Synthesis some of Pyrazines and oxazoles

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Abstract

Decaboxylative Transamination of the α-amino acids glycine , alanine and tyrosine in the presence of the symmetrical and asymmetrical benzoins [4,4´ - di methyl benzoin , 4,4´ - di chloro benzoin and 4- amino benzoin led to the formation of oxazoles ,tetra –substituted pyrazine and the corresponding benzils.

الخلاصه

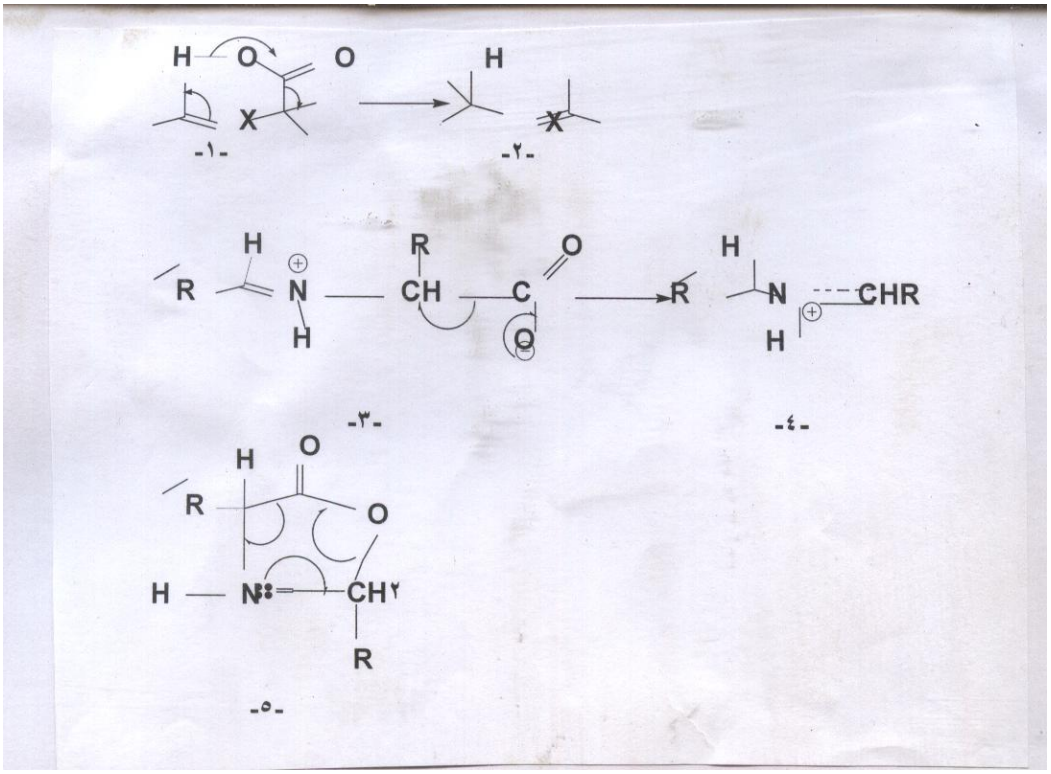
في هذا البحث تم نقل مجموعة الامين المصحوبة بفقدان ثنائي اوكسيد الكاربون للحوامض الامينية كلايسين ،الانين والتأيروسين بوجود مركبات البنزوين المتماثلة وغير المتماثلة(4، 4´- ثنائي مثيل بنزوين ، 4، 4´- ثنائي كلوروبنزوين و 4-امينو بنزوين) ادى الى تكوين مركبات البايرازين الرباعية التعويض والاوكسازولات كذلك اكسدة مركبات البنزوين الى مركبات البنزيل المطابقه .

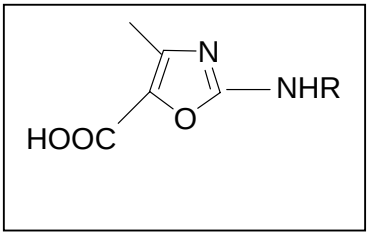
Introduction

The previous accepted mechanism for decarboxylative transamination of α-amino 1a→2a[1,4] analogous to the established for β,Y-unsaturated acids 1b→2b2 was renpvated by Griggs[3].

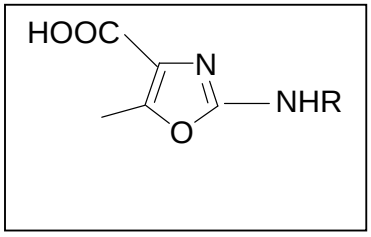
Who proposed the inter vention of 1,3-dipolar species (4) via the zwitter ionic from(3)in a later paper 4,Griggs showed that primary and secondary α-amino acids react with aldehydes and ketones ,with concomitant decarboxylation to give azomethine ylide (4)via an intermediate oxazolidine-5-one(5).In the absence oe added dipolarophile the azomethin ylide undergoes 1,2-prototroxy from nitrogen to C(1)or(3)generating imines,the region C(3)in(4)this suggested mechanismseems to fit the result of our previous work[1,5] .

We looked to expand our work by decarboxylation the α-amino acid in the presence of symmetrically substituted benzoin.

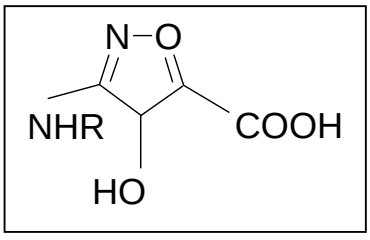




O-oxazole



N-oxazole



Hydroxyl iso oxazole

Experimental

Unless other wise atated the following generalization apply .
I.R spectra were measured in FT.IR Shimadz 2434 spectro photometer In Nujol . ^1H n.m.r spectra were measured with A-CL a (300μ Hz) in $cDCl_3$ with TMS as internal standard Micro analytical were analysed at the1106 carloerba in Jordan .

General Methods

(A) By Fusion

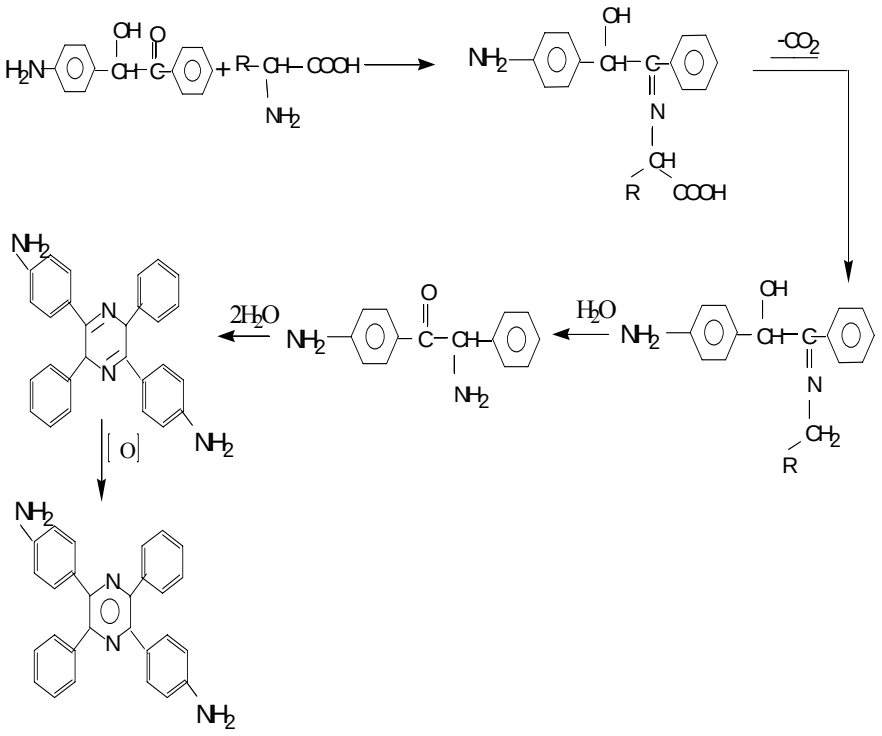
the α-amino acids was throughtly mixed with4-amino benzoin in equimolar . the resulting mixture was then heated in the oil bath to the minimum temperature required for decarboxylation(140-180C^O).
When the evolution of carbon dioxides had ceased , ethanol was then added and the mixture was refluxed for 15 minutes. The solution was then cooled and set aside for fractional cooled and set aside for fractional crystallization pyrazine was obtained first , then benzil and finally the Oxazoles . these products were purified from ethanol .

(B) The solvent Method

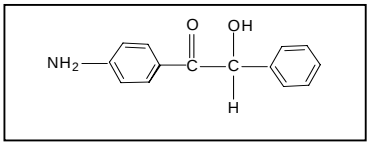
4-amino acids Benzoin (0.01 mole) was added to solution made of α – amino acids (0.01 mole) and sodium ethoxide (0.01 mole) in absolute ethanol (30ml) the reaction mixture was refluxed on a water bath until the evalution of carbon dioxide had ceased ; the hot mixture was filtered and set aside for fractional crystallization. The procedure was continued as in (A).

Result and Discussion

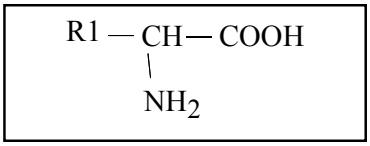
Rizzi and Grigg[7-11] isolated low yields of Oxazolidine from the aldehyde induced – decarboxylation of sarcosins under forcing conditions, Oxazolidine was also obtained , but in good yield , from Decarboxylation cyclic secondary α – amino acids in the Presence of aldehydes bearing electron withdrowing substituents[12] , during this work , we obtained different Oxazoles The decarboxylation led also to the formation one Pyrazine(2) and corresponding benzils (3).
The Oxazoles(5a,5b,5c) was obtained from the 4-amino benzoin with glycine, Alanine tyrosine. 4 -(p-amino phenyl) -5 -phenyl oxazole, 2-(methyl)- 4-(p-amino phenyl)-5-phenyl oxazole, 2-(p-hydroxy benzyle)-4-(p-amino phenyl)-5-phenyl oxazole .Benzoin with alanine and tyrosine .Benzils obtained during this work are more Under the conditions used led to the formation of the isolable oxazole derivative,the oxazolles were obtained from the decarboxylation of 4,4´-dimethyl benzoine with glysine,alanine and tyrosine, 4,4´-dichloro probably formed through the oxidation of the corresponding benzoins under the conditions used,the decarboxylation of the α-amino acid(6a-c)using method (B) only led to the formation of 2,3,4,5-tetra sub pyrazine(10-a-c).



SCHEME(I)

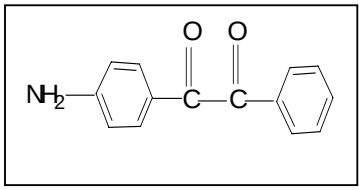


(1)

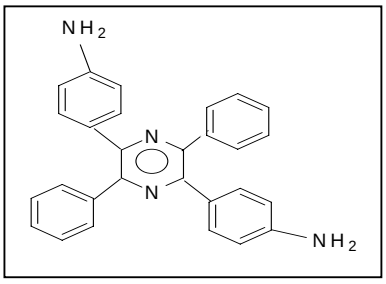


(2)

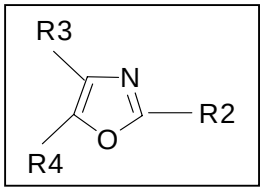
	R1
2a	H
2b	CH_3
2C	CH_2-Ph-OH



(3)



(4)



(5)

	R2	R3	R4
5a	H	Ph	P-NH_2-Ph
5b	CH_3	Ph	P-NH_2-Ph
5c	CH_2-PhOH	Ph	P-NH_2-Ph

SCHEME(II)

Table(1): Melting point,percentage yields and analtical results of pyrazine and oxazoles

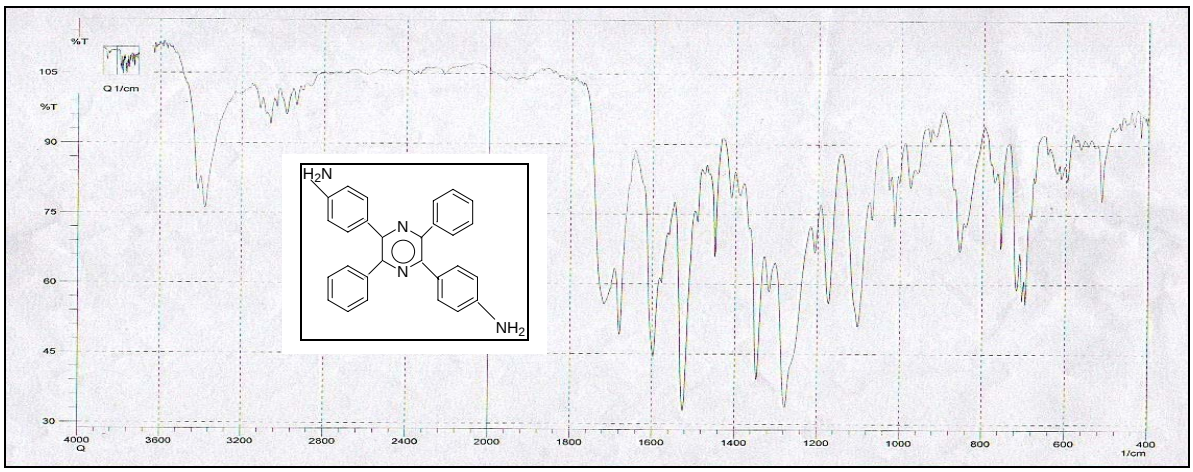
COMP NO	M.P C^O	YIELD %	FORMULA	FOUND (CALC)%		
				C	H	N
4	309	33.4	$C_{28}H_{22}N_4$	81.159 (81.156)	5.314 (5.323)	13.526 (13.49)
5a	131	24.5	$C_{15}H_{12}N_2O$	76.271 (76.287)	5.084 (5.089)	11.864 (11.866)
5b	136	12.8	$C_{16}H_{14}N_2O$	76.8 (76.788)	5.6 (5.61)	11.2 (11.203)
5c	142	21.8	$C_{22}H_{18}N_2O_2$	77.192 (77.19)	5.263 (5.258)	8.187 (8.188)

Table 2 : TheH^1 N.M.R spectra of pyrazines

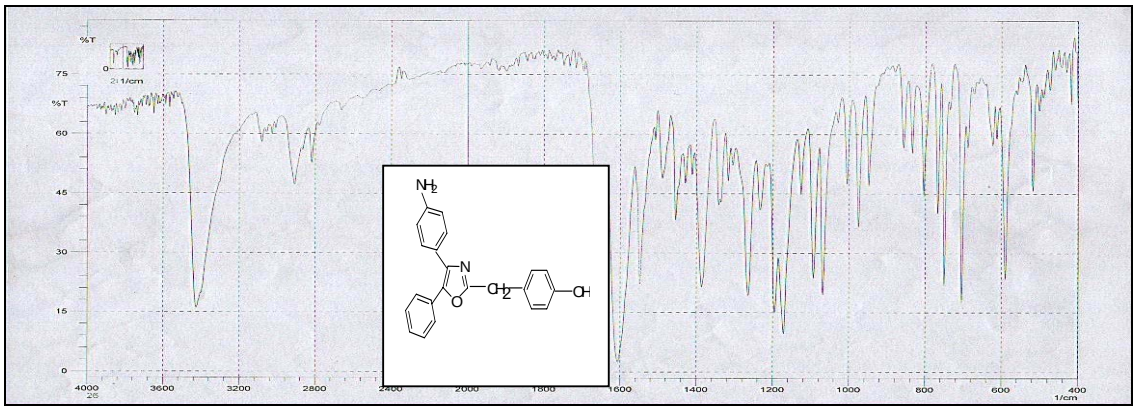
COMP.NO	N.M.R DMSO
4	δ 6.7,7.6(2x4H(d) $2C_6H_4$;7.3(2x5H(d)) and 9,42 ($2xNH_2$) (s)
5a	δ 2.4 (1xH(s)); 7.8 (1x4H(d) C_6H_4) ;7.3(1x5H(d) C_6H_5)and9.32(1XNH2(s))
5b	3(3XH(s)),7.8(1x4H(d)-C_6H_4 ,7.3(1X5H(d)C_6H_5) , 9.40(1XNH_2(s)

Table3: The I.R spectra of Pyrazines and Oxazole

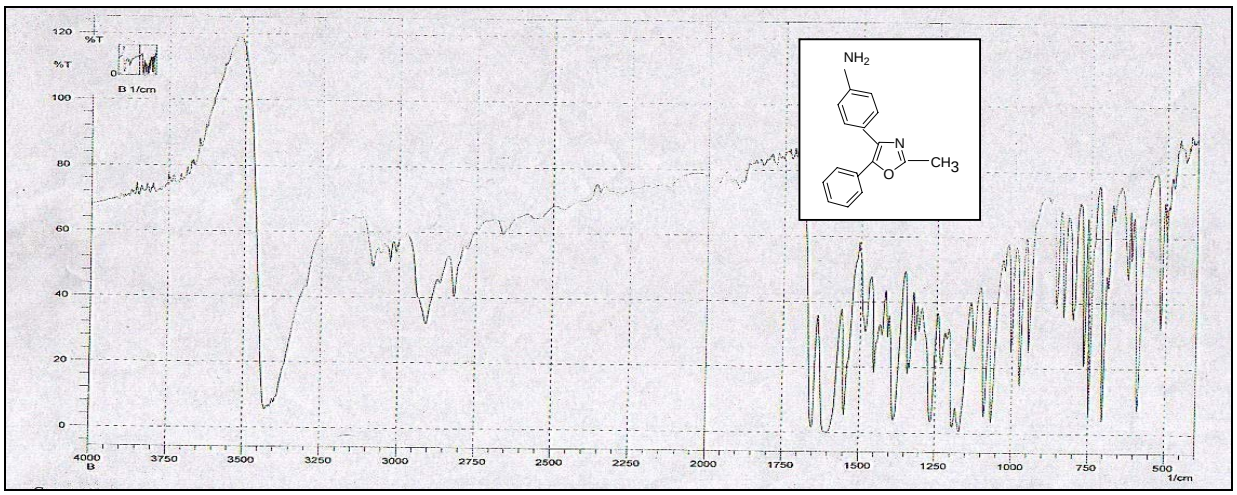
COMP. NO	MAX CM^{-}
4	1580-1590(-C=N-) , 1300-1600(=C-N), , 1442(-C=C-) , 3000-3050 (C-H) , 1500-1570 .
5a	1650(-C=C-),2925 (C-H),3000-3050(C-H),1550-1590(-C=C-), 675-710 (C-H)
5b	1650(-C=C-) , 2925(C-H) ,3000-3050(C-H) , 1550-1590(-C=C-) , 675-710(C-H)
5c	1650(-C=C-) , 2925(C-H) , 3000-3050 (C-H, 1550-1590 (-C=C-), 675-710(C-H)



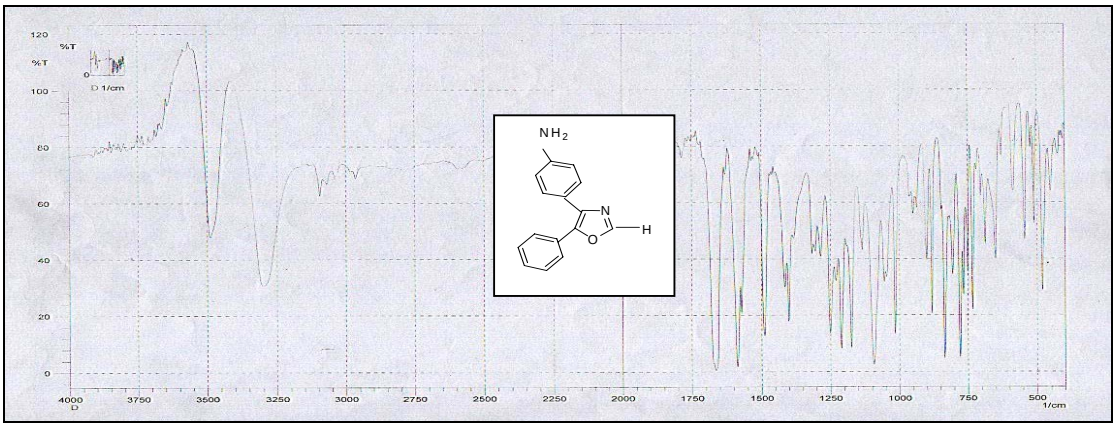
I.R spectra For 4-(amino phenyl)-3,6-di phenyl pyrazine



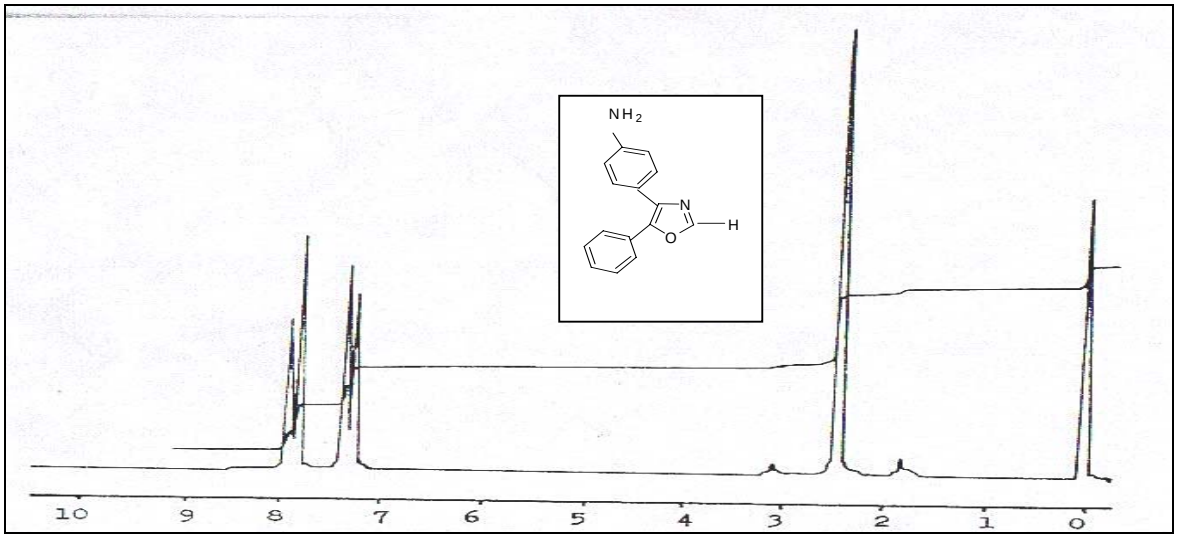
I.R spectra For 2-(p-hydroxy benzyl) 4-(p- amino phenyl) 5 phenyl Oxazol



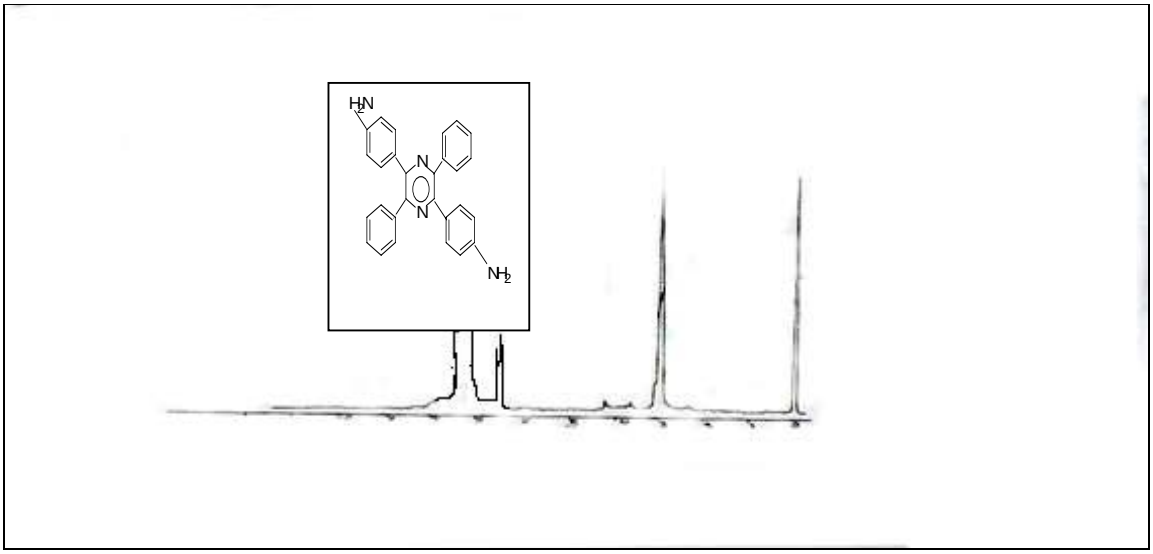
I.R spectra For 2- methyl 4-(P-amino phenyl)-5-phenyl Oxazol



I.R spectra For 4-(4- amino phenyl)-5- (phenyl) Oxazol



N.M.R spectra For 4-(4- amino phenyl)-5- (phenyl) Oxazol



N.M.R spectra For 2,5-di(amin phenyl)-3,6-di phenyl pyrazine

References

1- M.A. Marques , R.M. Doss, A.R. Vrbach and P.B. Helvetica , ***Helvetica Chimica Acta***., 2002, **85(12)** , 4485.
2- M.A. Marques and P.B. Dervan , ***Journal of the American Chemical Society***., 2004, **126(33)** , 10339.
3- D. Rennebery and P.B. Dervan, ***Journal of the American Chemical Society*** ., 2003, **125(19)**, 5707.
4- C.A. Briehn and P.B. Dervay , ***Chemistry – European Journal*** ., 2003, **9 (9)**, 2110.
5 – C.L. Kielkopf and D.C. Rees, ***Nature structural Biology***., 1998 , **5 (2)**, 104.
6 – C.L. Kielkopf and P.B. Dervan , ***Journal of Molecular Biology***., 2000, **295, (3)**, 557.
7 – R. Grigg and S.T. Patansul , ***J. chem. Soc . Chem.***, 1984, **Commun.**, 180 .
8 – R. Grigg and D.Vipond, ***J.Chem. Soc. Chem.***, 1987, **Commun**., 49.
9 – A.T. Atto and K.A. Habib , ***J. Iraqi . Chem. . Soc*** , 1987, **12(12)**, 35.
10 – I.schiketanz,c.drghici and T.Balaban, ***issu in Honor of prof.C.D.Nenitzeseu***, 2002, 64.
11 – M.N. Mohammad , ***J. AL Qadisay of pure Science***., 2005, **10(1)**.
12 – M.N .Mohammad , ***J. AL Qadisay for pure Science***., 2006, **10(3)**.