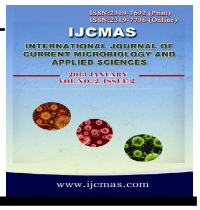
International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 2 Number (2013) pp.76–79.**
http://www.ijcmas.com



Original Research Article

Microwave Mediated Synthesis of some Mannich Bases and their Antibacterial activity

P. Saravanan*[1], and S. Ananda kumar[2]

[1]Assistant Professor in Chemistry, St. Joseph's college of Engineering, Chennai-119, Tamil Nadu, India.
[2]Assistant Professor (S.G) in Chemistry, Anna University, Chennai- 25, Tamil Nadu, India.
***Corresponding Author:** saranpava@gmail.com*

K E Y W O R D S

Microwave; PBA; PBN; PBB; Antibacterial activity.

A B S T R A C T

The synthesis of Mannich bases N-[1-(piprazinobenzyl)acetamide, PBA, N-[1-(piprazinobenzyl) nicodinamide, PBN, N-[1-(piprazinobenzyl)benzamide, PBB, have been reported under microwave radiation. The product is obtained in good yield.

Introduction

In recent times, there has been much interest in the use of microwave radiation in organic synthesis with improved yield and less reaction time (Pidstrom, 2001, Mgilaiah, 2003, Caddick,1995, Meenakshi and Ravichandran, 2006). The application of microwave heating under solvent free radiation condition is a promising alternative nonpolluting reaction and has been a current field of interest (Zoupy, 2006). It is well known from the literature that the compounds containing amide moiety have a strong ability to form metal complexes and exhibit a wide range of biological activities (Raman and Ravichandran, 2005; Raman, 2004; Raman and Ravichandran, 2006; Reshetova and Ustynyuk, 2004; Zhao,2004).

Keeping the above facts in mind in this paper, we have described the synthesis of some Mannich bases under microwave radiation.

Materials and Methods

(a) Synthesis of Mannich base, PBA

Benzaldehyde, piperazine and acetamide were taken in 1:1:1 mole ratio. Piperazine 0.9mL (10mM), acetamide 0.6g (10mM) and then 1mL of benzaldehyde (10mM) was added and kept under microwave for 2min. As usual workup followed by purification under thin layer chromatography gave the compound, PBA. Yield: 77%., m.p.167^{0}C.

(b) Synthesis of Mannich base, PBN

Benzaldehyde, piperazine and nicodinamide were taken in 1:1:1 mole ratio. Piperazine 0.9mL (10mM), nicodinamide 1.22g (10mM) and then 1mL of benzaldehyde (10mM) was added and kept under microwave for 2min. As usual workup followed by purification under thin layer chromatography gave the compound, PBN. Yield: 79%., m.p. 169^0C.

(c) Synthesis of Mannich base, PBB

Benzaldehyde, piperazine and benzamide were taken in 1:1:1 mole ratio. Piperazine 0.9mL (10mM), benzamides 1.2g (10mM) and then 1mL of benzaldehyde (10mM) was added and kept under microwave for 3min. As usual workup followed by purification under thin layer chromatography gave the compound, PBB. Yield: 79%., m.p. 167^0C.

All the compounds (PBA, PBN, and PBB) gave satisfactory spectral data like IR and 1H-NMR. The elemental analyses values were consistent with the stoichiometry for all the Mannich bases and the analytical data are given in the table -1.

Antibacterial activity of the compound PBA, PBN, and PBB

Antibacterial activity of the compound PBA, PBN, and PBB have been carried out against the gram positive bacteria like *S. aureus, B. subtilis* and gram negative DMSO as solvent (Table 2). Ampicillin was used as the standard for comparing the bacteria such as *E. coli, P. aeuroginosa* using Muller Hinton agar by well-diffusion method using results. The zone of inhibition values was determined at the end of an incubation period of 24h at 37°C. Mannich bases have been reported as potential biological agents. They find application as antitubercular (Joshi e*t al.,* 2008); antimalarial (Lopes *et al.*, 2004) vasorelaxing (Ferlin *et al*., 2002) anticancer(Holla *et al*., 2003) and analgesic drugs(Malinka *et al*., 2005). They have also found several applications in the polymer industry as paints and surface active reagents (Tramontini and Ghedeni, 1988).

Results and Discussion

Synthesis of Mannich base,PBA, PBN and PBB

All the compounds (PBA, PBN, and PBB) gave satisfactory spectral data like IR and 1H-NMR. The elemental analyses values were consistent with the stoichiometry for all the Mannich bases and the analytical data are given in the table -1.

Antibacterial activity of the compound PBA, PBN, and PBB

Antibacterial activity of the compound PBA was found to be maximum in *E.coli* (13mm) and minimum in *S.aureus* (11mm). Maximum inhibitory activity was observed in *Ps.aeruginosa* (14mm) of PBN compounds. Antibacterial activity of the compound PBB was found to be maximum in *S.aureus* (13mm) and minimum in *Ps.aeruginosa* (10mm). The antibacterial activity was represented in table.2.

Mannich bases have been reported as potential biological agents. They find application as antitubercular (Joshi e*t al.,* 2008); antimalarial (Lopes *et al*., 2004) vasorelaxing (Ferlin *et al*., 2002) anticancer(Holla *et al*., 2003) and analgesic drugs(Malinka *et al*., 2005). They have also found several applications in the polymer industry as paints and surface active reagents (Tramontini and Ghedeni, 1988).

Figure.1(a) Formation of Mannich base, PBA

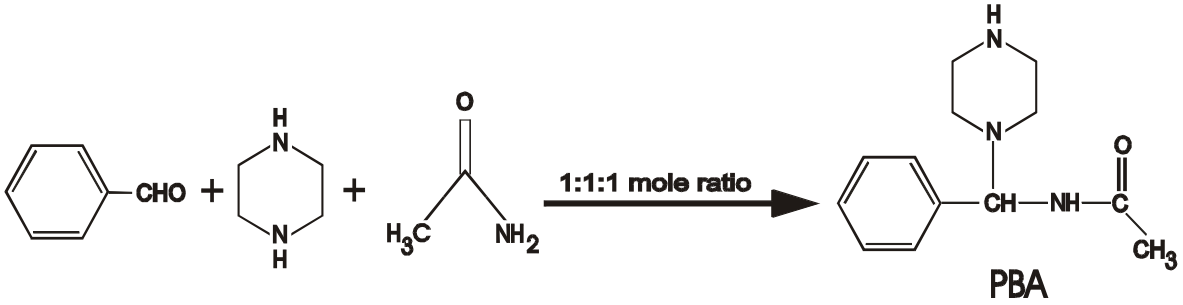


Figure.1(b) Formation of Mannich base, PBN

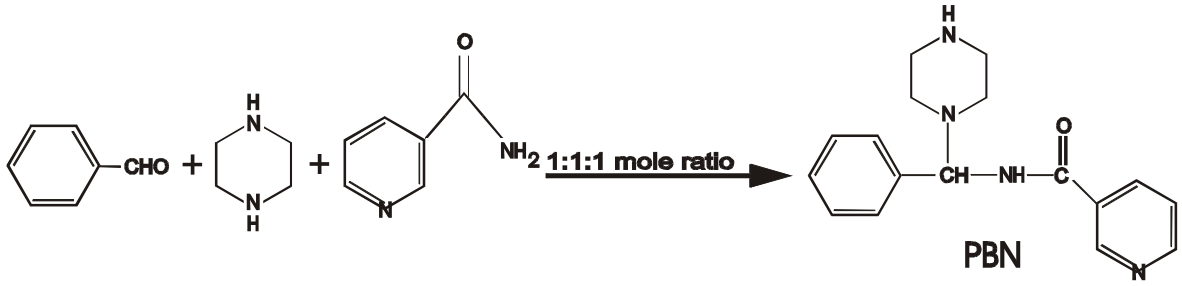


Figure.1(c) Formation of Mannich base, PBB

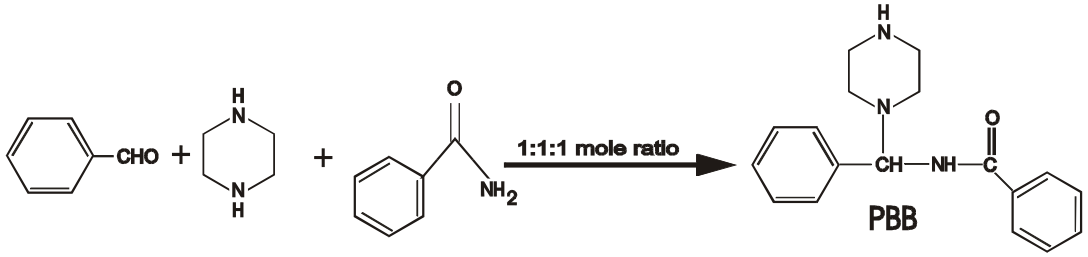


Table. 1 Analytical data of the Mannich bases

Compound	Found (Calculated)				
	C (%)	H (%)	N (%)	Mol.wt	Yield %
PBA	65.48 (66.74)	7.93	18.00 (8.15)	233.16 (18.02)	77
PBN	66.74 (68.93)	6.38	18.09 (6.75)	296 (18.92)	79
PBB	73.14 (73.23)	7.04 (7.11)	14.98 (14.24)	295	79

Table. 2 Antibacterial activity of Mannich bases

Compounds	*S.aureus*	*E.coli*	*P.aeuroginosa*	*B.subtilis*
PBA	12	11	13	12
PBB	11	10	12	13
PBB	11	10	12	13
Ampicillin	9	8	8	10

Acknowledgements

I am highly thankful to the Managing Director, Director, Principal and Head of the Department of St. Joseph's college of Engineering, Chennai for their constant support and encouragement. My guide expresses his sincere thanks to the Head of the department and board members of Anna University, Chennai for their motivation. The authors are also thanking to the RSIC and IIT Chennai for the use of their instrumentation facilities.

References

Caddick, S., 1995. Tetrahedron. 51:10403.

Ferlin, M. G., G. Chiarelotto, F. Antonucci, L. Caparrotta and Froldi, G. 2002. Eur J Med Chem. 37:427-434.

Holla, B. S., B. Veerandra, M.K. Shivanada and Poojary. 2003. B Eur J Med Chem. 38: 759-767.

Joshi, S., N. Khosla, P. Tiwari, 2004. Bioorg Med Chem. 12: 571-576.

Lopes, F., R. Capela, J.O. Goncaves, P.N. Horton, M.B. Hursthouse, J. Iley, C. M. Casimiro, J. Bom and Moreira, R.2004. Tetrahedron Lett. 45: 7663-7666.

Malinka, W., P. Swiatek, B. Filipek, J. Sapa, A. Jezierska, A. Koll and Farmaco, A. 2005. Green Chem. 60: 961-968.

Meenakshi, C., and Ravichandran, S. Int J Chem Sci. 4: 125.

Mgilaiah,K., M. Prashanthi and. Reddy, G.R. 2003. Indian J Het Chem., 12: 389.

Pidstrom, L., J. Tierney, B. Wthey and Westman,J. 2001. Etrahedron. 57: 9225

Raman, N., and Ravichandran, S.2006. Synth. React Inorg Met Org Nano-Metal Chem. 35: 439

Raman, N., S. Esthar and Thangaraja, S. 2004. J Chem Sci. 116: 209.

Raman,N., and Ravichandran, S.2005. Polish J Chem. 79: 1107.

Reshetova, K., and Ustynyuk, Y.A.2004. Russ Chem Bull. 53: 335.

Tramontini, A. L., and Ghedeni, N. 1988. Polymer. 29: 771-775.

Zhao, G., T. Jiang, H. Gao, B. Han, J. Huang and Sun, D. 2004. Green Chem. 6: 75.

Zoupy, A., A. Petit, F.Hamelin and Mathe,D. 1998. Synthesis. 6: 1213.