NO_2), 1520 cm^{-1} (C=N), 1560 cm^{-1}(NH-N=C).

NMR ($CDCl_3$): 2.28 (s, 3H, -CH_3), 7.2-7.45 (m, Ar-H, 6H), 8.92 (s, 1H, pyridine H of C6), 13.4 (m, 3H, -NH & -NH_2),

RESULTS AND DISCUSSION

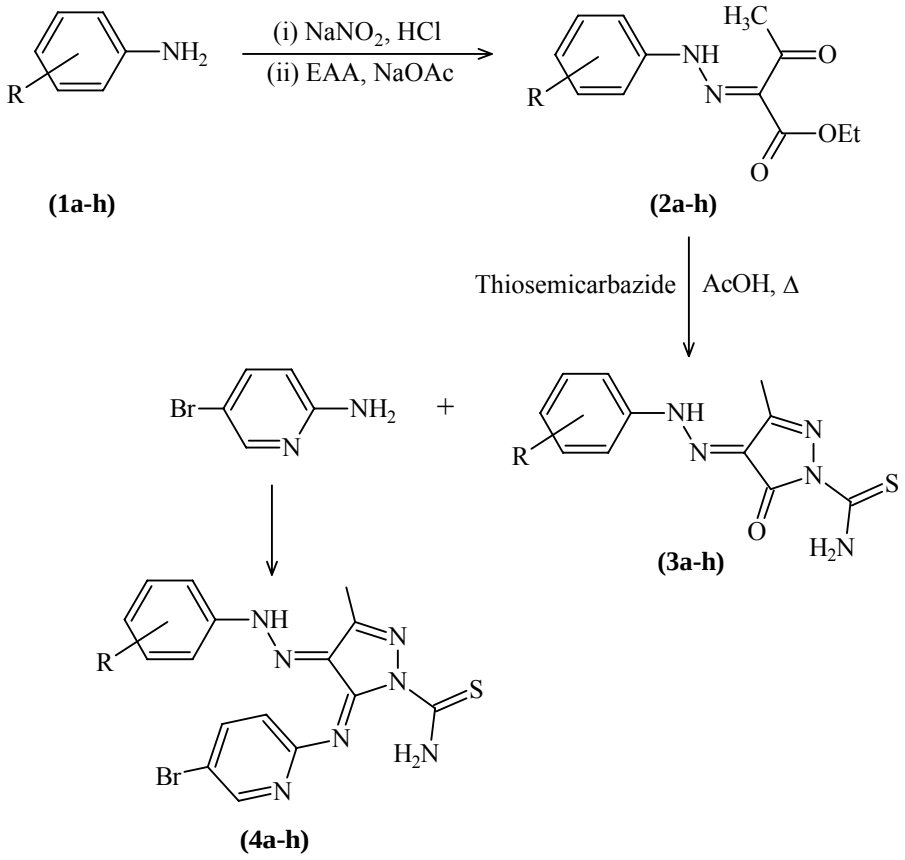
Synthesis of 1-thiocarboxamido-3-methyl-4-(4-arylhydrazono)-5-(5-bromopyridin-2-yl) imino-4,5-dihydro pyrazole derivatives has been carried out using conventional method as well as by using microwave irradiation.

The reaction rate is enhanced tremendously under microwave irradiation as compared to the conventional method with improved yields.

The IR spectrum of compound 3 shows peak at 1676 cm^{-1} indicating the presence of carbonyl group whereas the IR spectrum of compound 4 does not shows peak in this region indicating the absence of carbonyl group.

Biological activities

All the newly synthesized compounds i.e. 4a to 4h were screened for their antibacterial activity against *E.coli*, *S.aureus*, *P.aeroginosa* and *S. typhi* using Ciprofloxacin as a standard. The zone of inhibition was measured in mm. DMF was used as diluent control. However Compounds 4a to 4h did not show promising activities.



R = (a) H, (b) 2-OCH_3, (c) 4-OCH_3, (d) 4-Br, (e) 4-Cl, (f) 4-CH_3, (g) 4-NO_2, (h) 3-NO_2

Scheme 1

Table 1: Characterization data of 4(a-h)

S. No.	R	M.P. (Comp. No. 4)	Conventional method (Comp. No. 4)		Microwave irradiation (Comp. No. 4)	
			Time (hrs)	% Yield	Time (mins)	% Yield
1	H	198	2	49	9	61
2	2-OCH_3	230	2	50	9	64
3	4-OCH_3	196	2	44	9	58
4	4-Br	219	2	57	6	66
5	4-Cl	212	2	45	6	60
6	4-CH_3	188	2	43	6	54
7	4-NO_2	256	2	44	12	60
8	3-NO_2	262	3	39	12	50

REFERENCES

1. M. F. Brana, A. Gradillas, A. G. Ovalles, B. Lopez, N. Acero, F. Llienares and D. M. Mingarro, Bioorg. Med. Chem., **14**, 9 (2006).

2. B. Kalluraya, A. Rahiman and B. David, Arch. Pharm. Med. Chem., **334**, 263 (2001).

3. M. M. F. Ismail, Y. A. Ammar, H. S. A. El-Zahaby, S. I. Eisa and S. E. Barakat, Arch. Pharm. Life Sci., **340**, 476 (2007).

4. N. S. Rai, B. Kalluraya, B. Lingappa, S. Shenoy and V. G. Puranic, Eur. J. Med. Chem.,**43(8)**, 1715 (2008).

5. S. Minakata, T. Hamada, M. Konatsu, H. Tsubo and Y. Ohshiro, J. Agric Food Chem., **45**, 2345 (1997).

6. M. M. F. Ismail, Y. A. Ammar, H. S. A. El-Zahaby, S. I. Eisa and S. E. Barakat, Arch. Pharm. Life Sci., **340**, 476 (2007).

7. S. Shetty, B. Kalluraya, Nithinchandra, Babu M, Chandrashekhar G. Joshi, H. Joshi and R. B. Nidavani, Indian J. Heterocyclic Chem., **23**, 33 (2013).

8. P. R. Rodrigues and S. M. Bhalekar, Int. J. Chem. Sci., **13(4)**, 1844 (2015).

Accepted : 23.09.2016