

Anticancer and anti-inflammatory activities of some new pyrazolo[3,4-*b*]pyrazines

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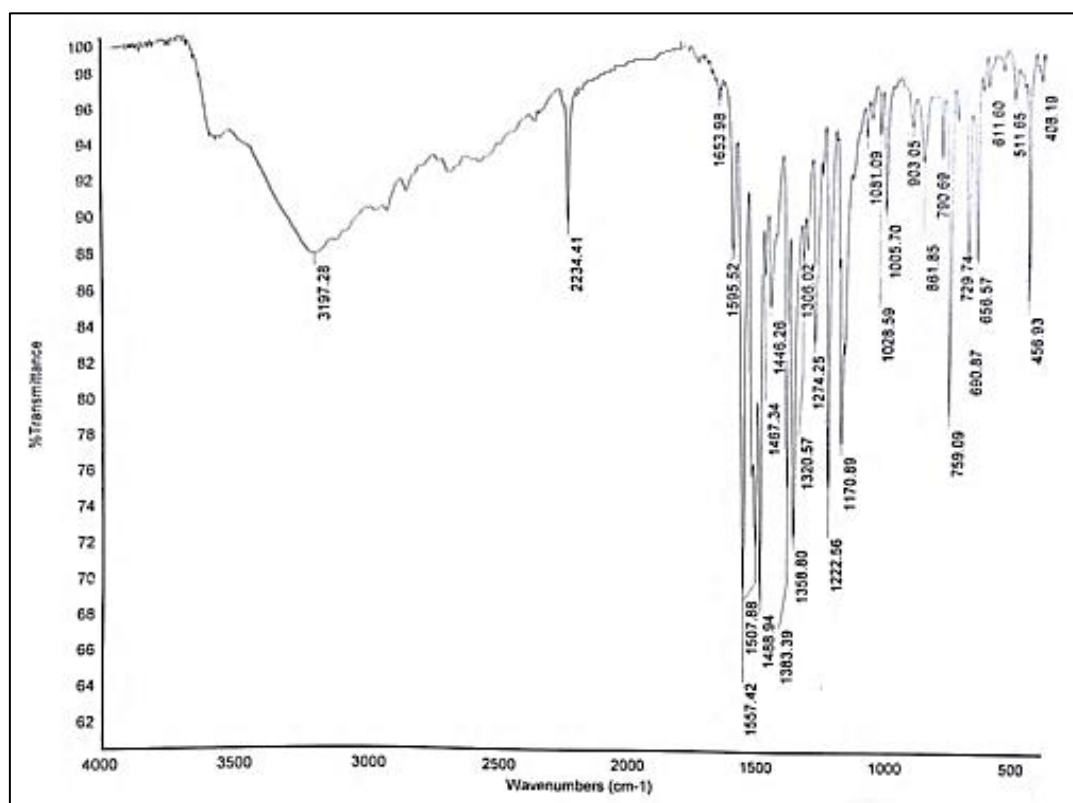
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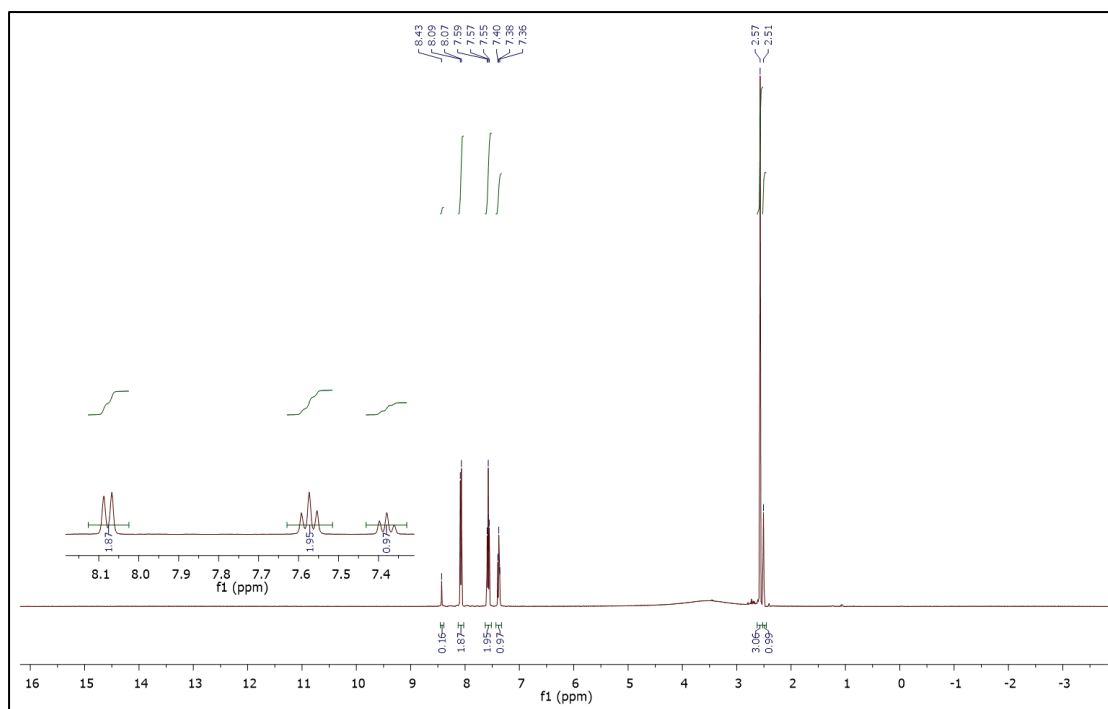
³ Aix-Marseille Université, CNRS, Institut de Chimie Radicale ICR, UMR 7273, Laboratoire de Pharmaco-Chimie Radicale, Faculté de Pharmacie, 27 boulevard Jean Moulin CS 30064, Marseille Cedex 05, 13385, France; patrice.vanelle@univ-amu.fr

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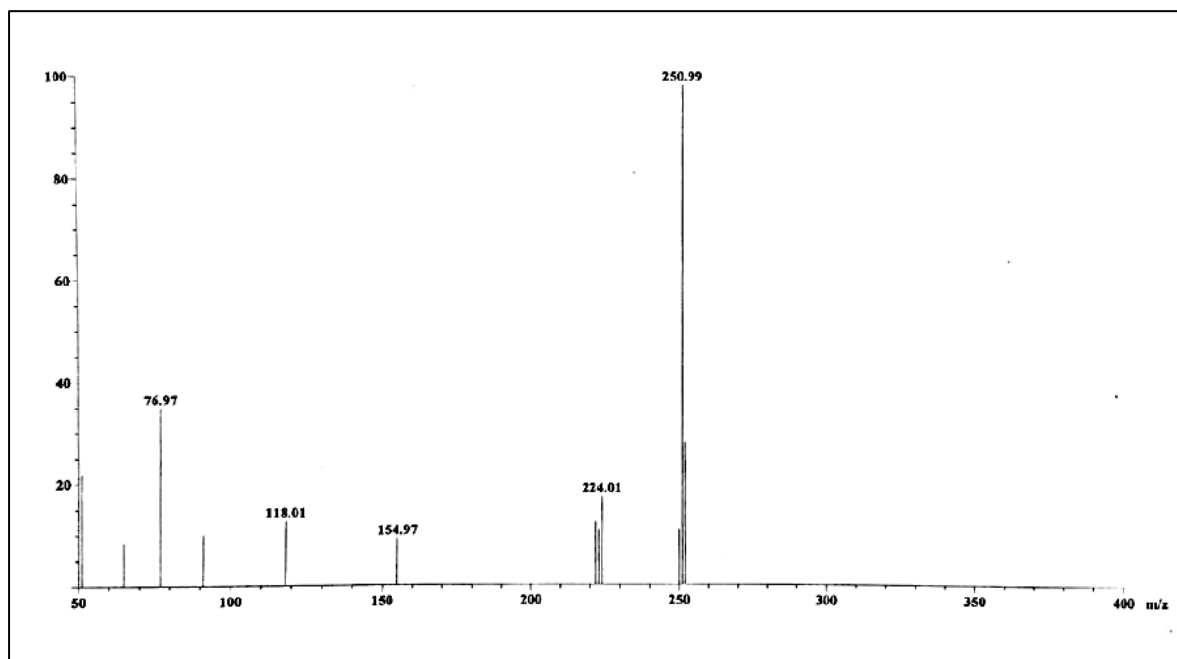
Supplementary Materials:



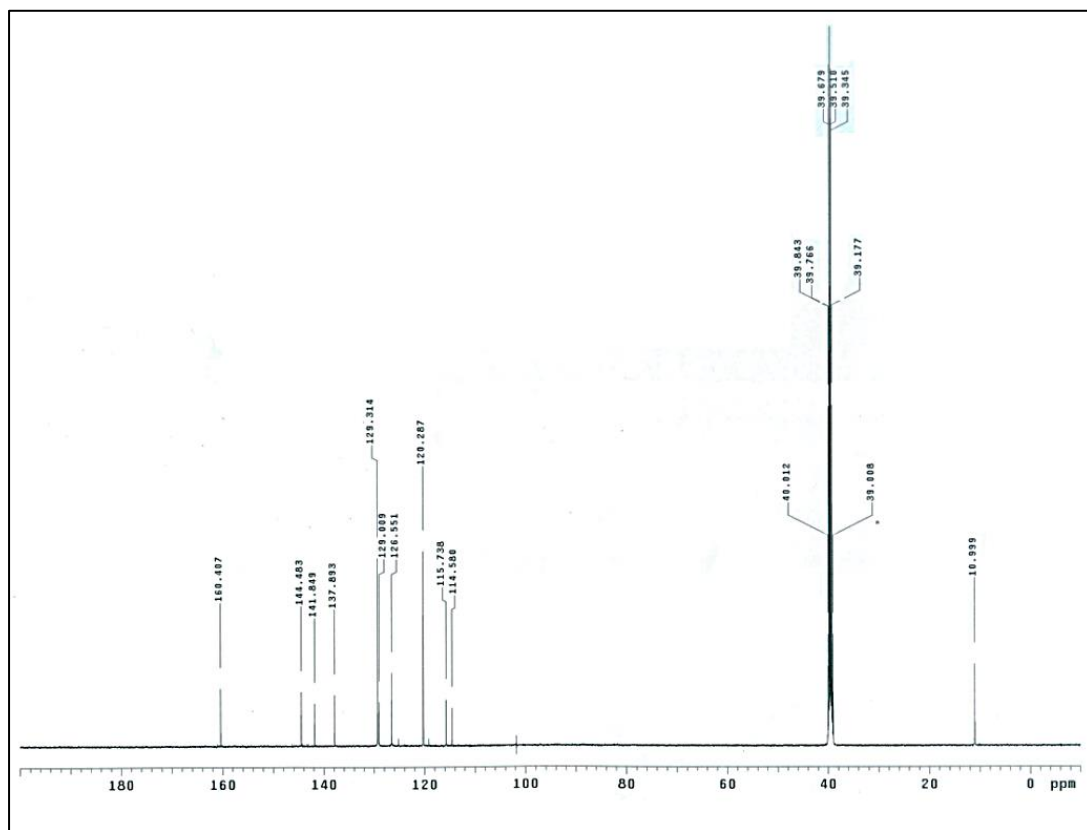
(Fig. 1), IR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-carbonitrile (**6a**)



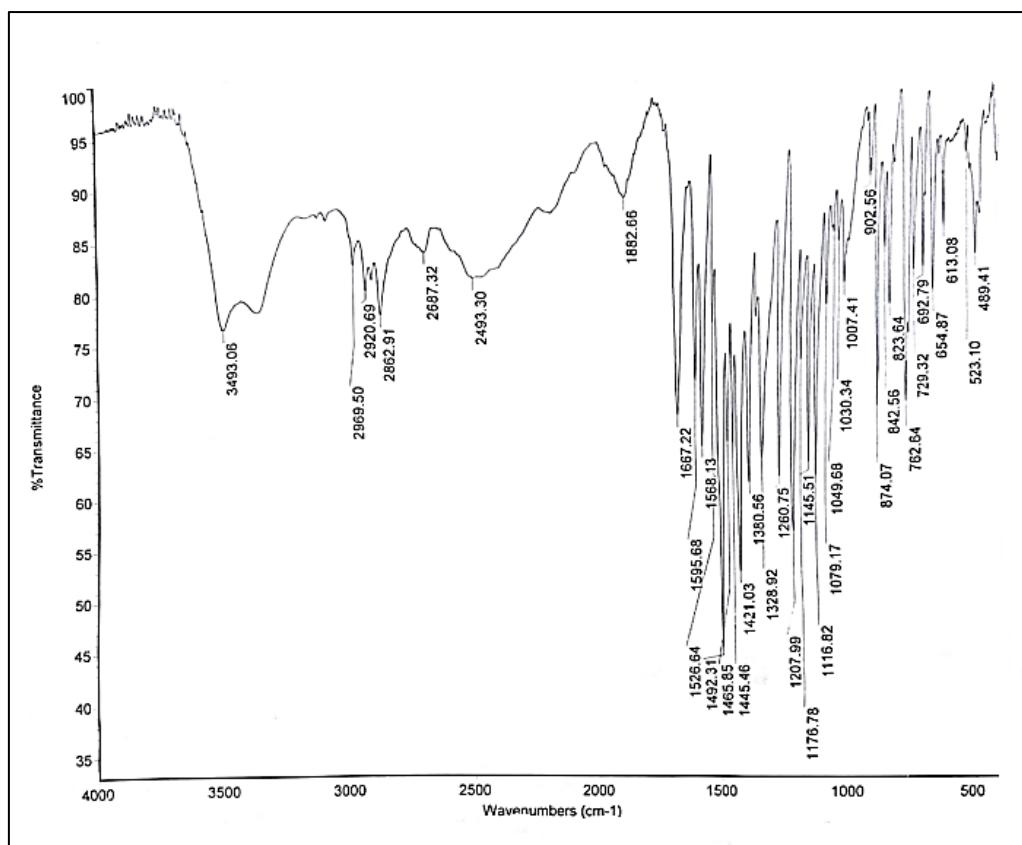
(Fig. 2), ¹H-NMR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-carbonitrile (6a). DMSO-*d*₆



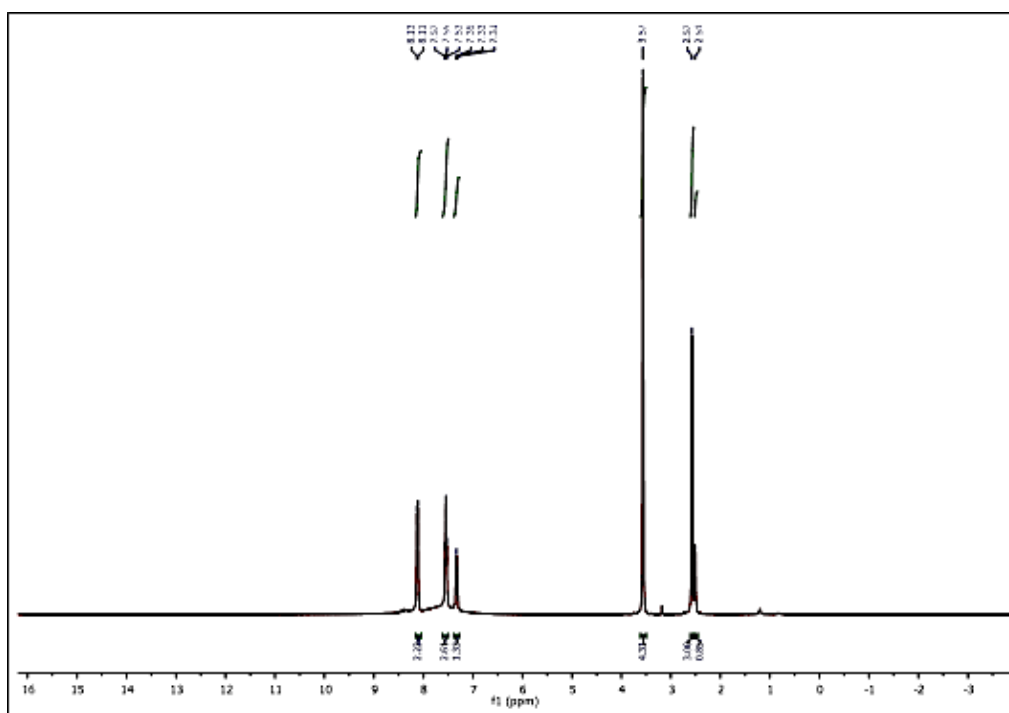
(Fig. 3), Mass spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-carbonitrile (**6a**).



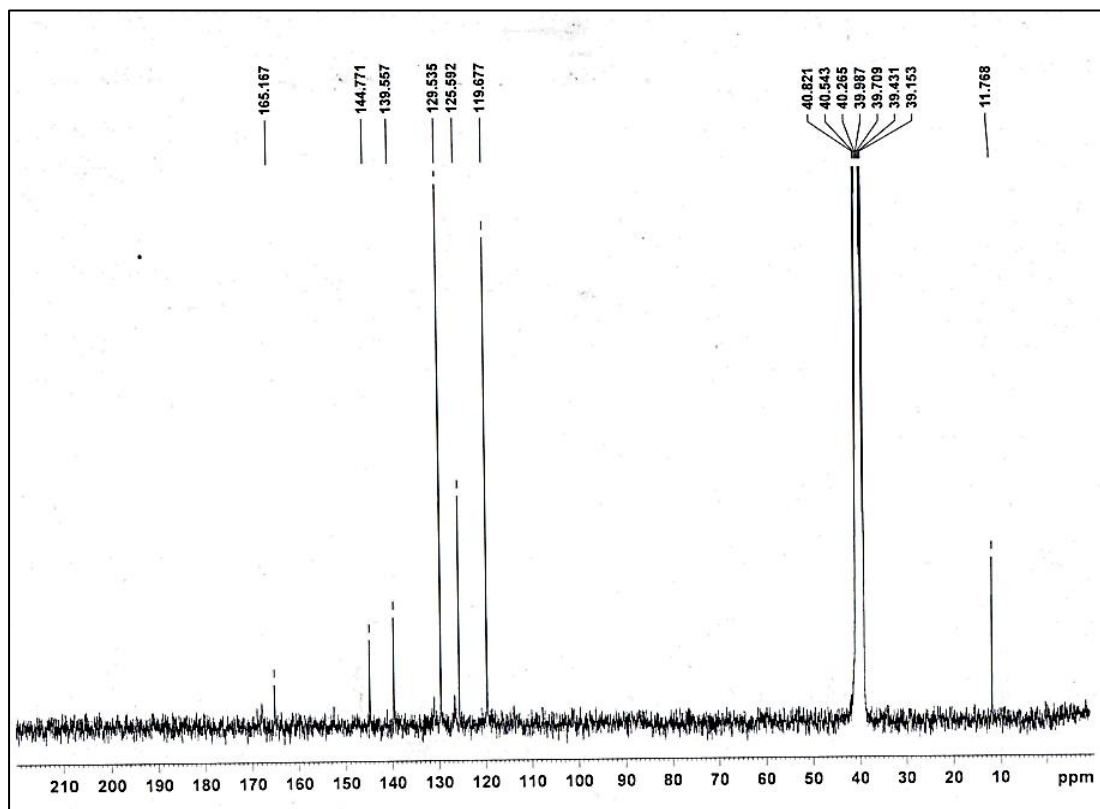
(Fig. 4), ^{13}C -NMR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-carbonitrile (**6a**). $\text{DMSO-}d_6$.



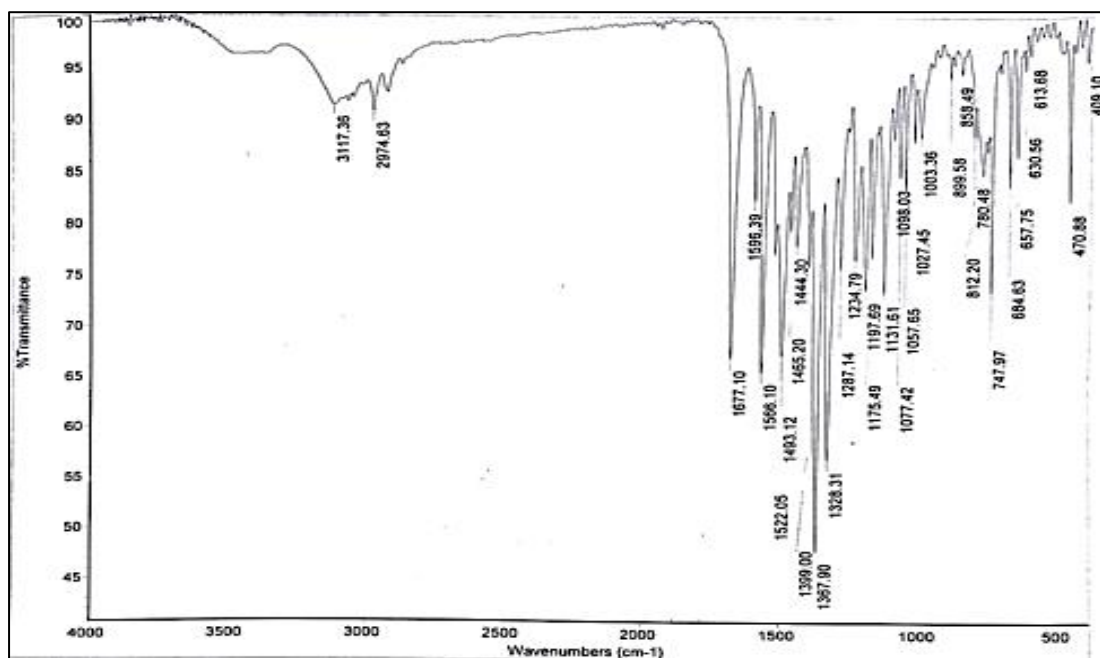
(Fig. 5), IR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylic acid (**8**)



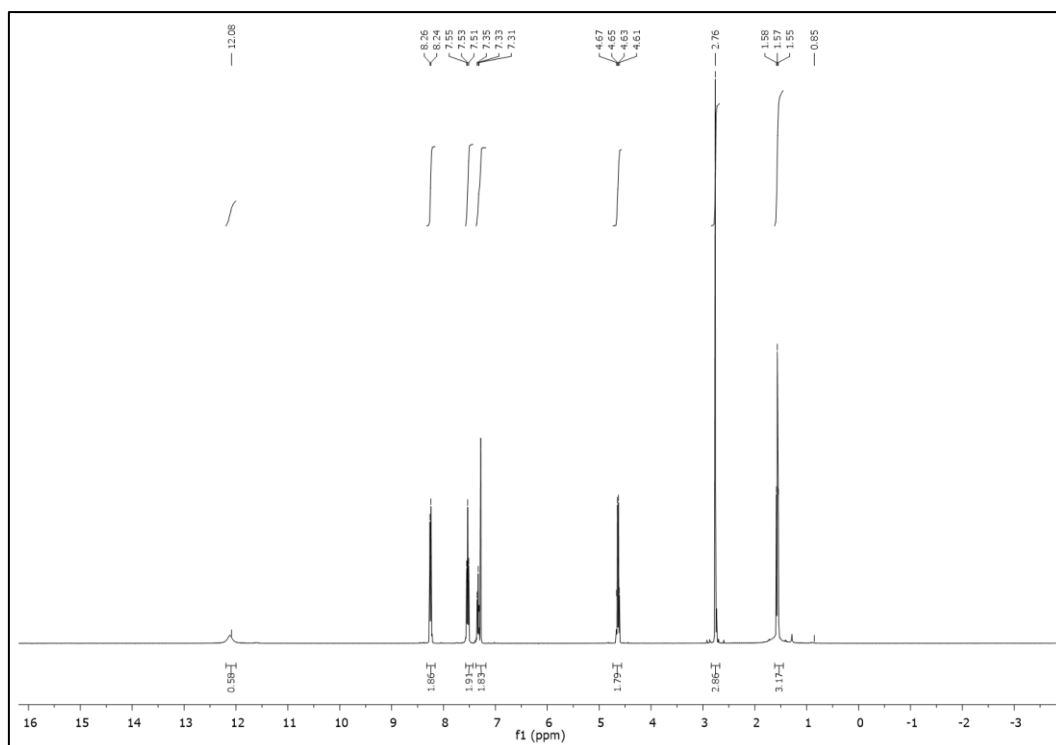
(Fig. 6), ¹H-NMR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylic acid (**8**). DMSO-d₆.



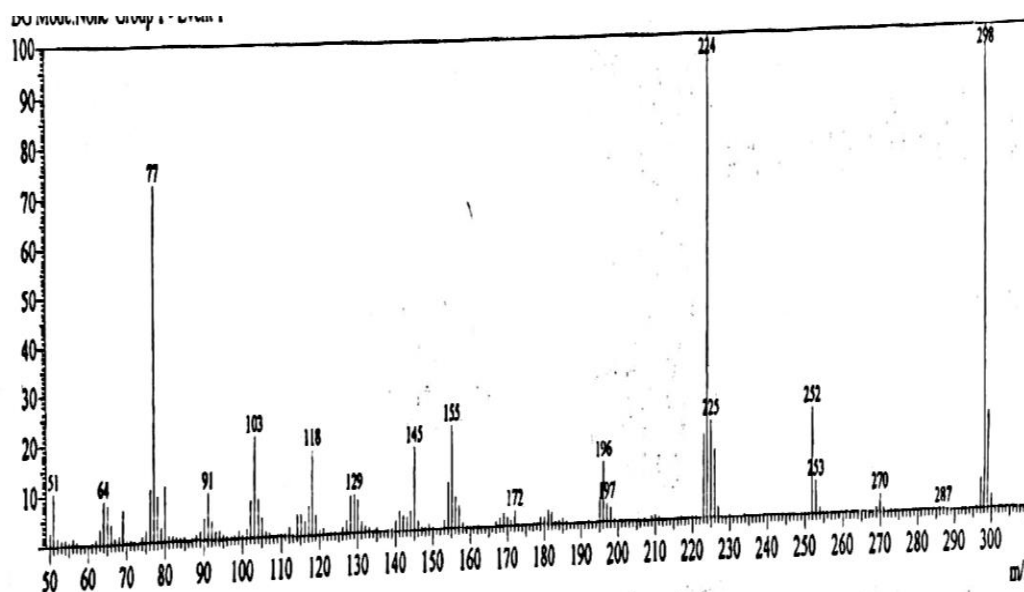
(Fig. 7), ¹³C-NMR spectrum of 6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylic acid (**8**). DMSO-*d*₆.



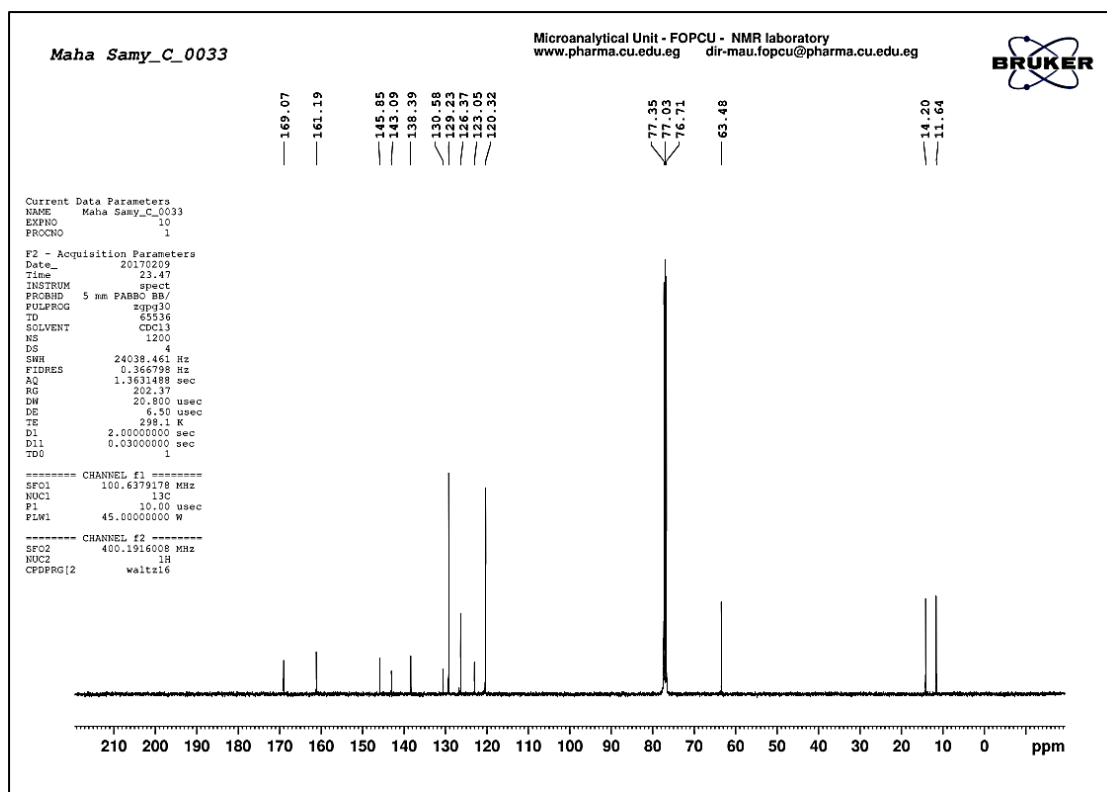
(Fig. 8), IR spectrum of ethyl-6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylate (**9**).



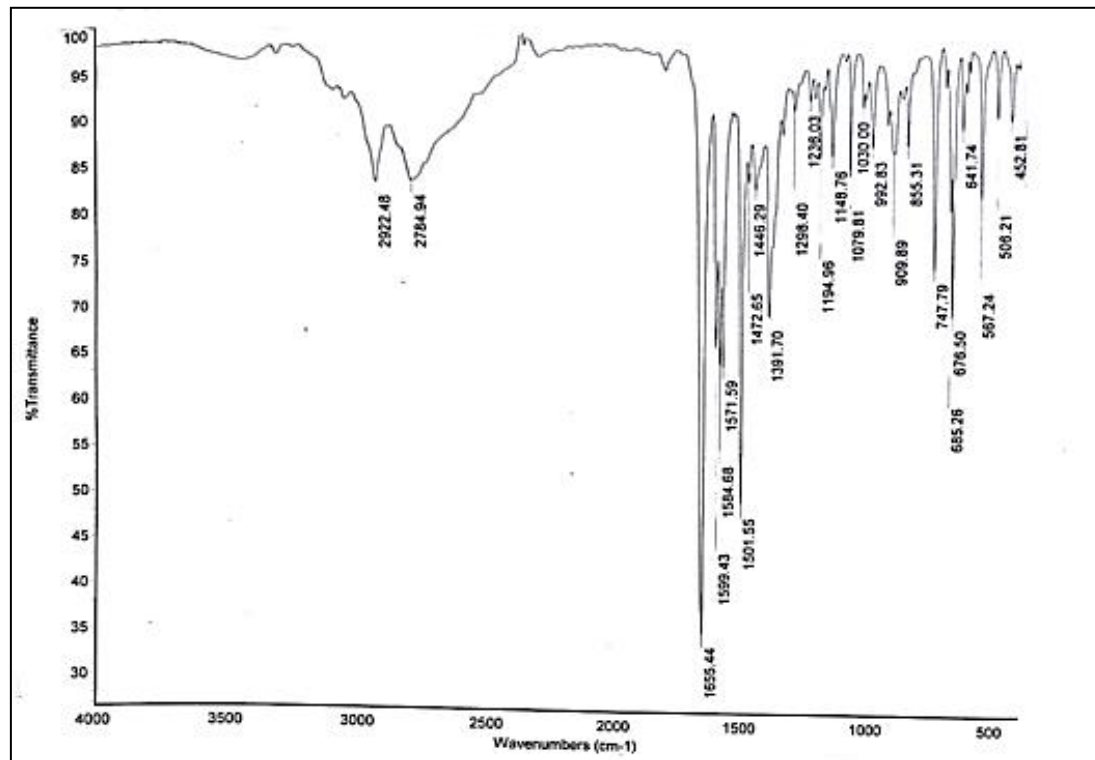
(Fig. 9), ¹H-NMR spectrum of ethyl-6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylate (9).CDCl₃



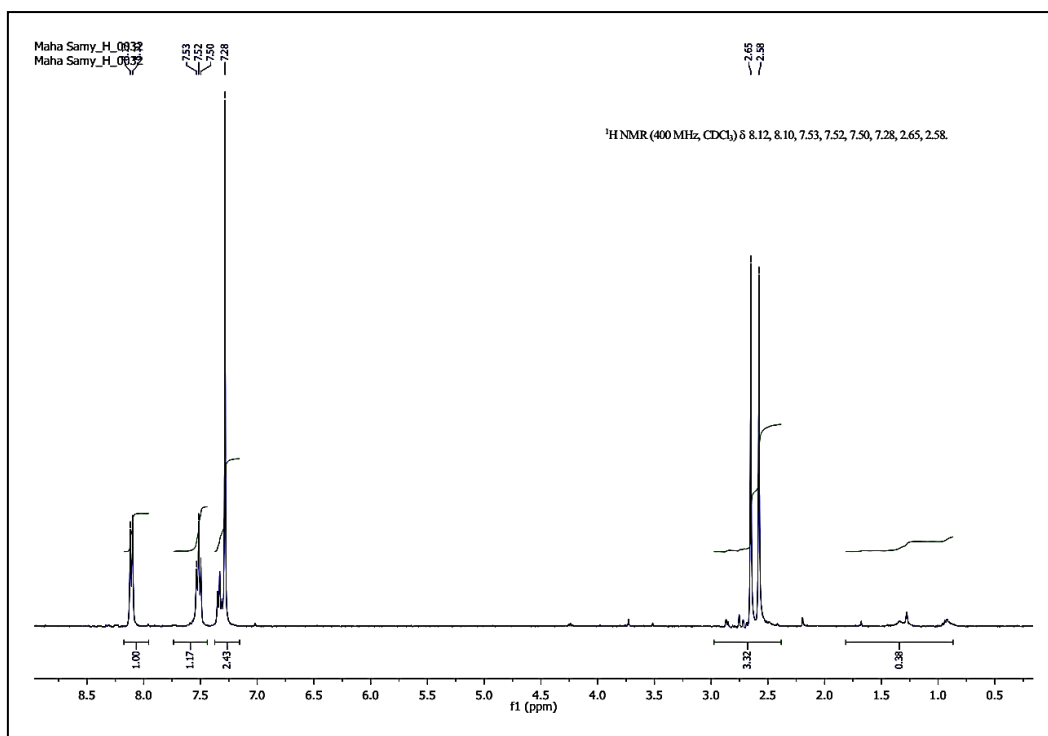
(Fig. 10), Mass spectrum of ethyl-6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylate (9).



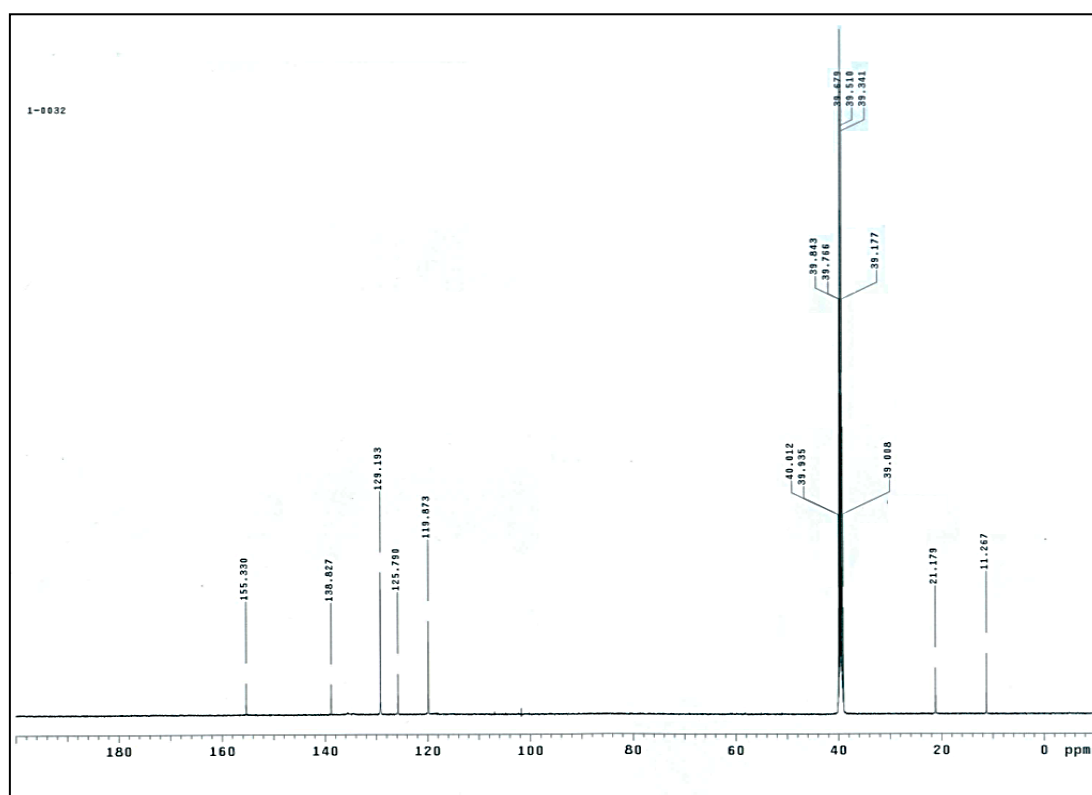
(Fig. 11), ^{13}C -NMR spectrum of ethyl-6-hydroxy-3-methyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-carboxylate (**9**). CDCl_3



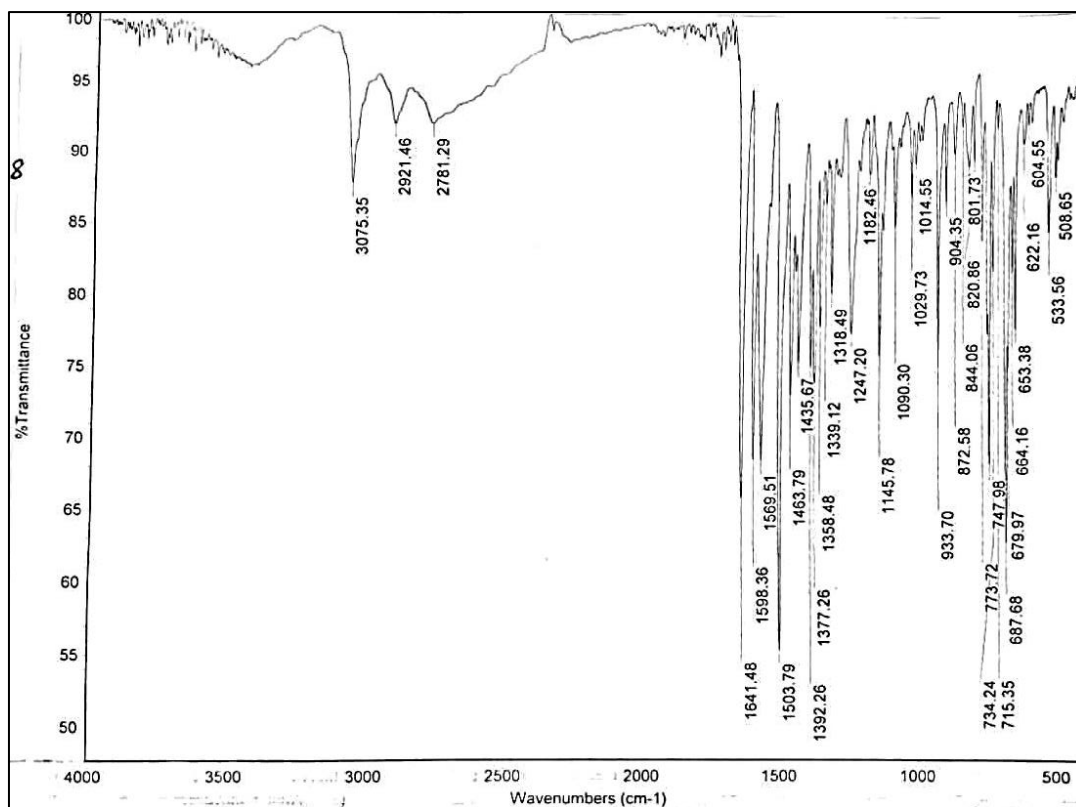
(Fig. 12), IR spectrum of 5-acetyl-3-methyl-1-phenyl-1H,6H-imidazo[4,5-c]pyrazole (**10**).



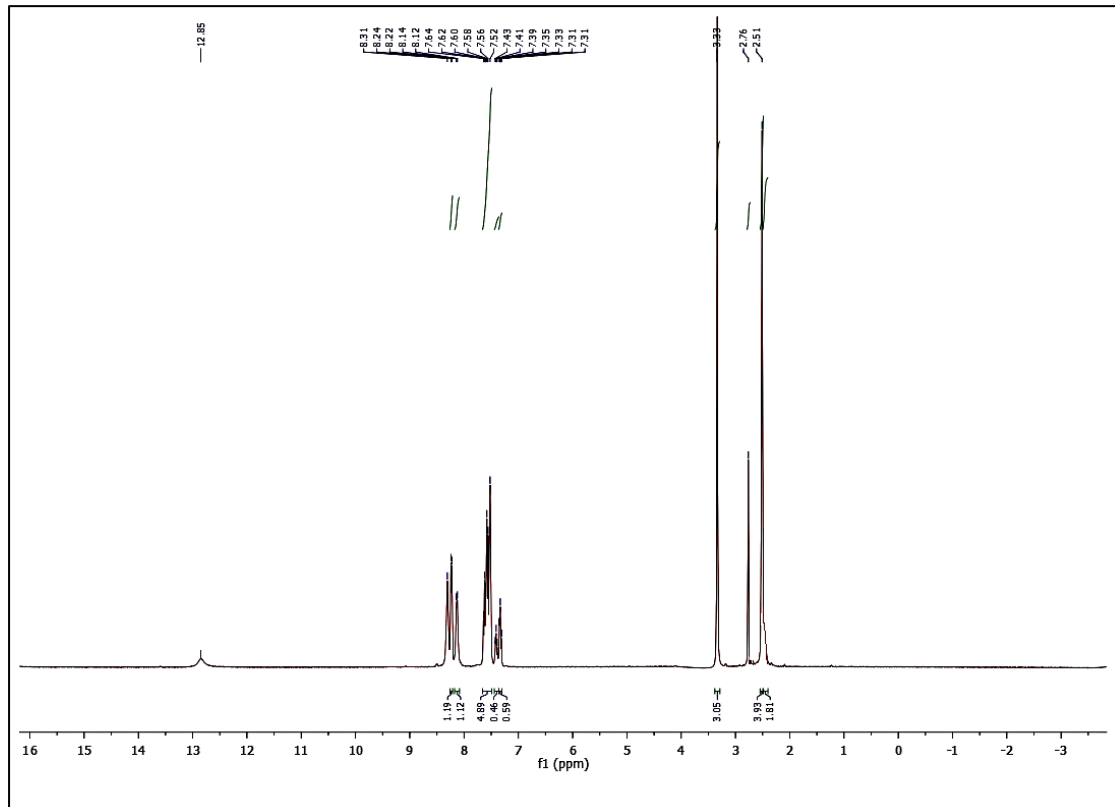
(Fig. 13), ¹H-NMR spectrum of 5-acetyl-3-methyl-1-phenyl-1*H*,6*H*-imidazo[4,5-*c*]pyrazole (**10**). DMSO-*d*₆.



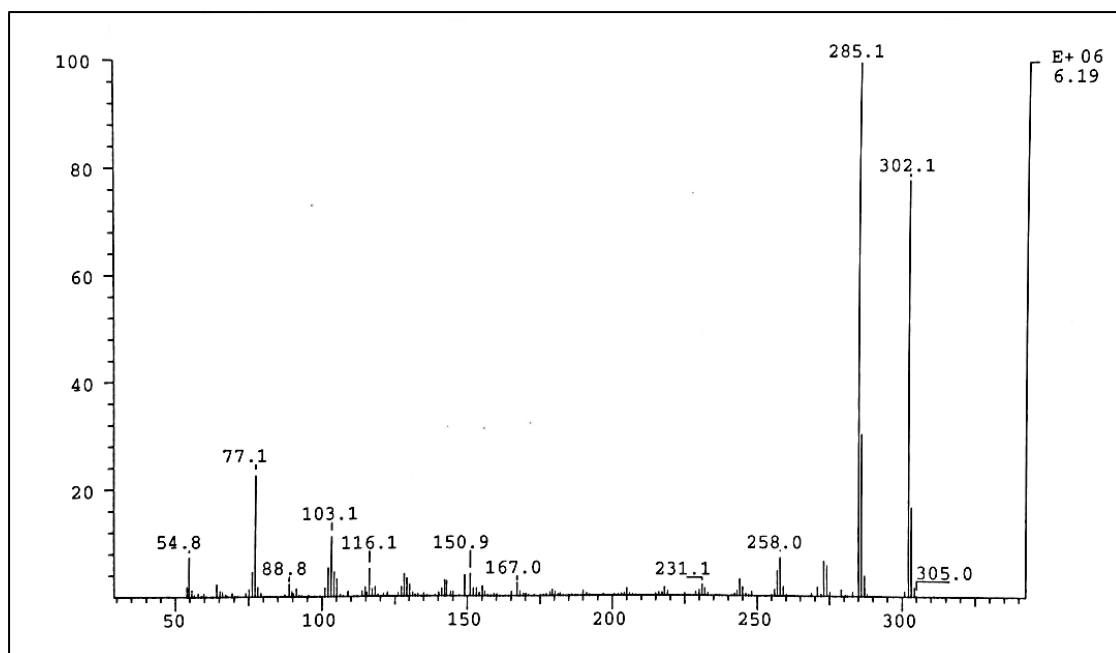
(Fig. 14), ¹³C-NMR spectrum of 5-acetyl-3-methyl-1-phenyl-1*H*,6*H*-imidazo[4,5-*c*]pyrazole (**10**). DMSO-*d*₆.



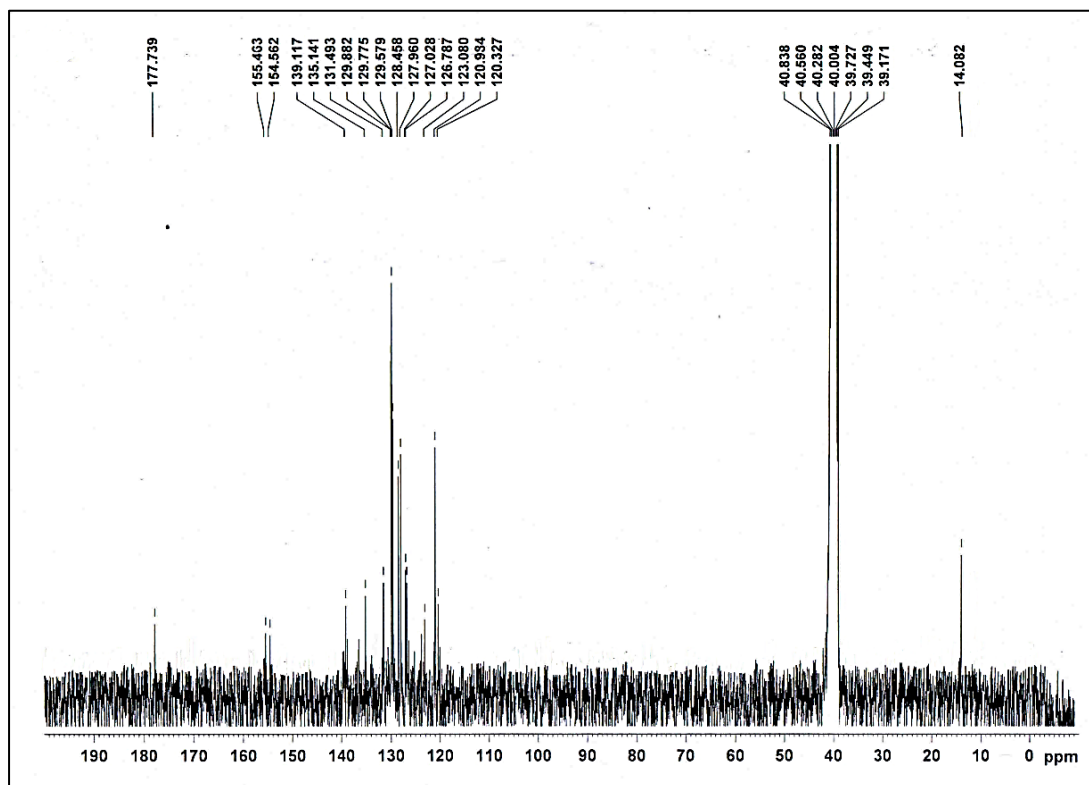
(Fig. 15), IR spectrum of 5-benzoyl-3-methyl-1-phenyl-1H,6H-imidazo[4,5-c]pyrazole (11)



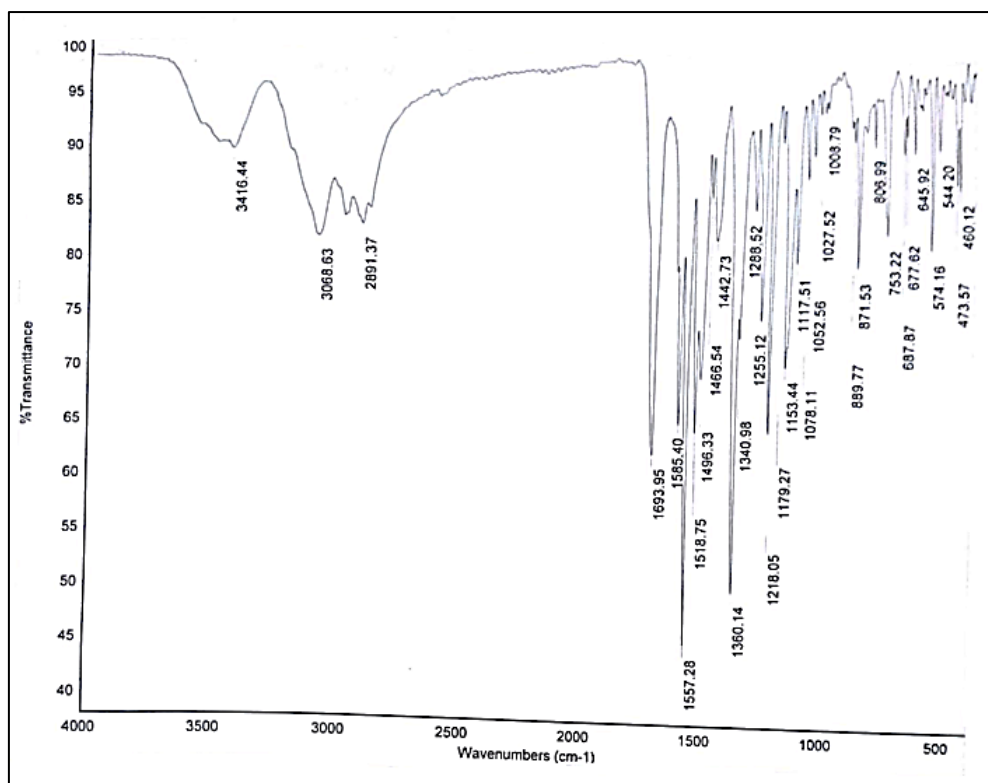
(Fig. 16), ¹H-NMR spectrum of 5-benzoyl-3-methyl-1-phenyl-1H,6H-imidazo[4,5-c]pyrazole (11). DMSO-d₆.



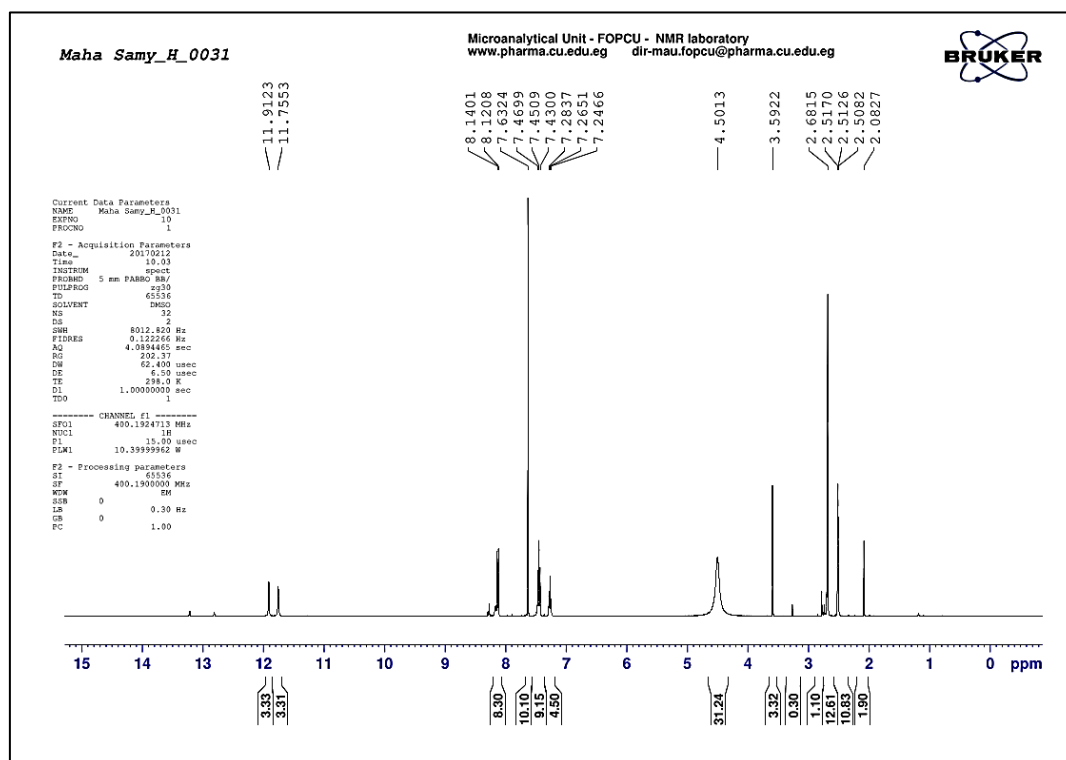
(Fig. 17), Mass spectrum of 5-benzoyl-3-methyl-1-phenyl-1H,6H-imidazo[4,5-c]pyrazole (**11**).



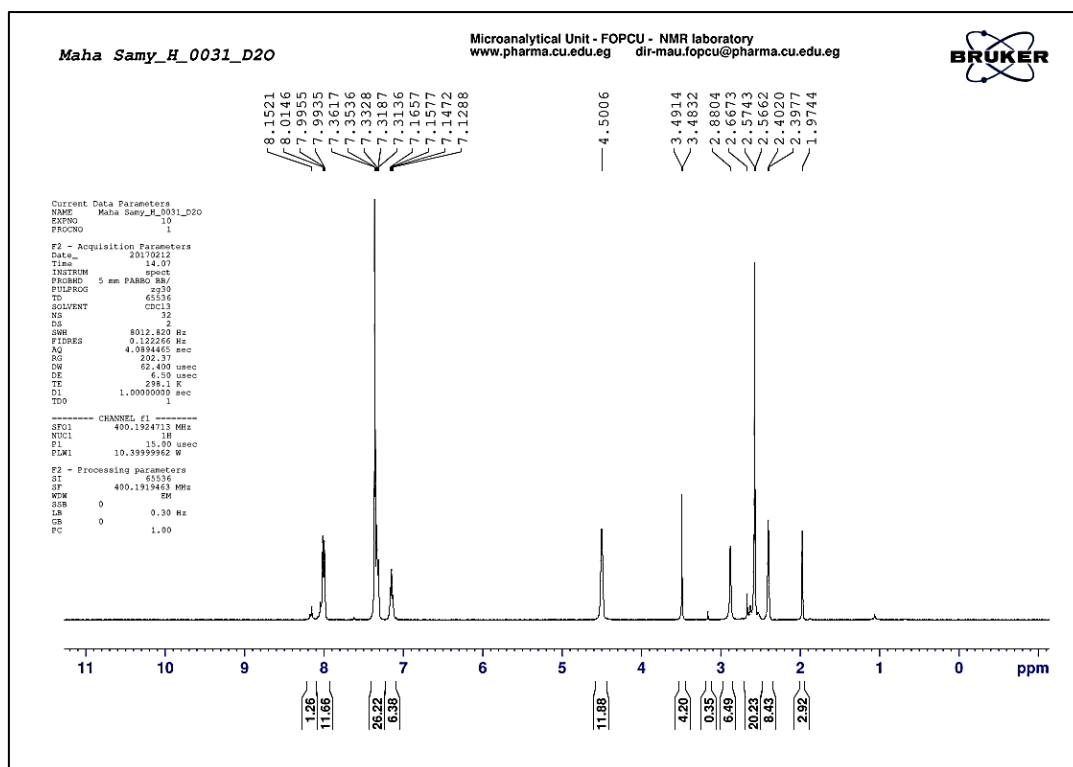
(Fig. 18), ¹³C-NMR spectrum of 5-benzoyl-3-methyl-1-phenyl-1H,6H-imidazo[4,5-c]pyrazole (**11**). DMSO-*d*₆.



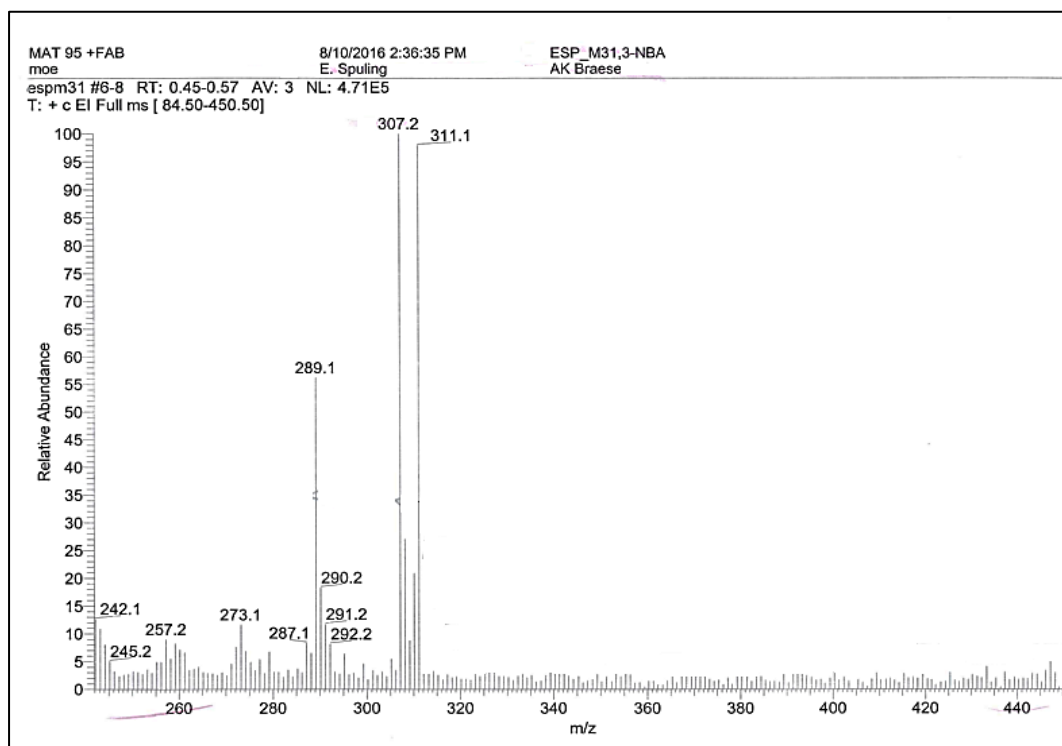
(Fig. 19), IR spectrum of 3-methyl-1-phenyl-7-thioxo-7,8-dihydro-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (12).DMSO- d_6



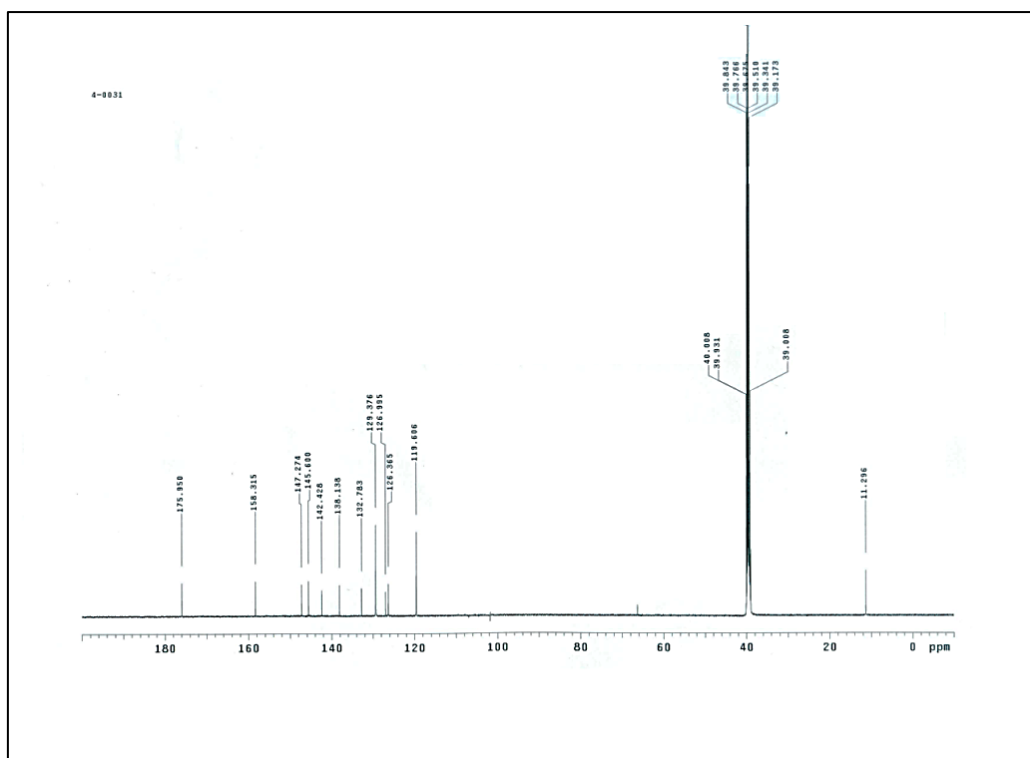
(Fig. 20), ^{13}C -NMR spectrum of 3-methyl-1-phenyl-7-thioxo-7,8-dihydro-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (12).DMSO- d_6 .



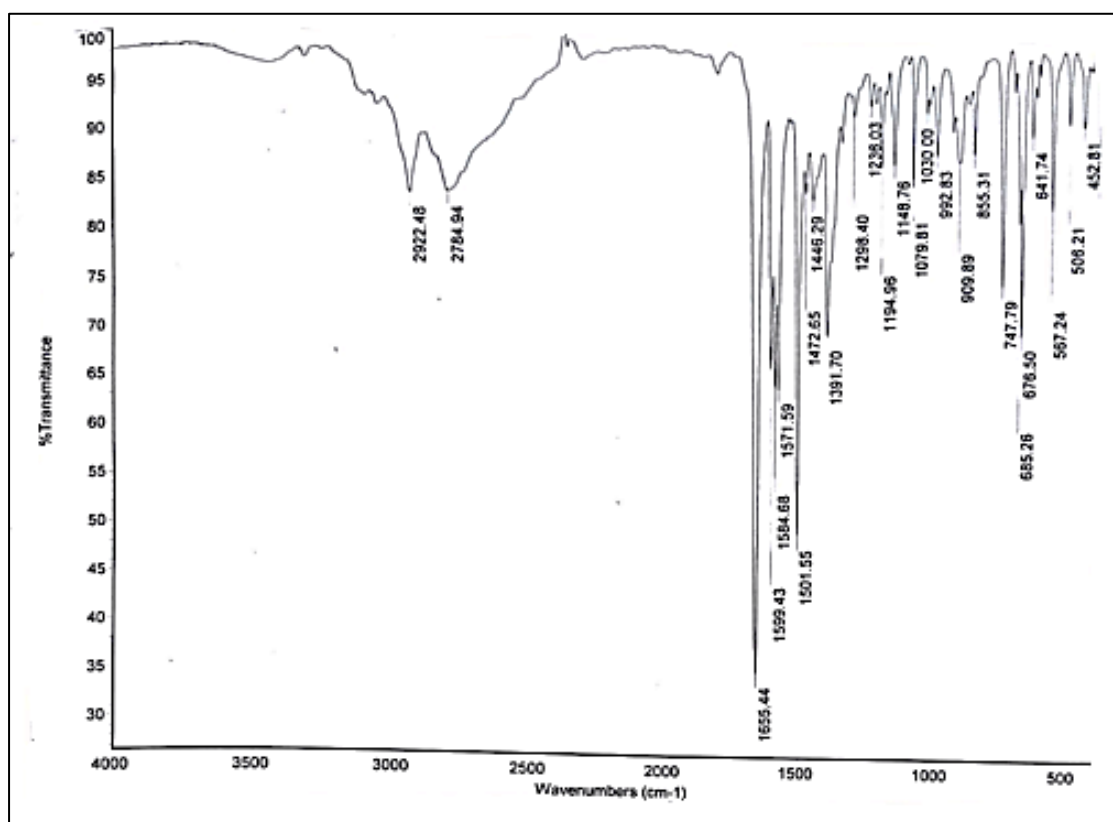
(Fig. 21), ^1H -NMR spectrum of 3-methyl-1-phenyl-7-thioxo-7,8-dihydro-1H-pyrazolo [4,3-g]pteridin-5(6H)-one (12).DMSO- d_6 .D $_2$ O



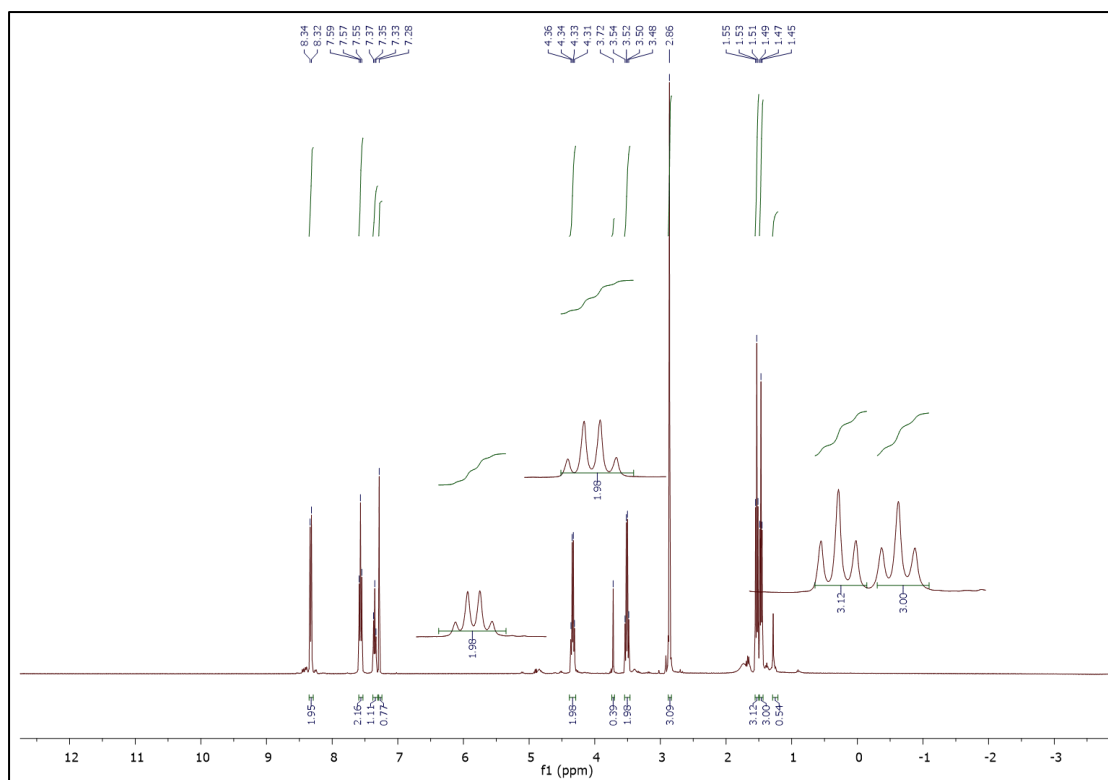
(Fig. 22), Mass spectrum of 3-methyl-1-phenyl-7-thioxo-7,8-dihydro-1H-pyrazolo [4,3-g]pteridin-5(6H)-one (12)



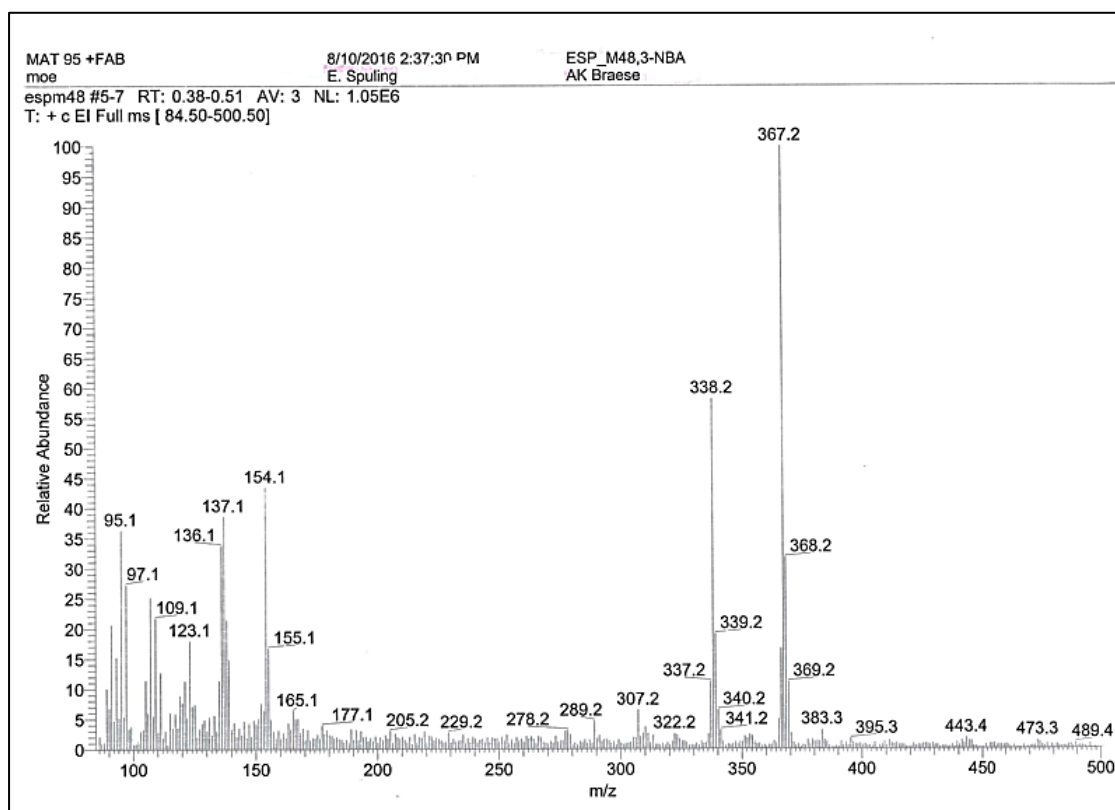
(Fig. 23), ^{13}C -NMR spectrum of 3-methyl-1-phenyl-7-thioxo-7,8-dihydro-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (12).DMSO- d_6



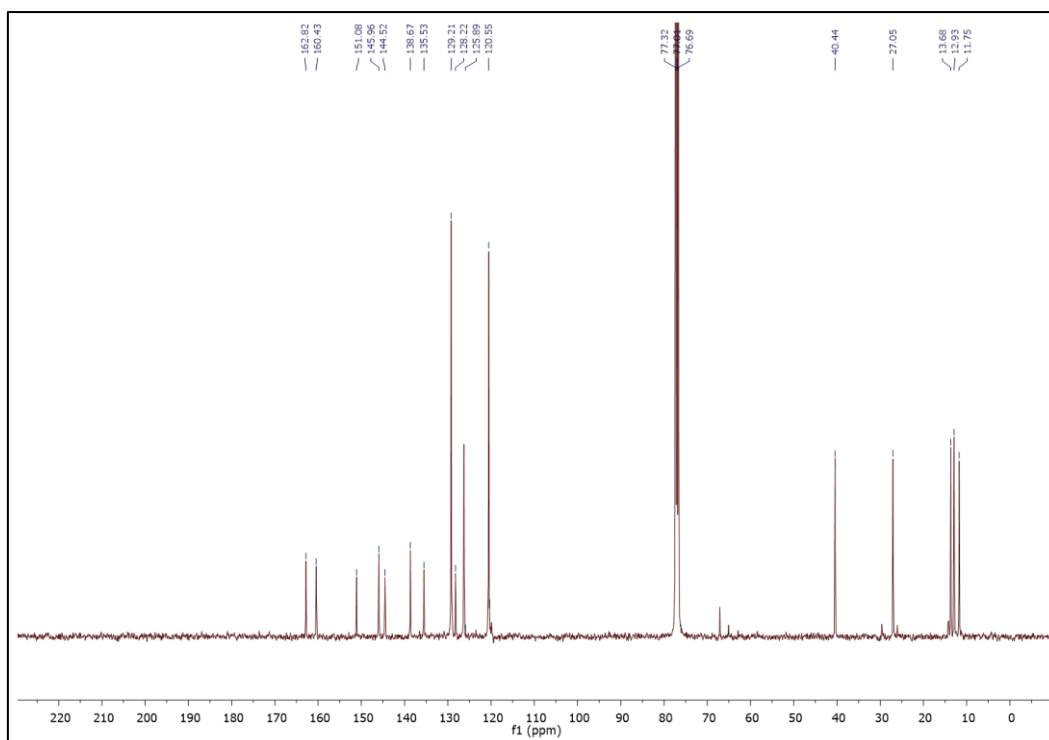
(Fig. 24), IR spectrum of 6-ethyl-7-(ethylthio)-3-methyl-1-phenyl-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (13).



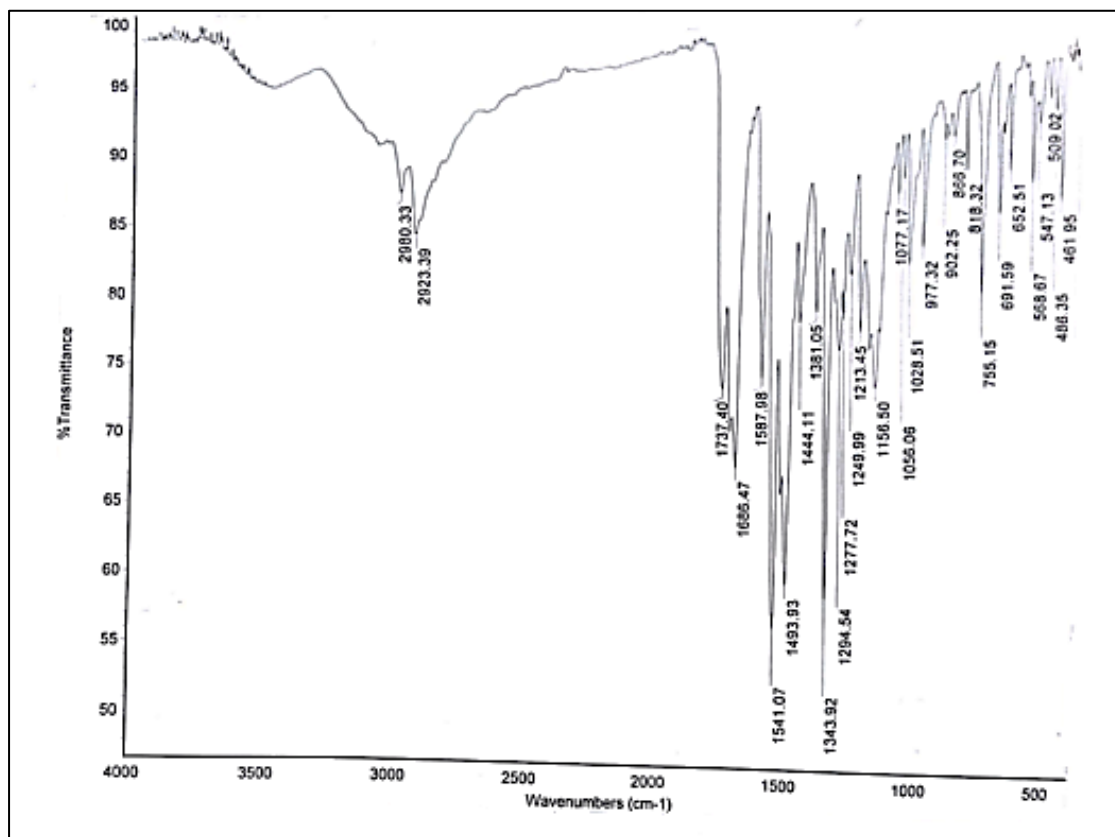
(Fig. 25), ¹H-NMR spectrum of 6-ethyl-7-(ethylthio)-3-methyl-1-phenyl-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (**13**) CDCl₃.



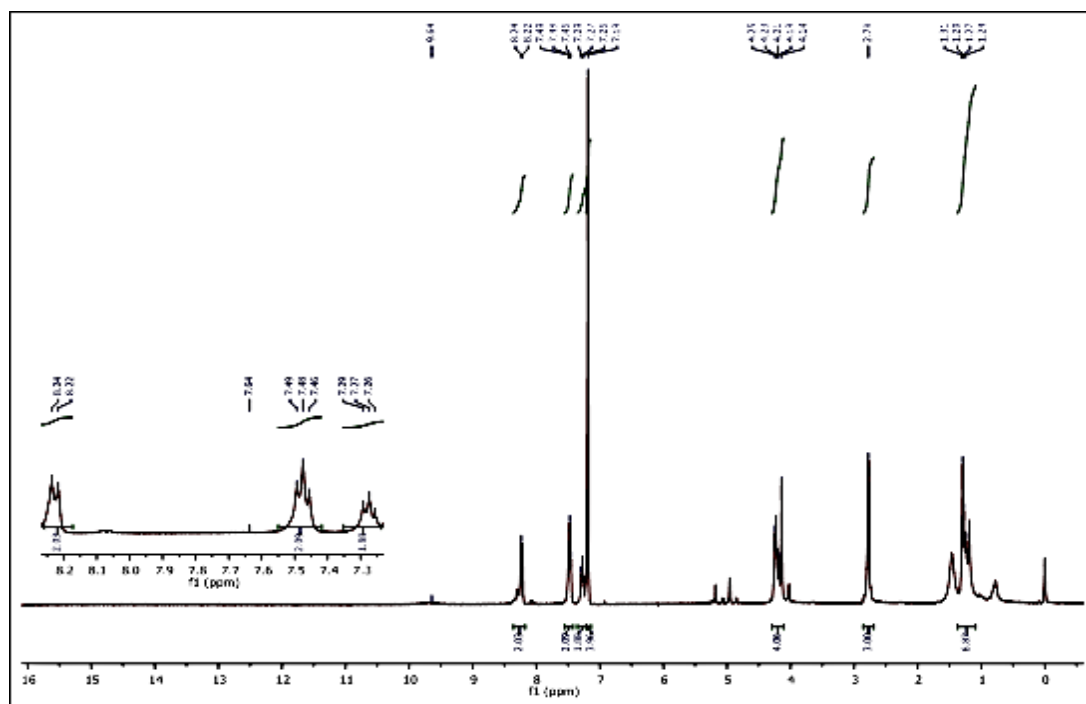
(Fig. 26), Mass spectrum of 6-ethyl-7-(ethylthio)-3-methyl-1-phenyl-1H-pyrazolo[4,3-g]pteridin-5(6H)-one (**13**).



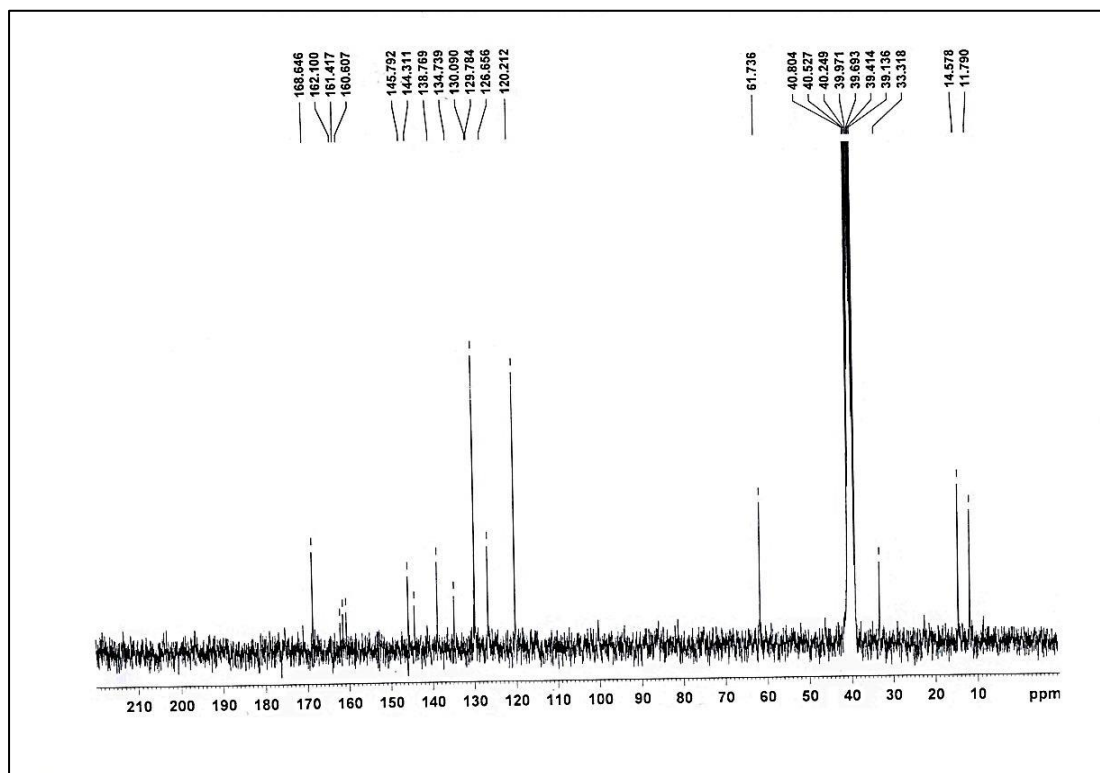
(Fig. 27), ^{13}C -NMR spectrum of 6-ethyl-7-(ethylthio)-3-methyl-1-phenyl-1H-pyrazolo [4,3-g]pteridin-5(6H)-one (**13**). CDCl_3



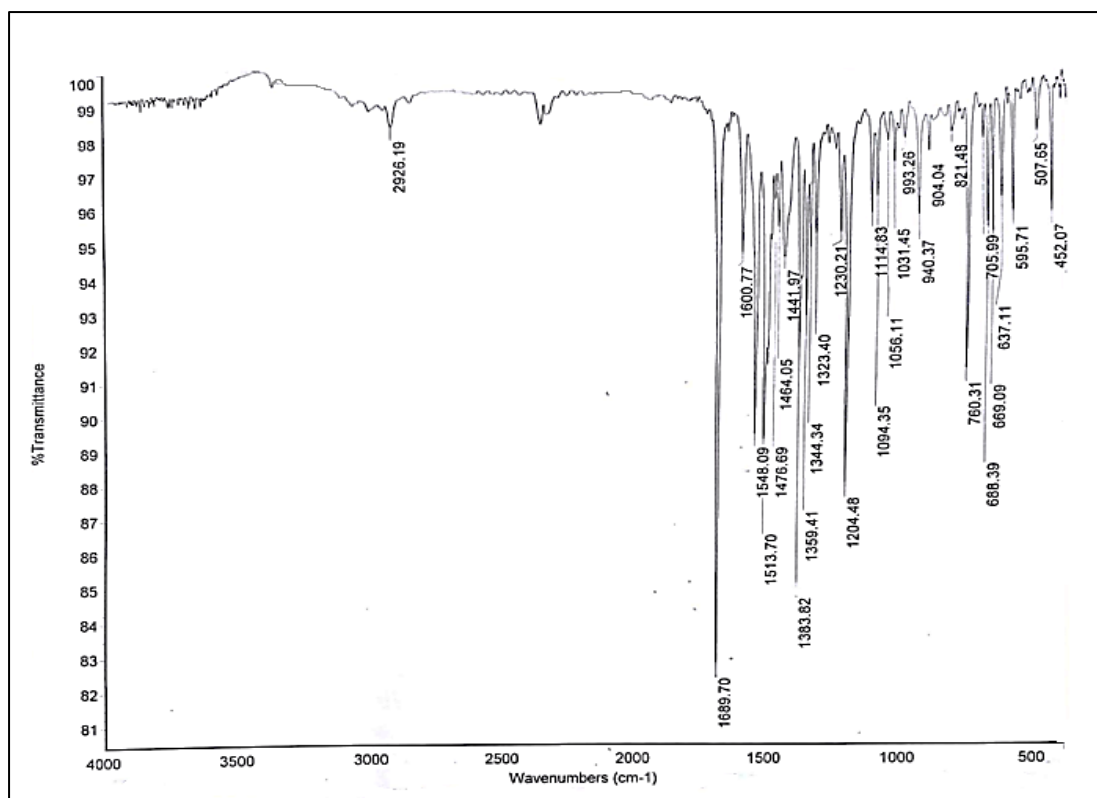
(Fig. 28), IR spectrum of ethyl 2-(3-methyl-5-oxo-1-phenyl-5,6-dihydro-1H-pyrazolo [4,3-g]pteridin-7-ylthio)acetate (**14**)



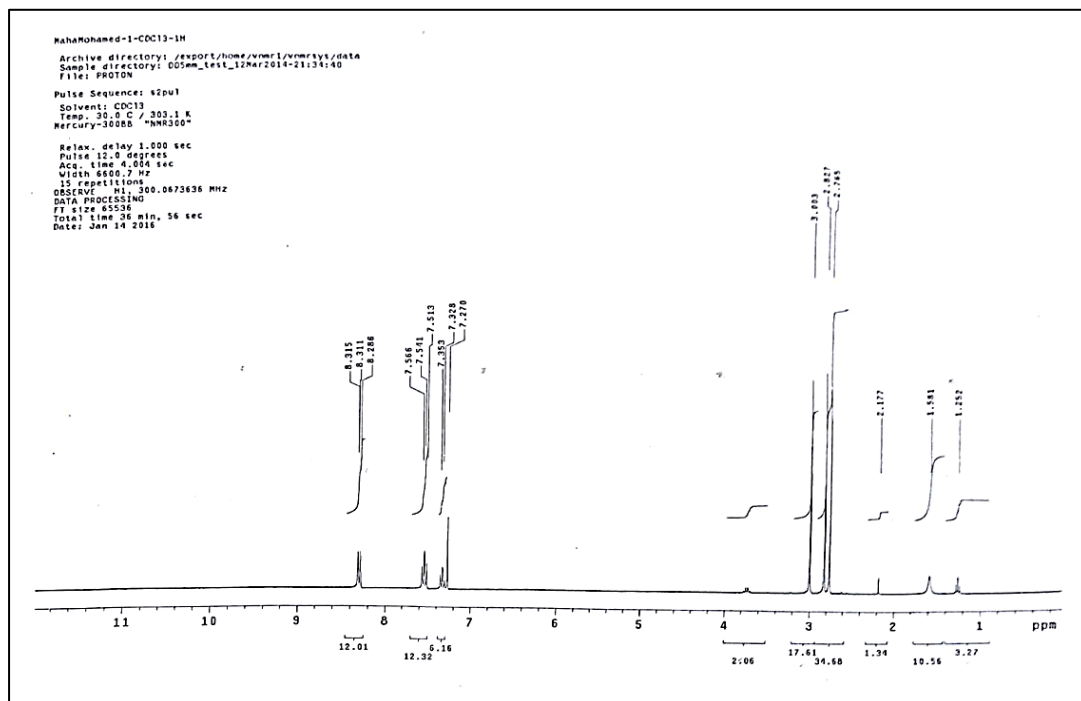
(Fig. 29), ^1H -NMR spectrum of ethyl 2-(3-methyl-5-oxo-1-phenyl-5,6-dihydro-1H-pyrazolo[4,3-g]pteridin-7-ylthio)acetate. (14). CDCl_3



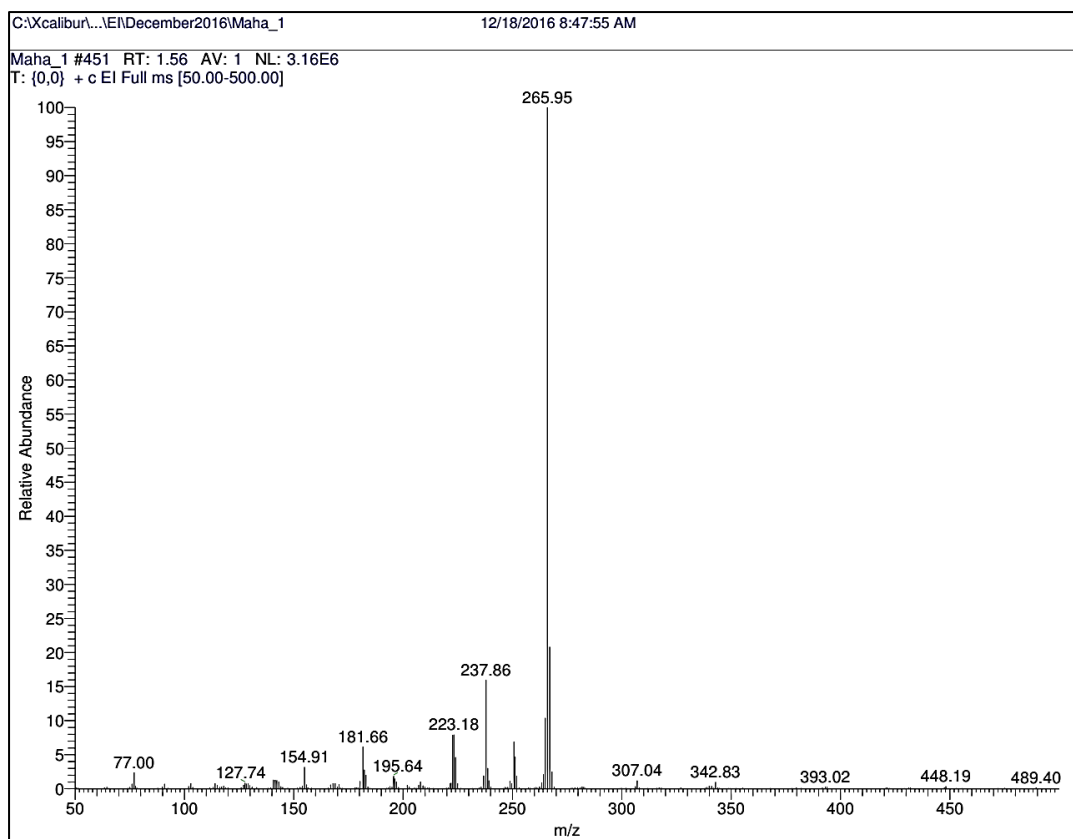
(Fig. 30), ^{13}C -NMR spectrum of ethyl 2-(3-methyl-5-oxo-1-phenyl-5,6-dihydro-1H-pyrazolo[4,3-g]pteridin-7-ylthio)acetate. (14). CDCl_3



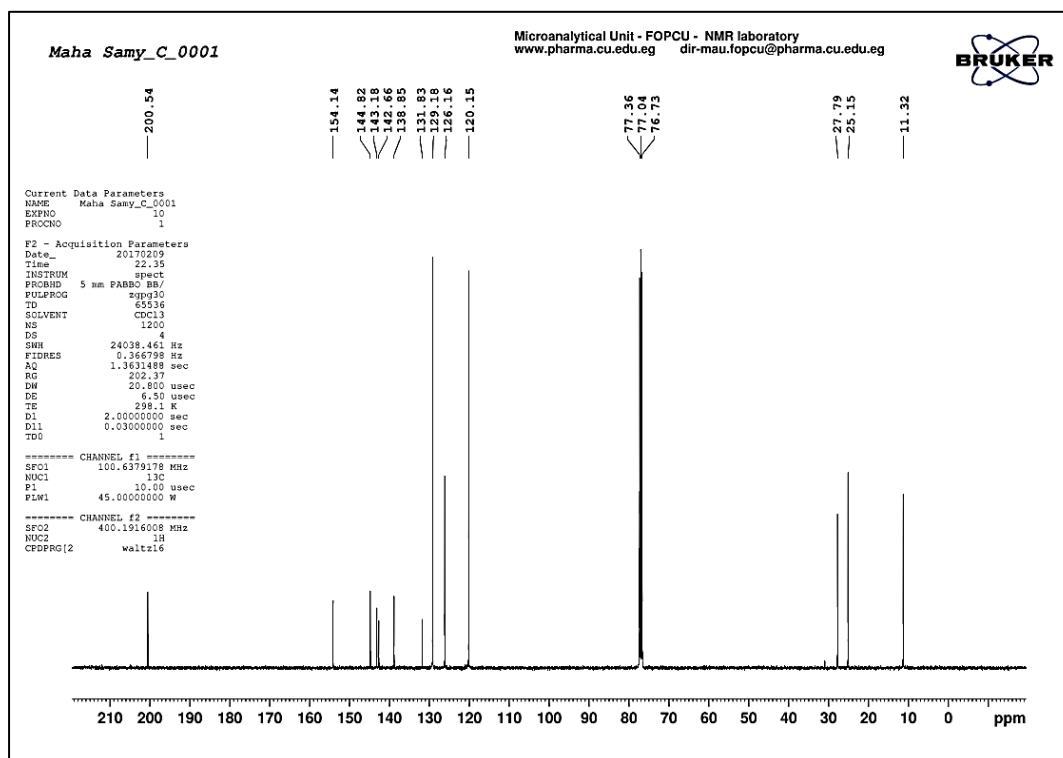
(Fig. 31), IR spectrum of 5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (15)



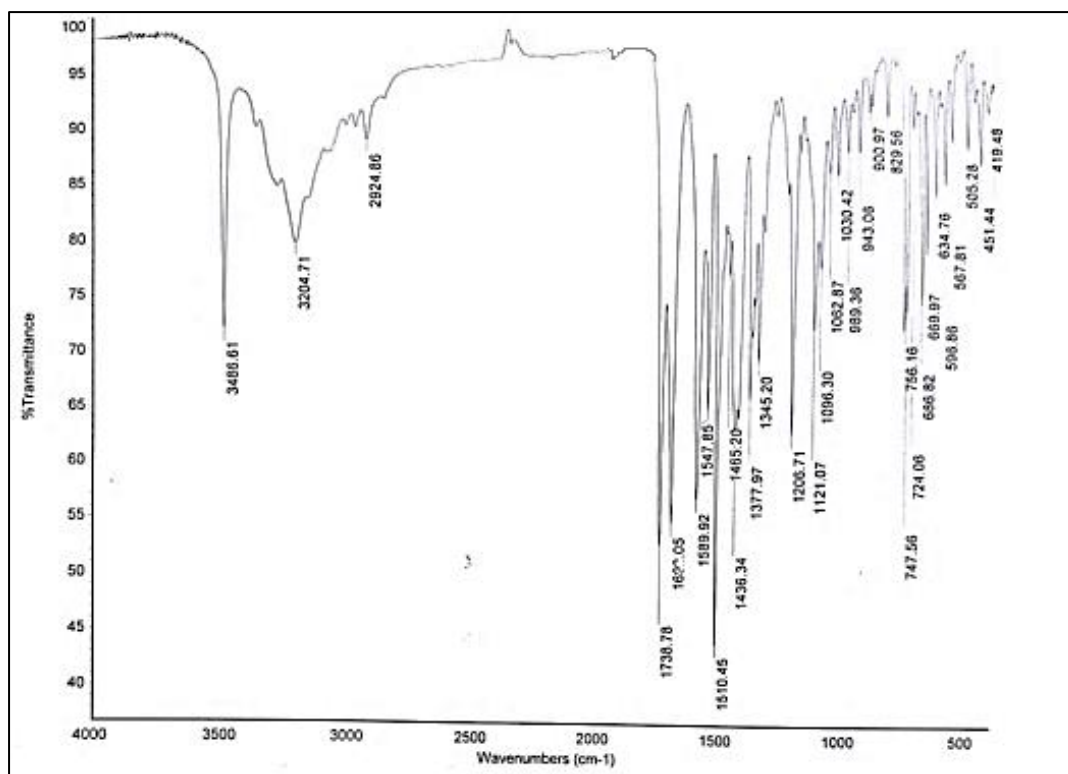
(Fig. 32), ¹H-NMR spectrum of 5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (15).CDCl₃.



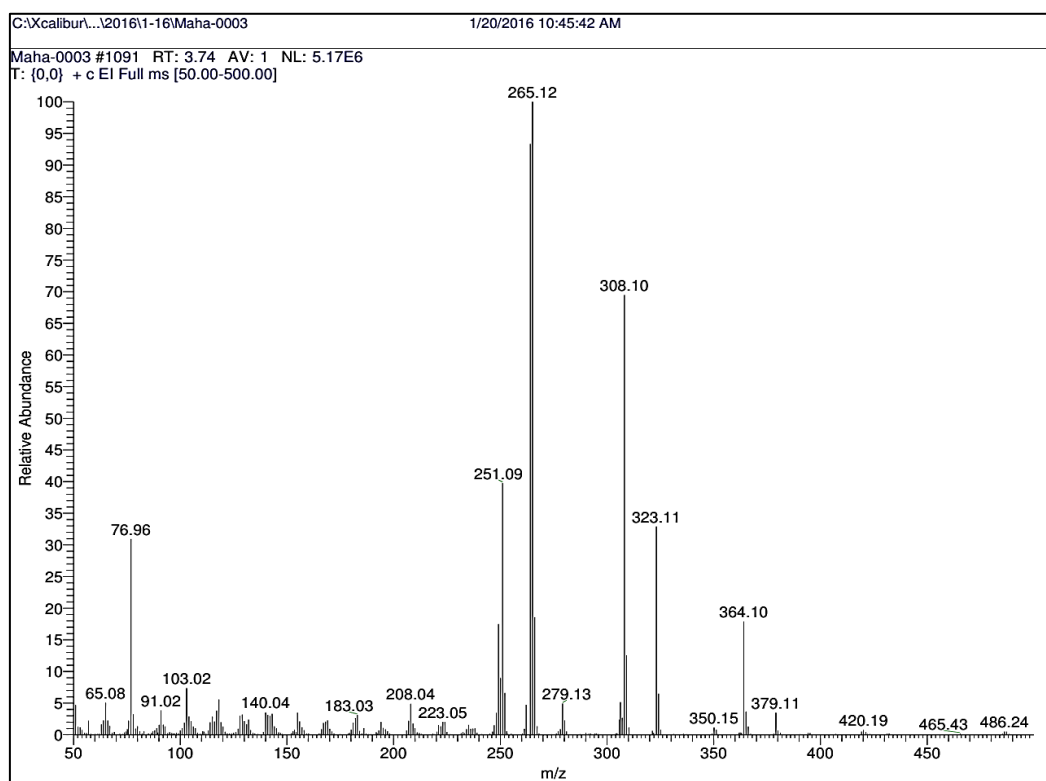
(Fig. 33), Mass spectrum of 5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (15).



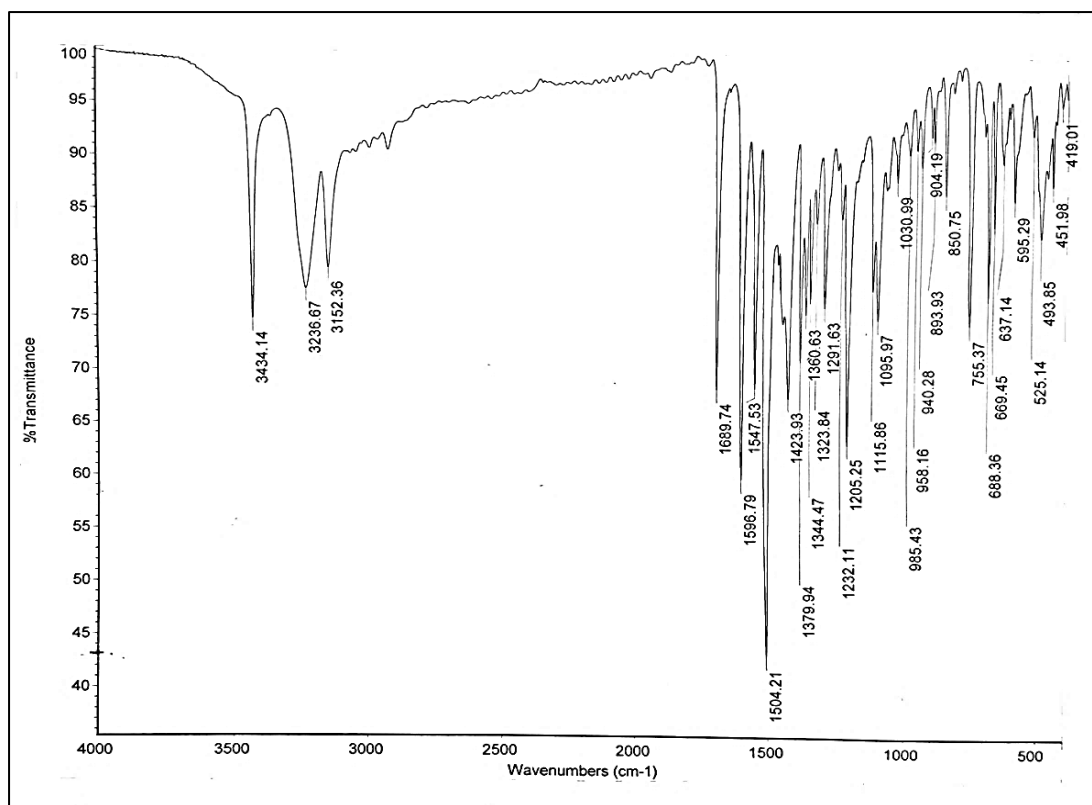
(Fig. 34), ^{13}C -NMR spectrum of 5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (15). CDCl_3 .



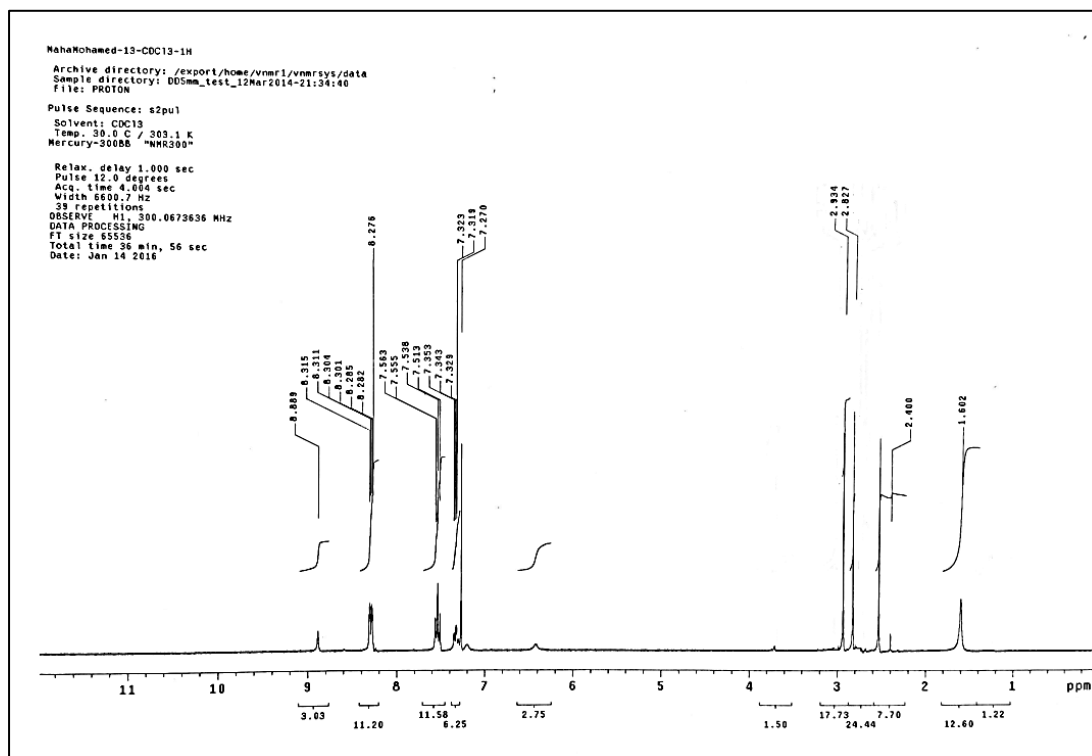
(Fig. 35), IR spectrum of (3,6-dimethyl-1-phenyl-5-acetyl-1H-pyrazolo[3,4- b] pyrazine)semicarbazone (16).



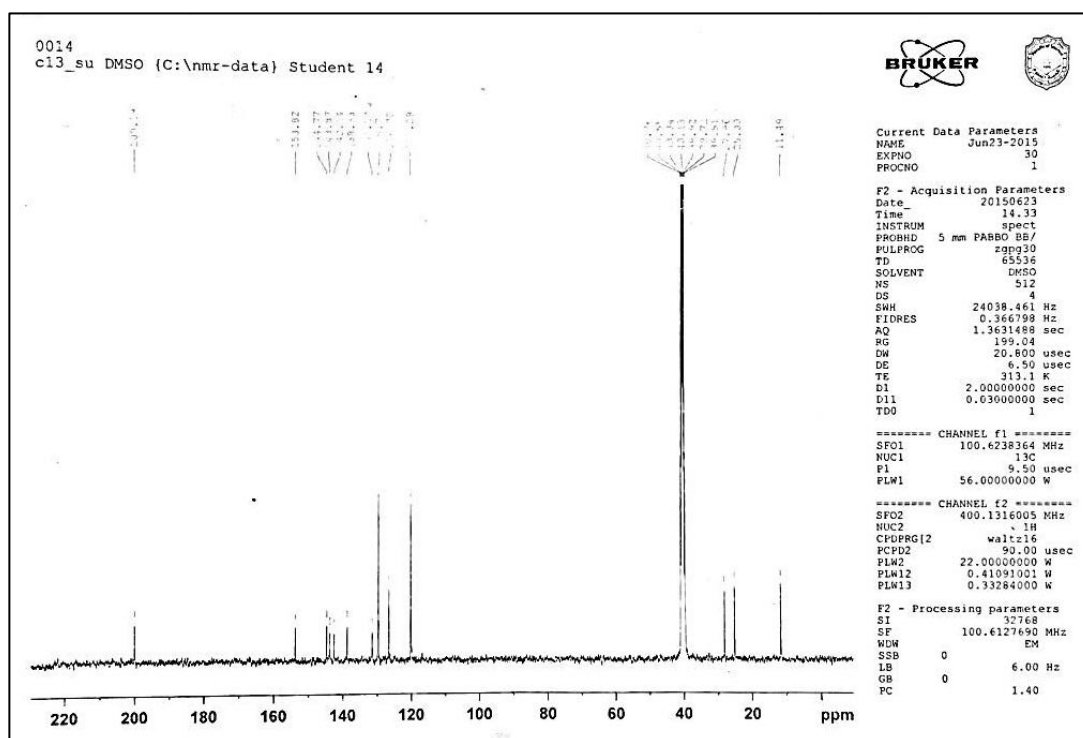
(Fig. 36), Mass spectrum of (3,6-dimethyl-1-phenyl-5-acetyl-1H-pyrazolo[3,4- b] pyrazine)semicarbazone (16).



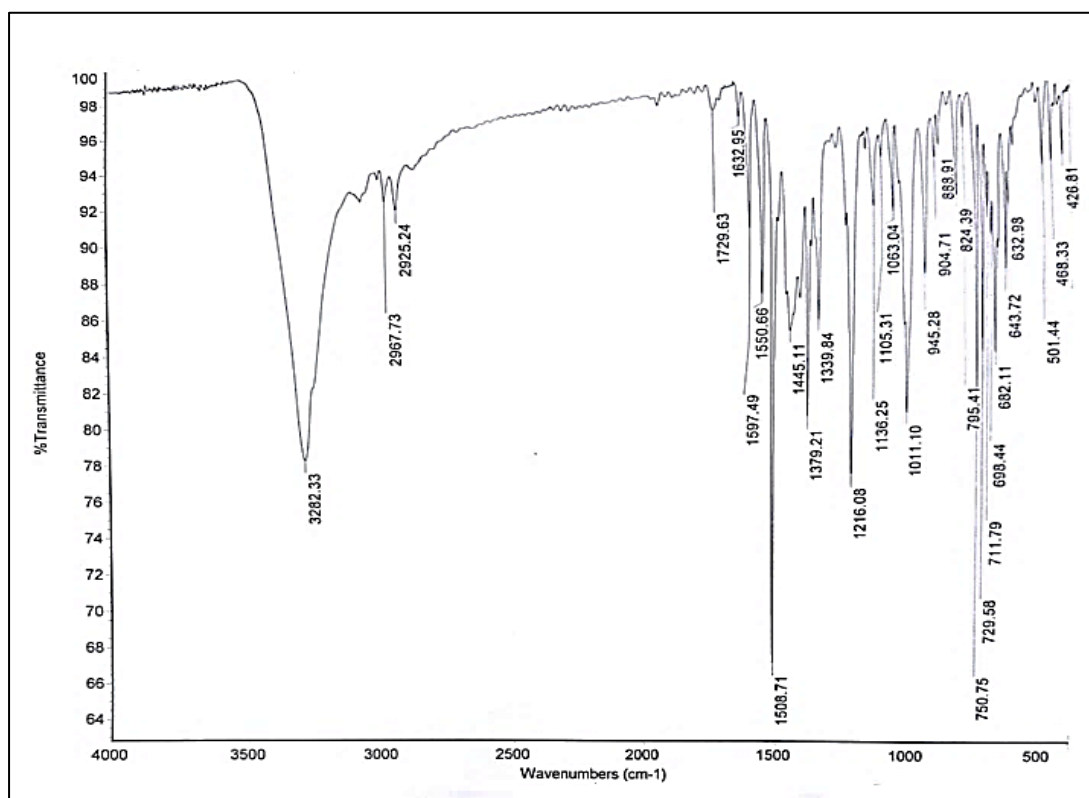
(Fig. 37), IR spectrum of (3,6-dimethyl-1-phenyl-5-acetyl-1H-pyrazolo[3,4-b]pyrazine)thiosemicarbazone (17).



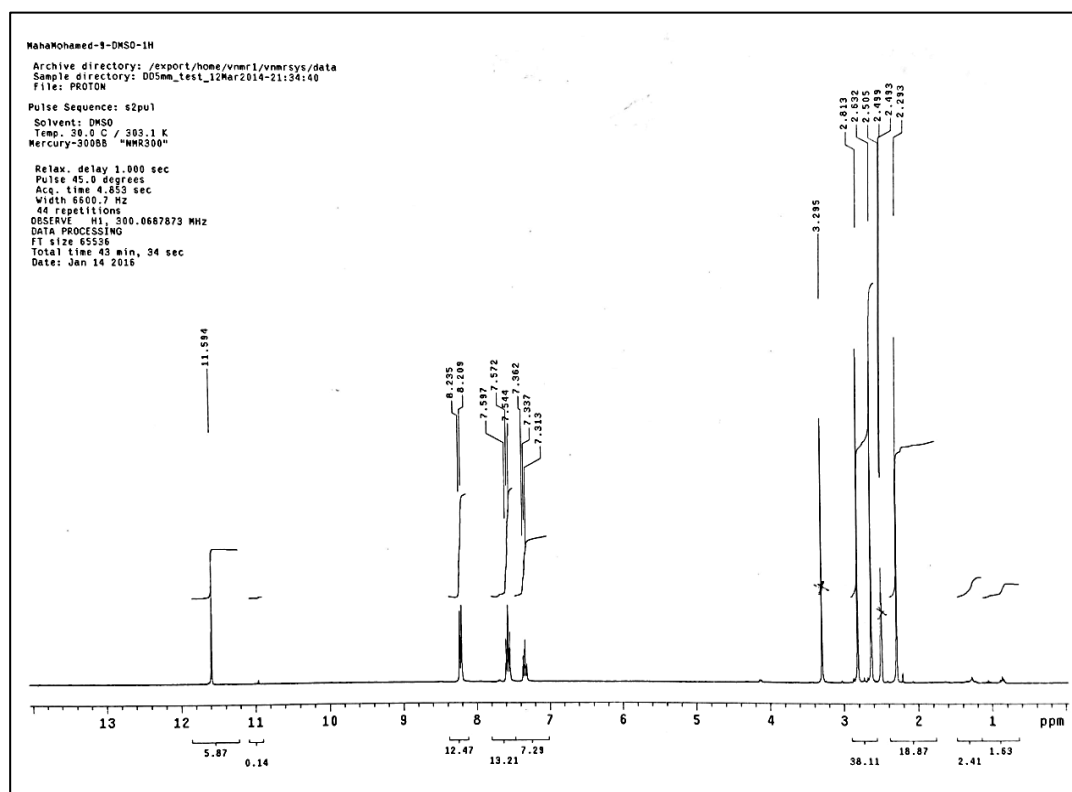
(Fig. 38), ¹H-NMR spectrum of (3,6-dimethyl-1-phenyl-5-acetyl-1H-pyrazolo[3,4b]pyrazine)thiosemicarbazone (17).CDCl₃



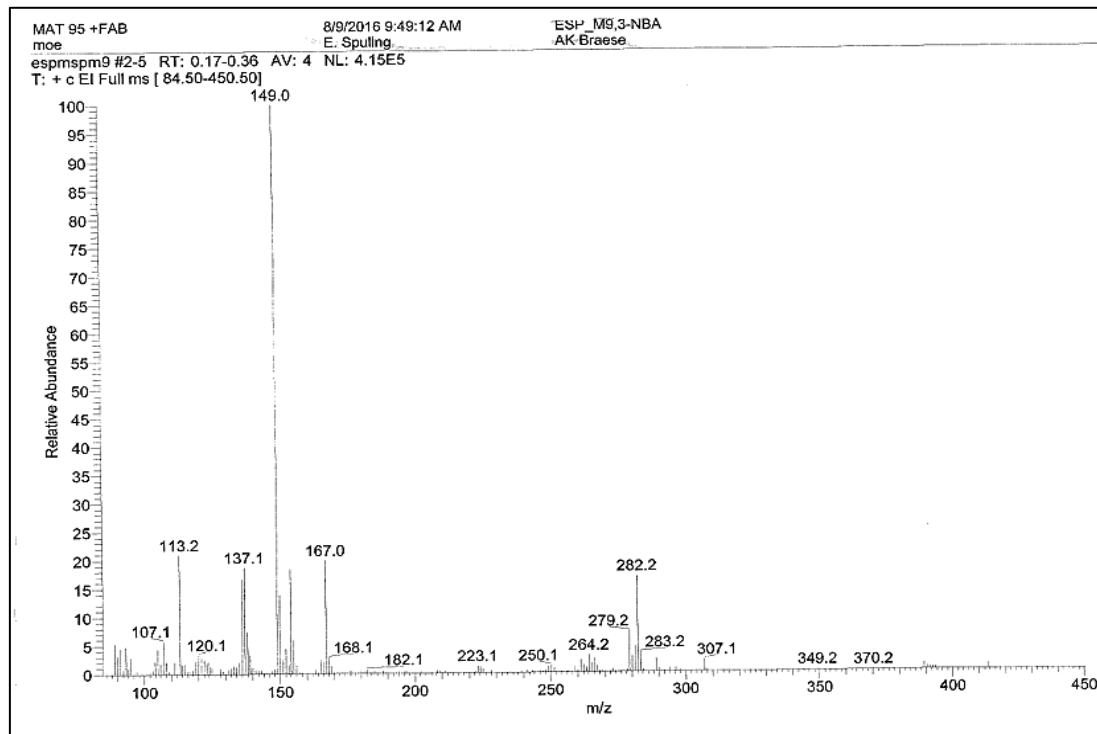
(Fig. 39), ^{13}C -NMR spectrum of (3,6-dimethyl-1-phenyl-5-acetyl-1H-pyrazolo[3,4b]pyrazine)thiosemicarbazone (17). CDCl_3



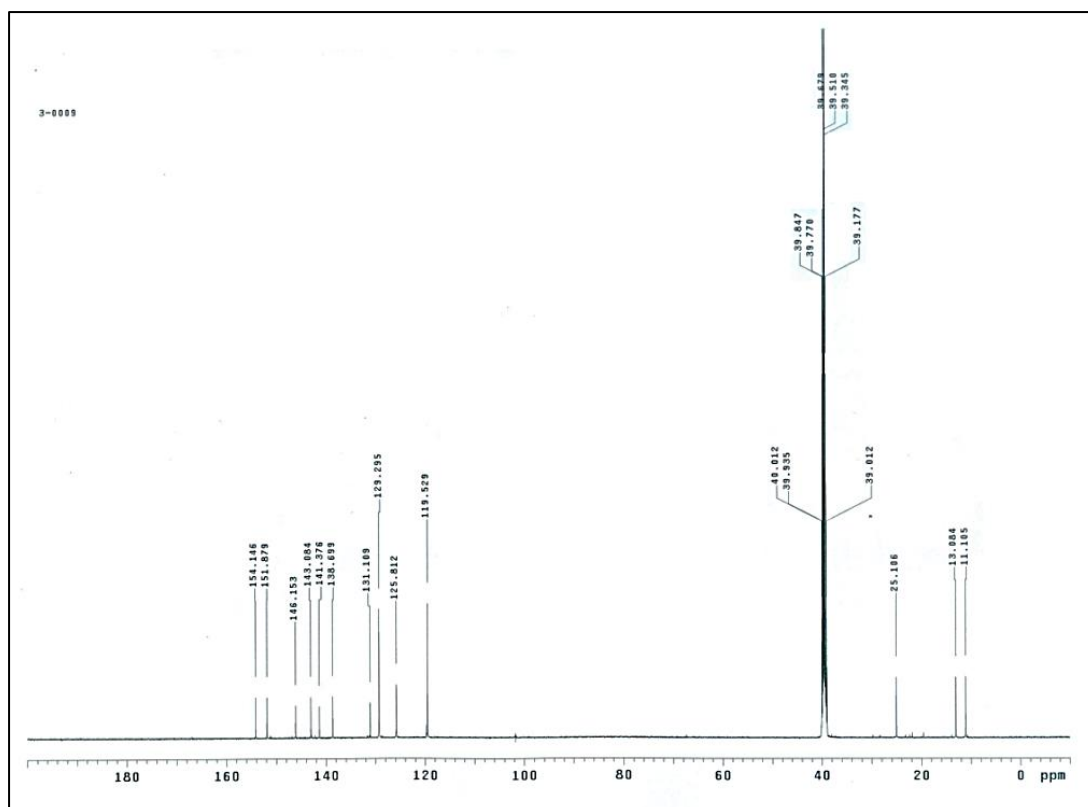
(Fig. 40), IR spectrum of 3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazin-5-ethanone oxime (18)



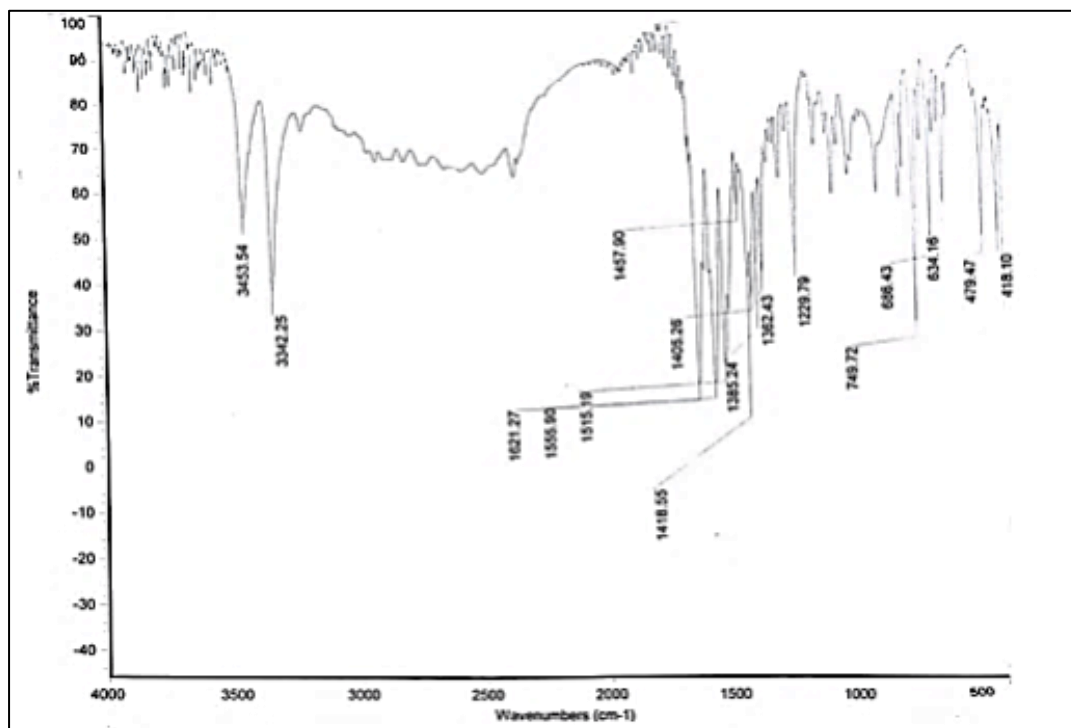
(Fig. 41), ^1H -NMR spectrum of 3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazin-5-ethanone oxime (**18**) DMSO- d_6



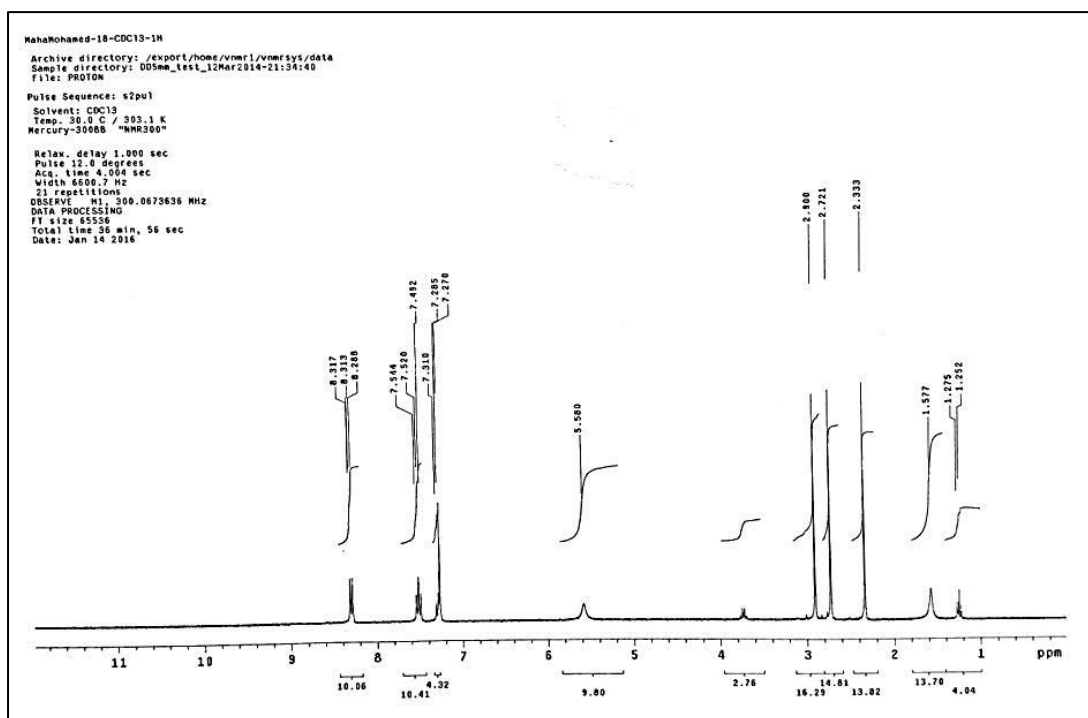
(Fig. 42), Mass spectrum of 3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazin-5-ethanone oxime (**18**)



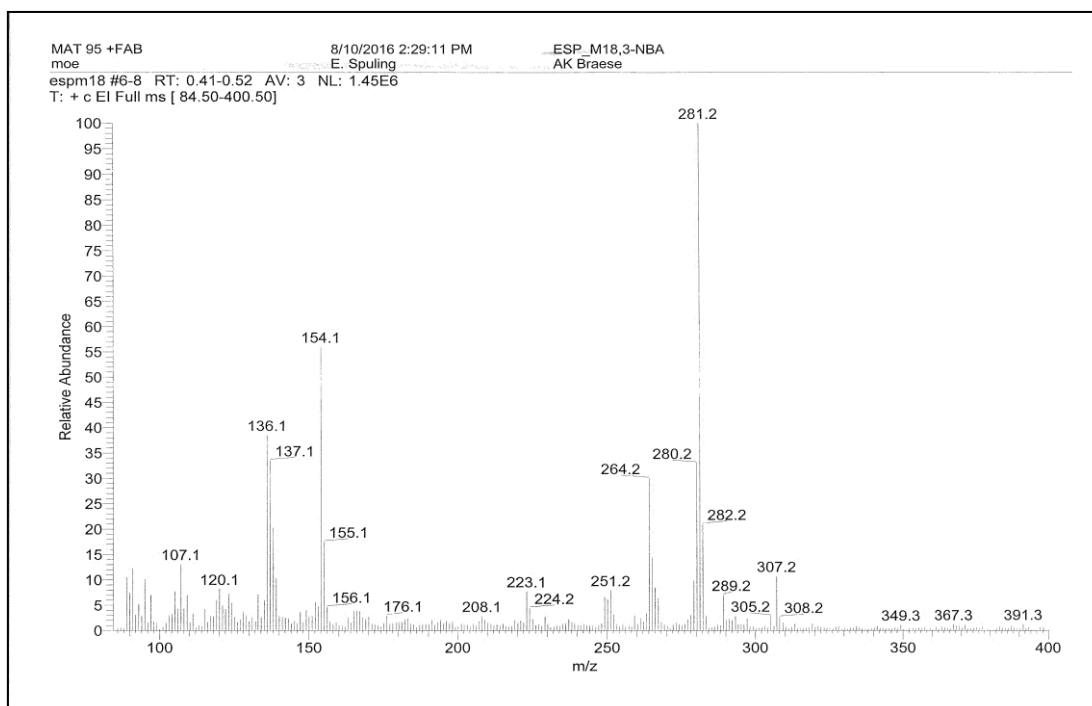
(Fig. 43), ¹³C-NMR spectrum of 3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazin-5-ethanone oxime (18).DMSO-d₆



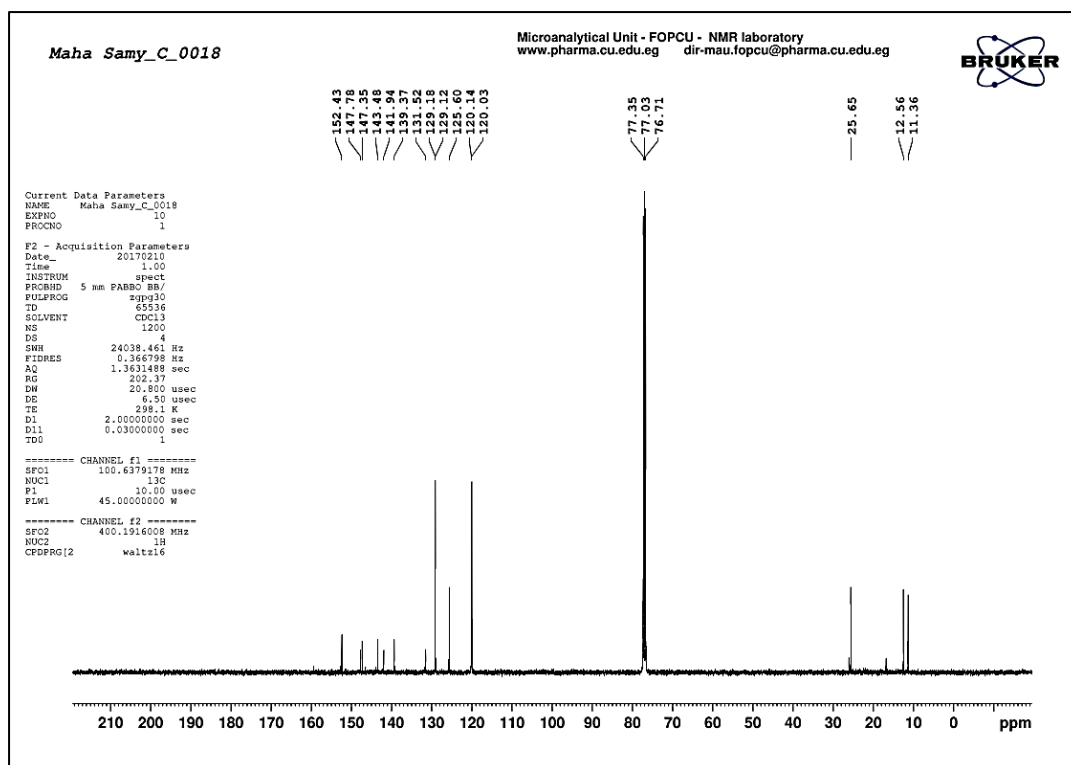
(Fig. 44), IR spectrum of (5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine)hydrazone (19).CDCl₃



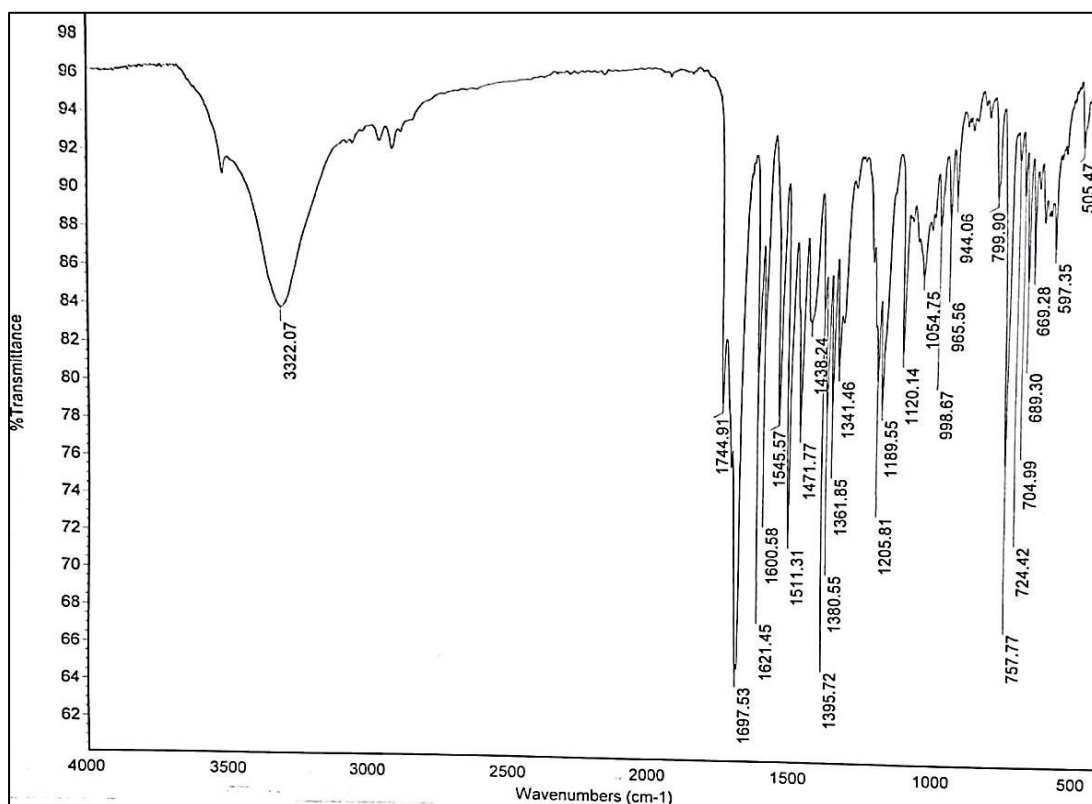
(Fig. 45), ^1H -NMR spectrum of (5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine)hydrazone (**19**). CDCl_3



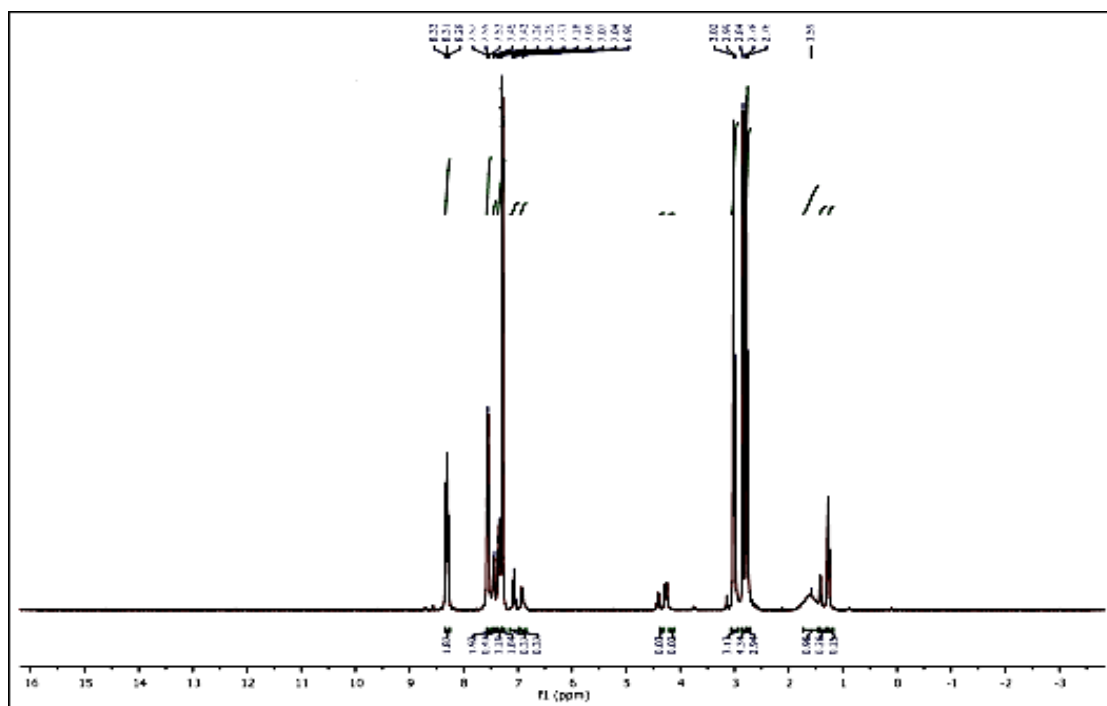
(Fig. 46), Mass spectrum of (5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine)hydrazone (**19**).



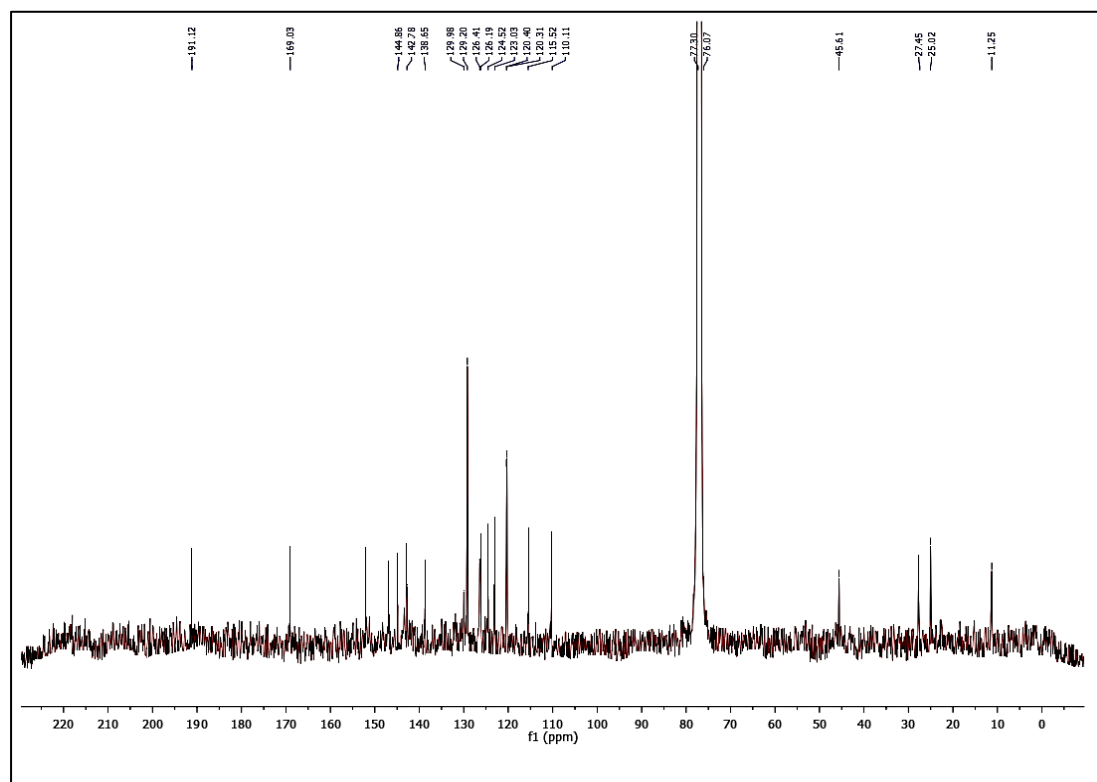
(Fig. 47), ^{13}C -NMR spectrum of (5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine)hydrazone (19). CDCl_3



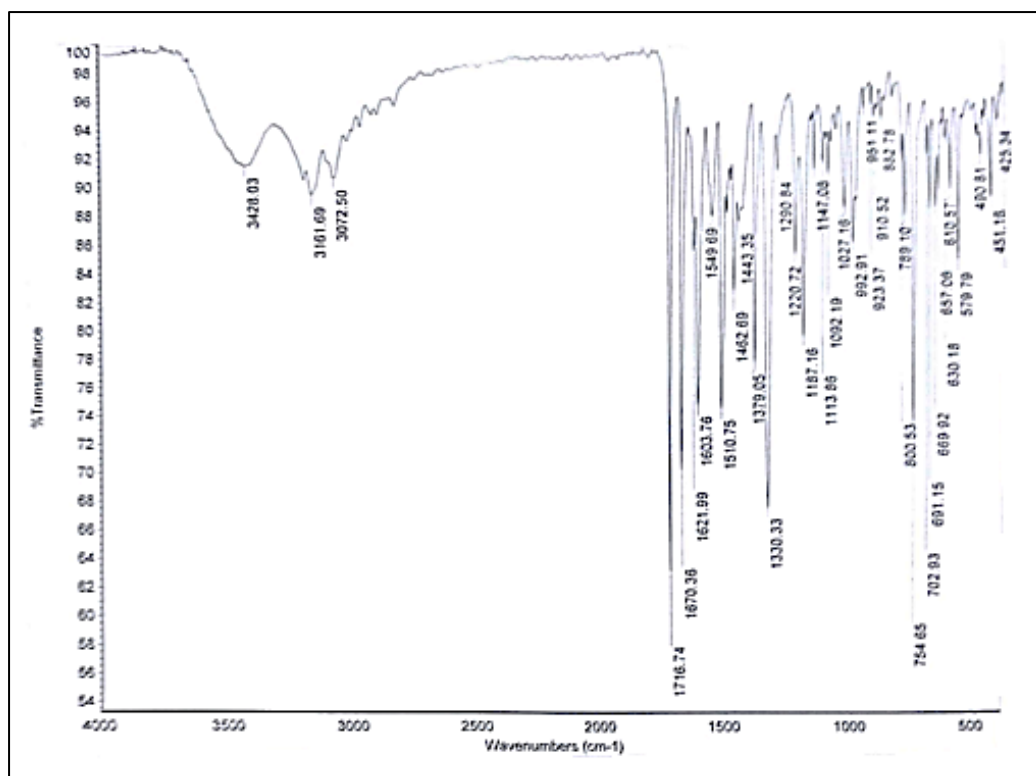
(Fig. 48), ^1H -NMR spectrum of 5-(3-hydroxy-2,3-dihydroindol-2-on-3-ylacetyl)-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (20).



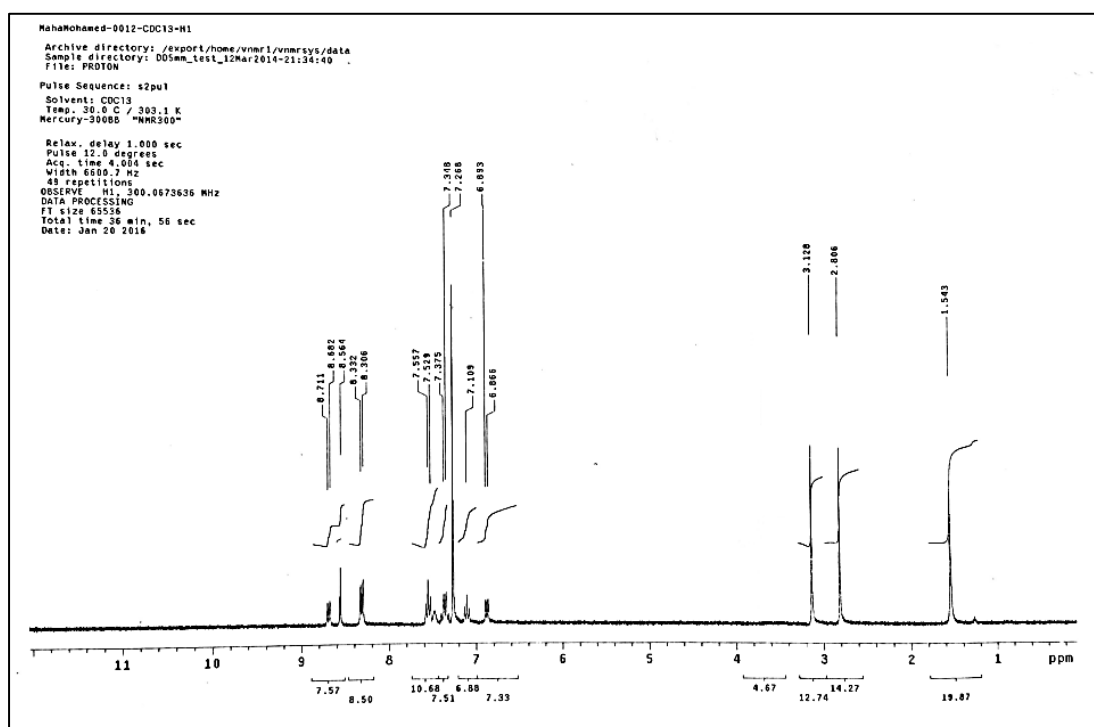
(Fig. 49), ¹H-NMR spectrum of 5-(3-hydroxy-2,3-dihydroindol-2-on-3-ylacetyl)-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (**20**). CDCl₃



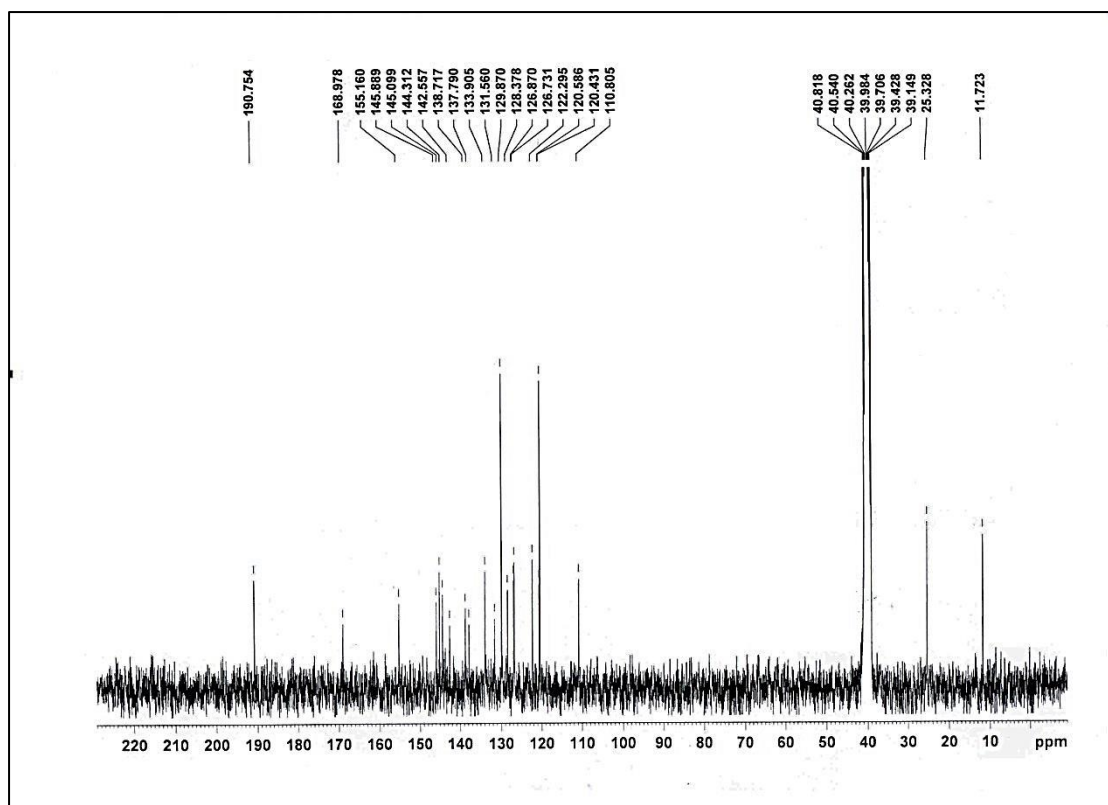
(Fig. 50), ^{13}C -NMR spectrum of 5-(3-hydroxy-2,3-dihydroindol-2-on-3-ylacetyl)-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (**20**). CDCl_3



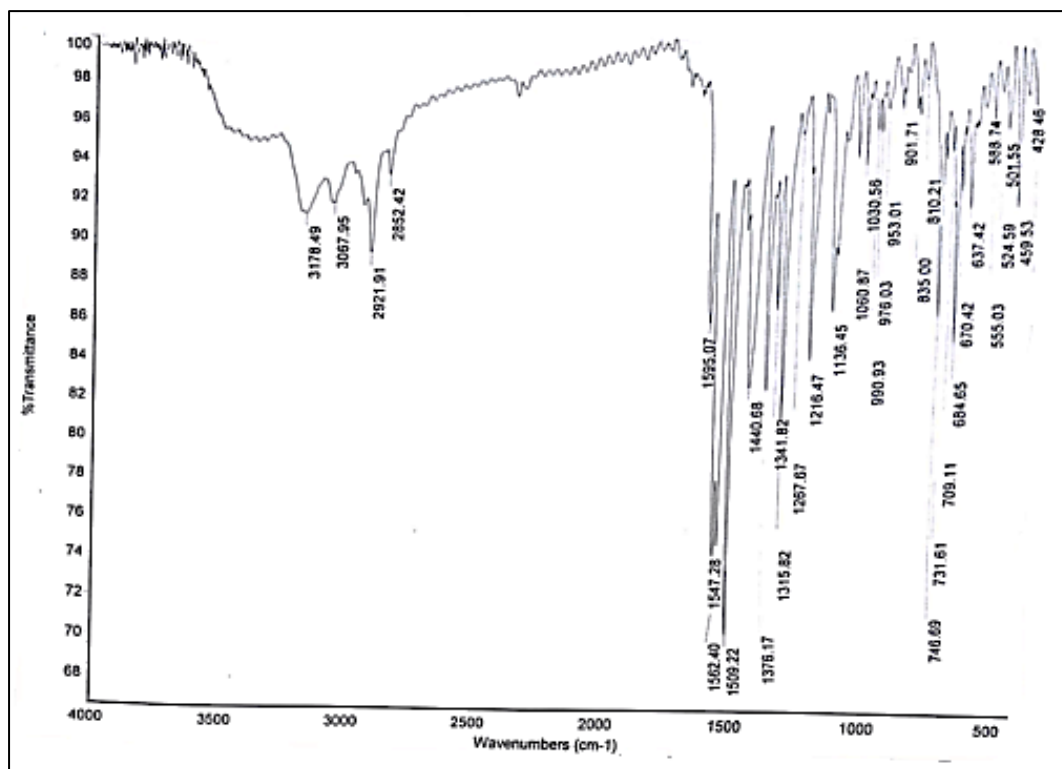
(Fig. 51), IR spectrum of 2,3-dihydroindol-2-on-3-ylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (21)



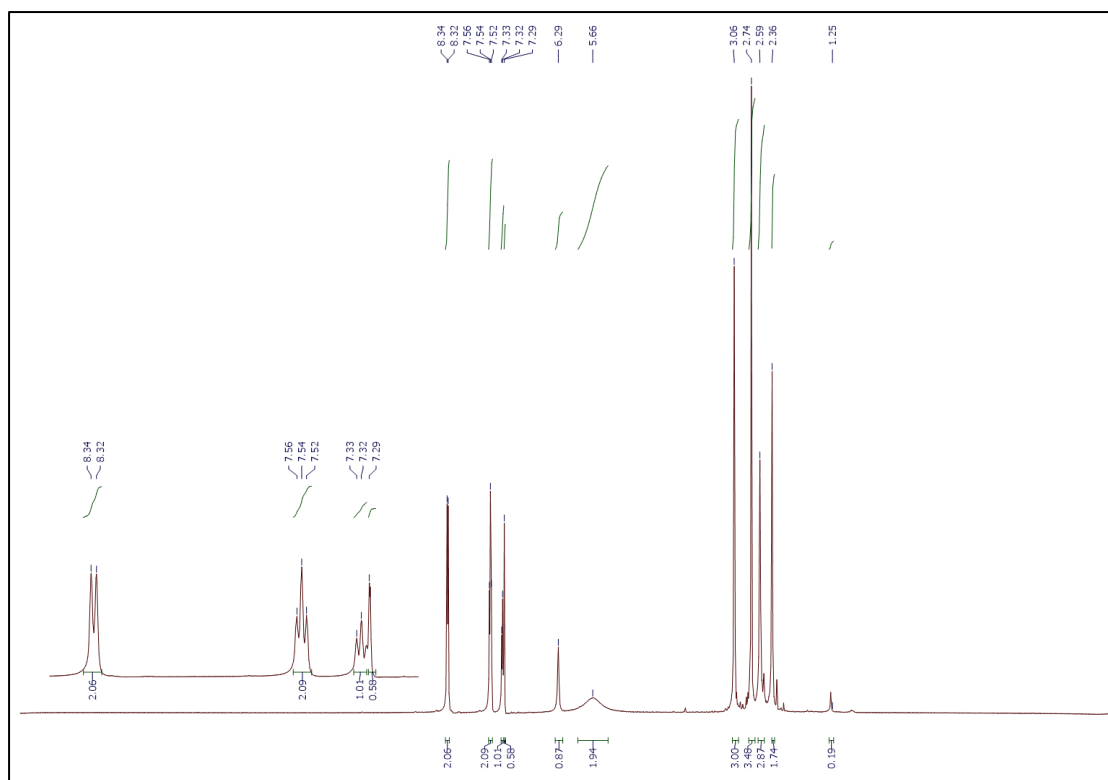
(Fig. 52), ¹H-NMR spectrum of 2,3-dihydroindol-2-on-3-ylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (21).CDCl₃



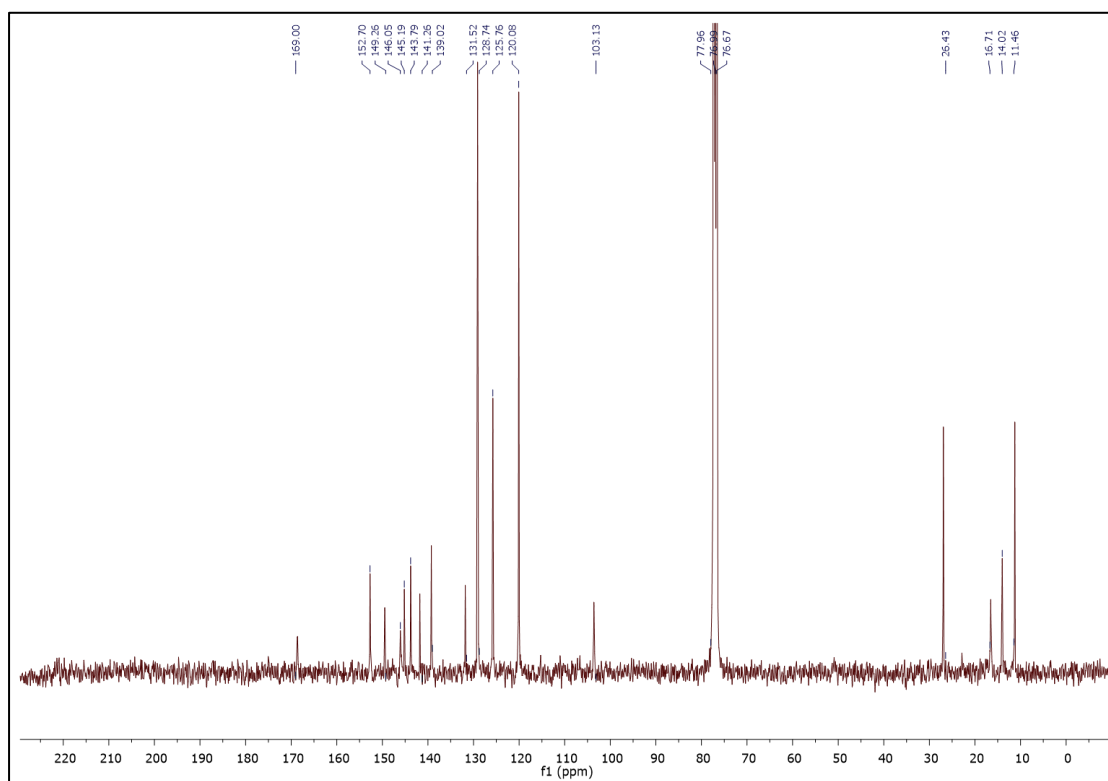
(Fig. 53), ^{13}C -NMR spectrum of 2,3-dihydroindol-2-on-3-ylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b] pyrazine (21).DMSO- d_6



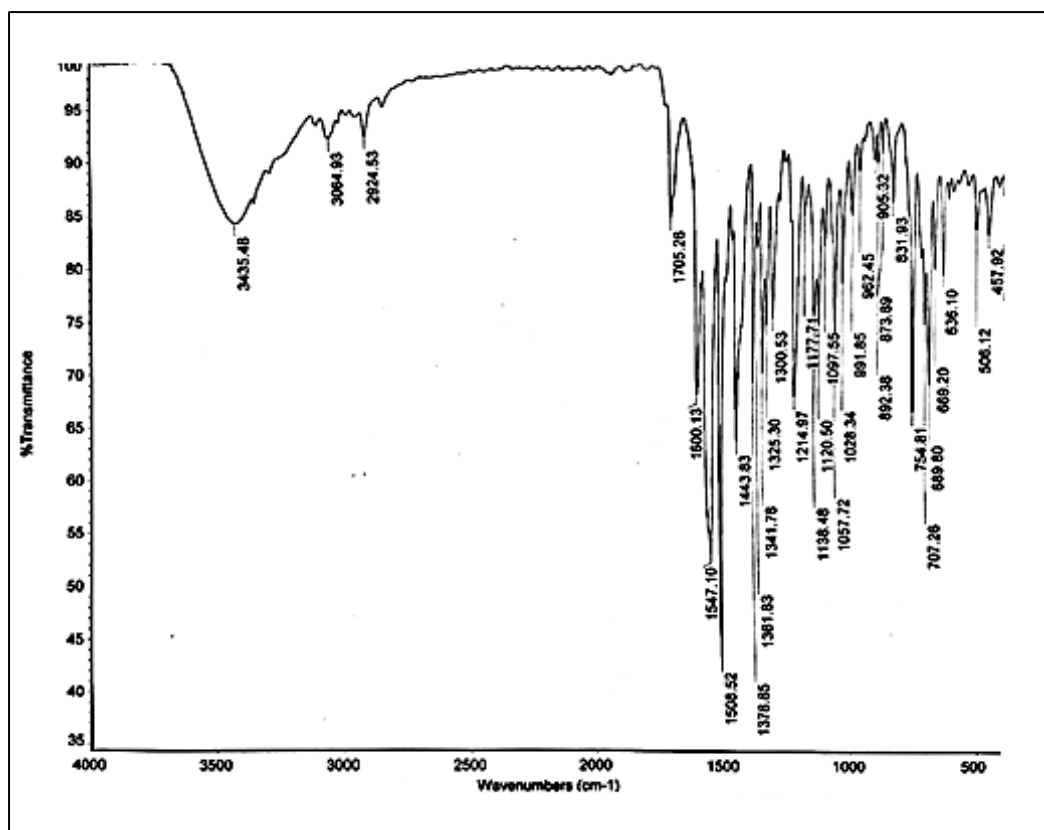
(Fig. 54), IR spectrum of N-(4-methyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine)hydrazine (22).



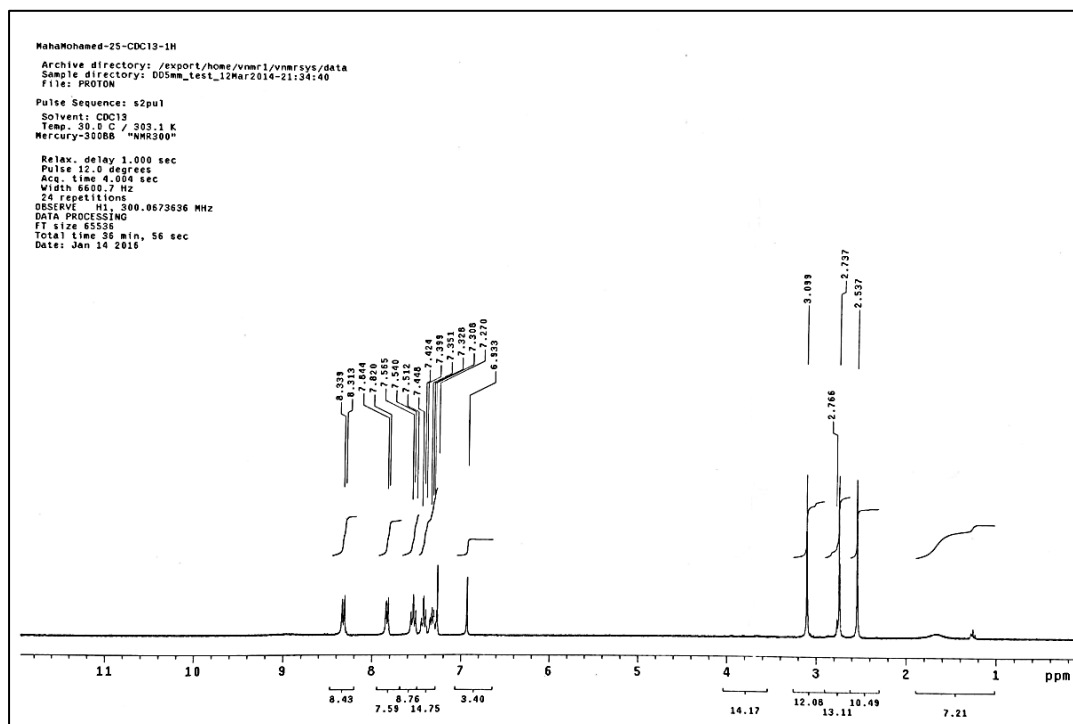
(Fig. 55), ¹H-NMR spectrum of *N*-(4-methyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine)hydrazine (22).CDCl₃.



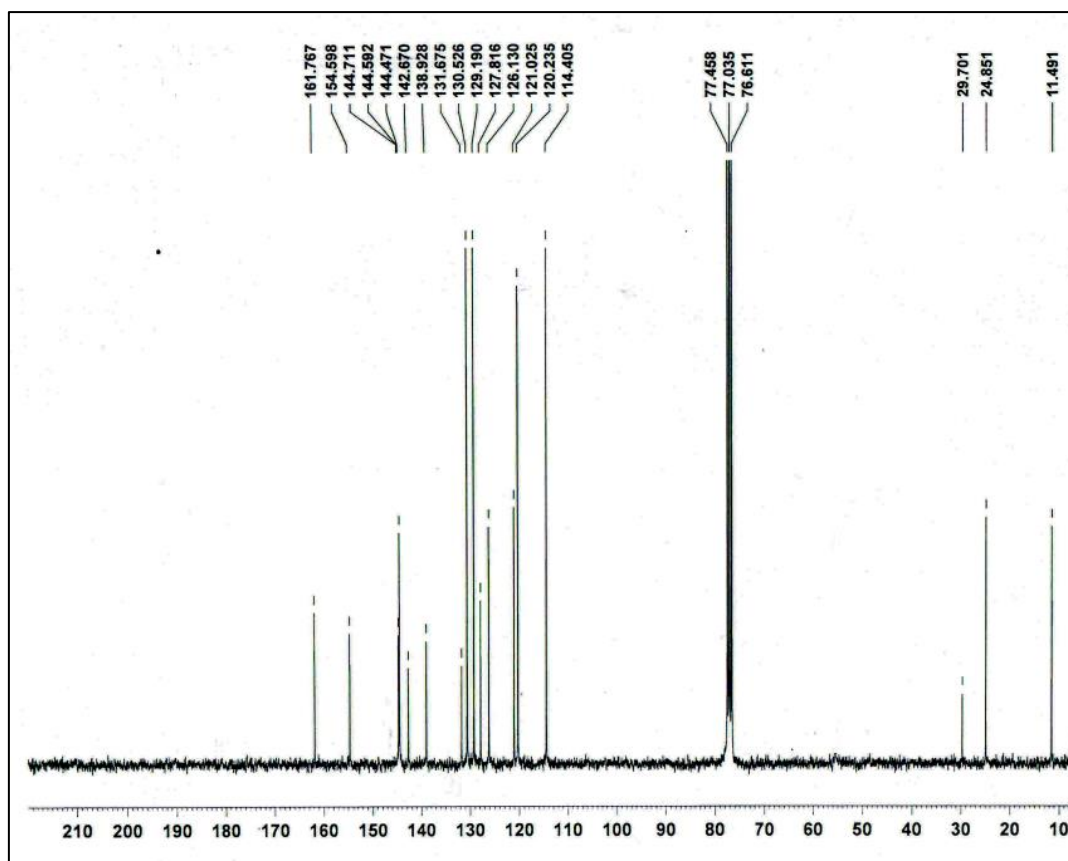
(Fig. 56), ¹³C-NMR spectrum of *N*-(4-methyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine)hydrazine (22).CDCl₃.



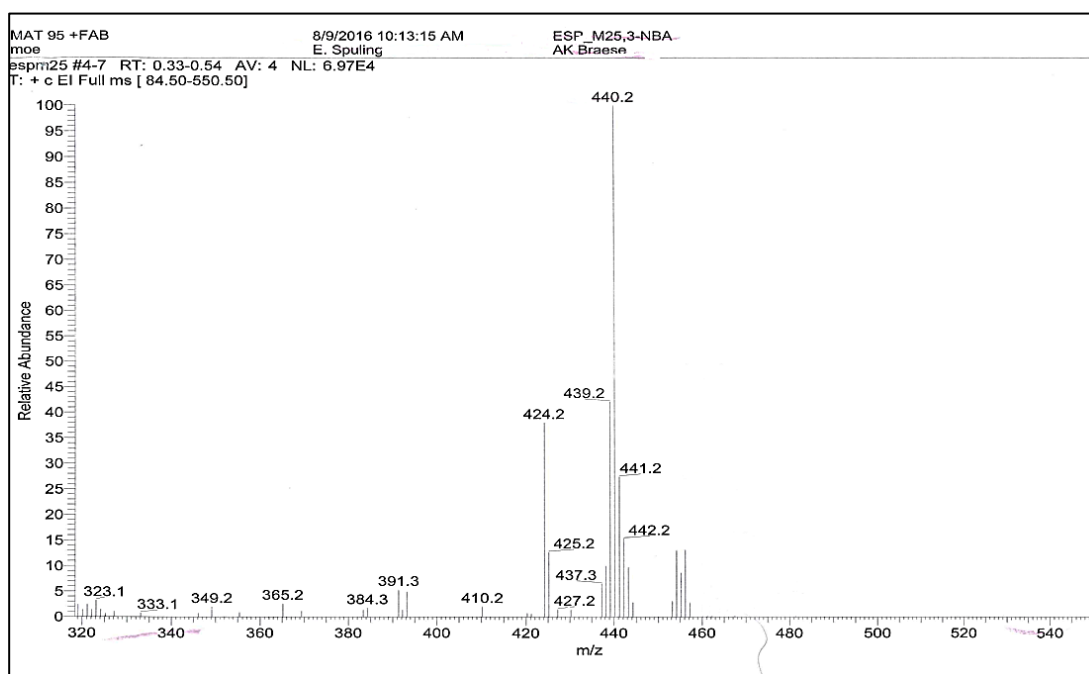
(Fig. 57), IR spectrum of *N*-(4-phenyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine)hydrazine (**23**).



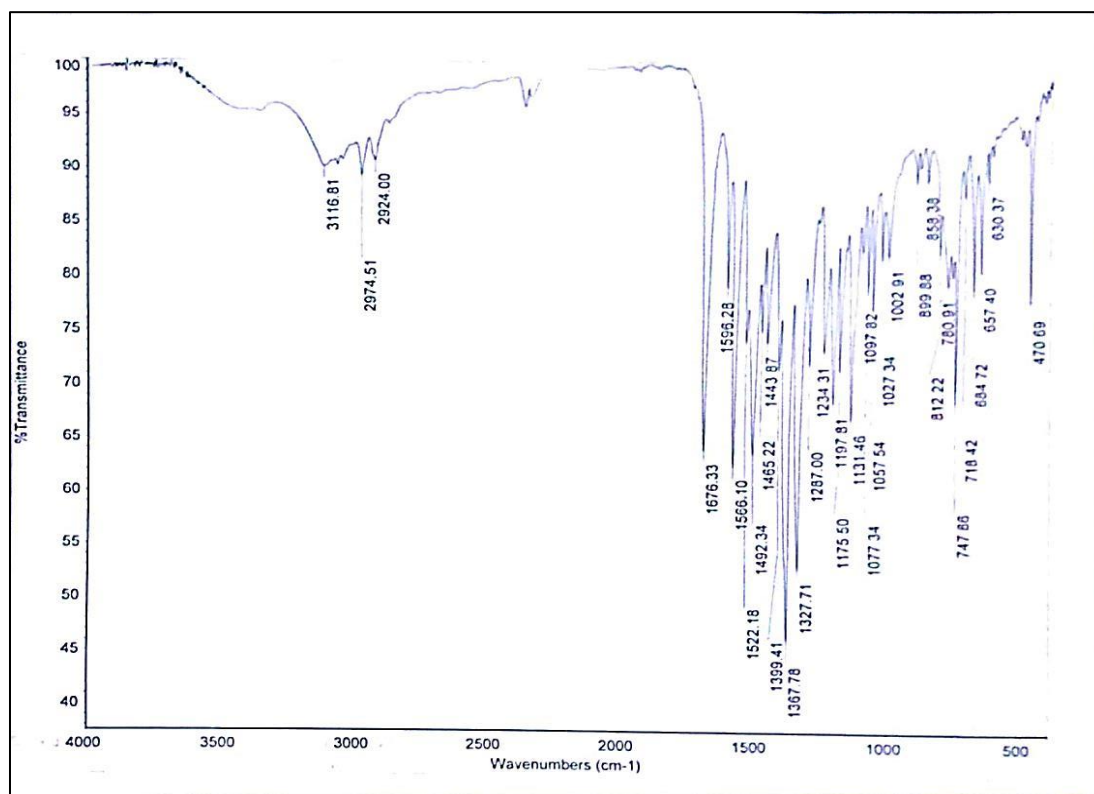
(Fig. 58), ¹H-NMR spectrum of *N*-(4-phenyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine)hydrazine (**23**).CDCl₃.



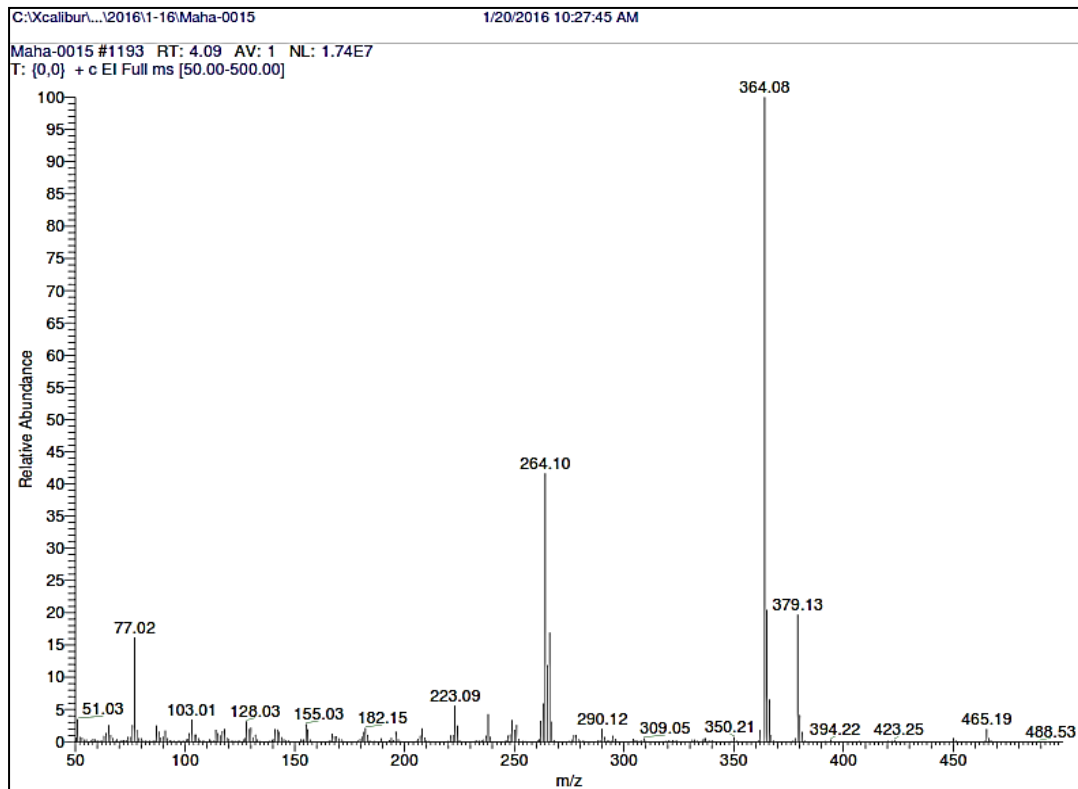
(Fig. 59), ^{13}C -NMR spectrum of *N*-(4-phenyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1*H*-pyrazolo[3,4-*b*]pyrazine)hydrazine (**23**). CDCl_3 .



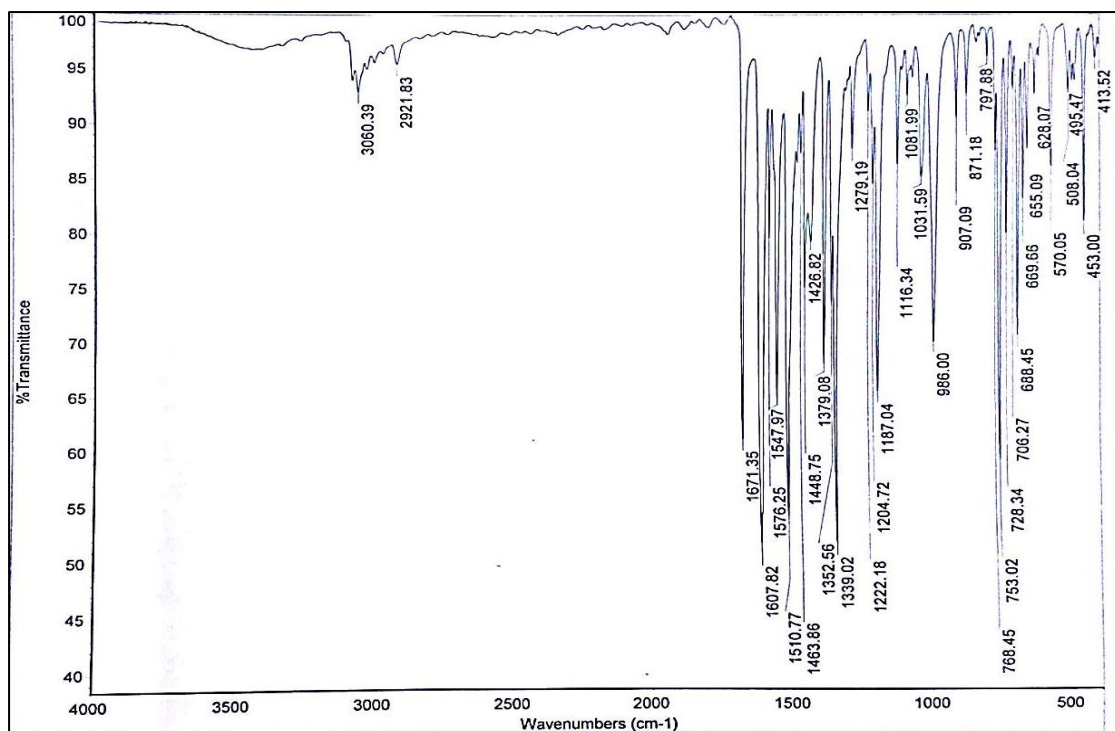
(Fig. 60), Mass spectrum of *N*-(4-phenyl-2,3-dihydrothiazol-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1*H*-pyrazolo[3,4-*b*]pyrazine)hydrazine (**23**).



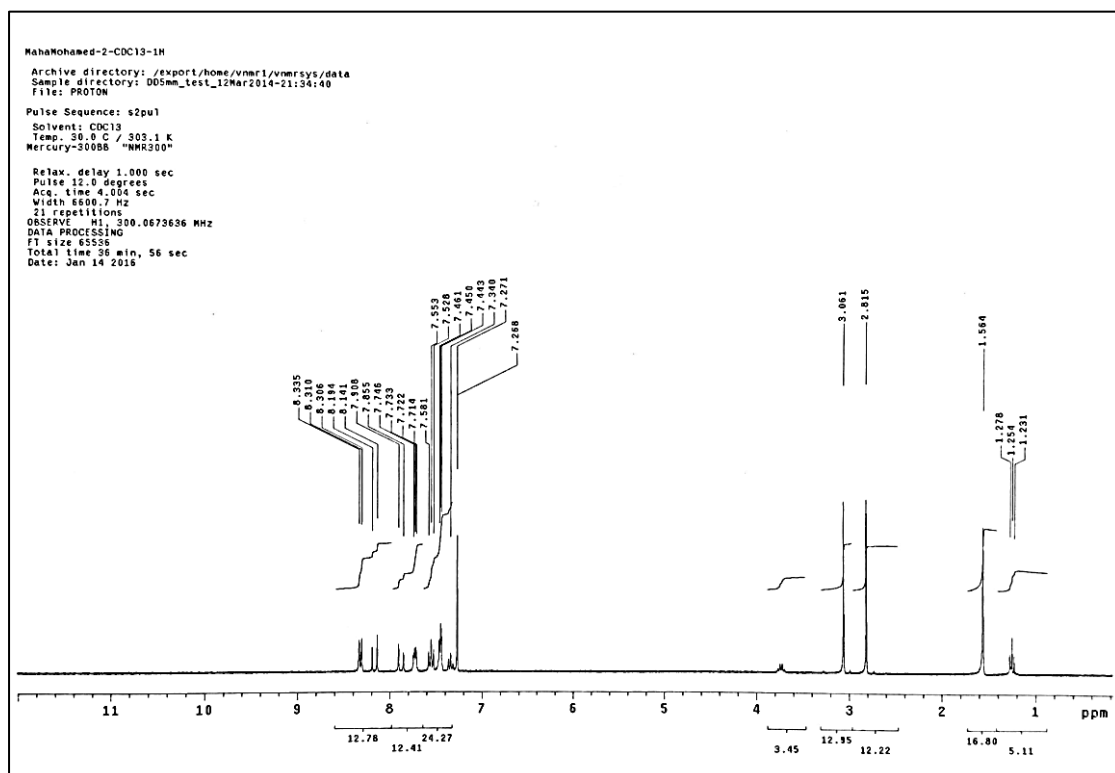
(Fig. 61), IR spectrum of *N*-(thiazolidin-4-on-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*] pyrazine)hydrazine (**24**).



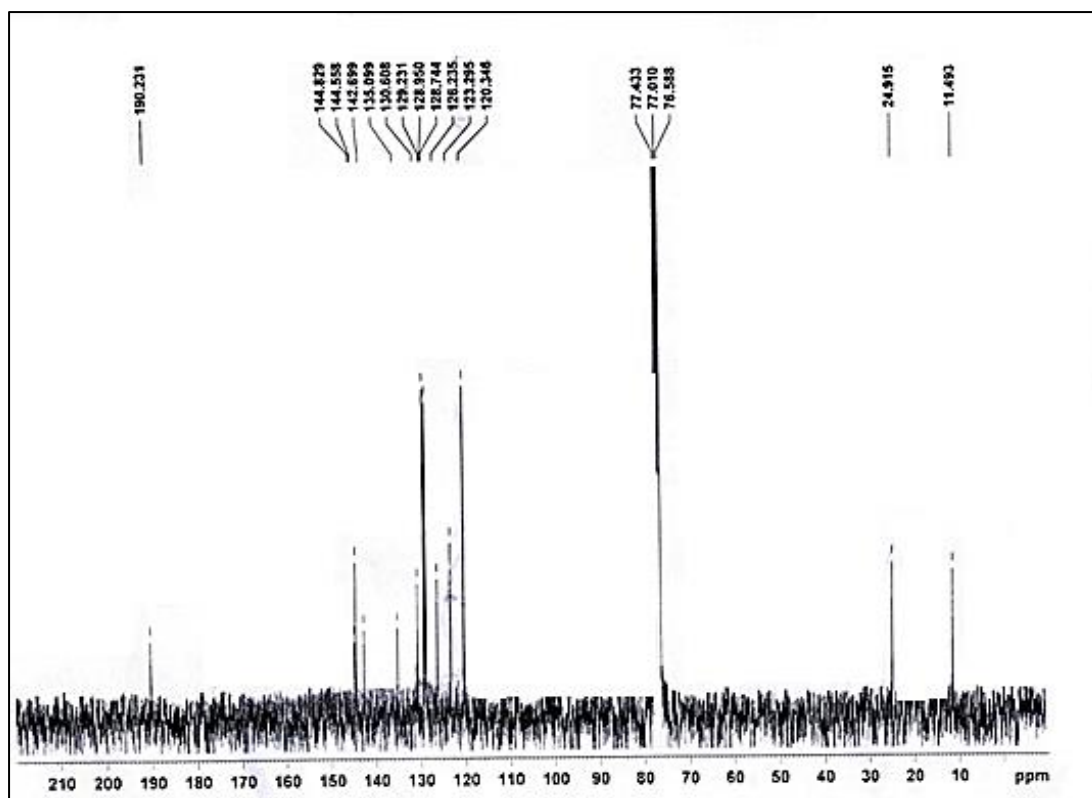
(Fig. 62), Mass spectrum of *N*-(thiazolidin-4-on-2-ylidene)-(5-acetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine)hydrazine (**24**).



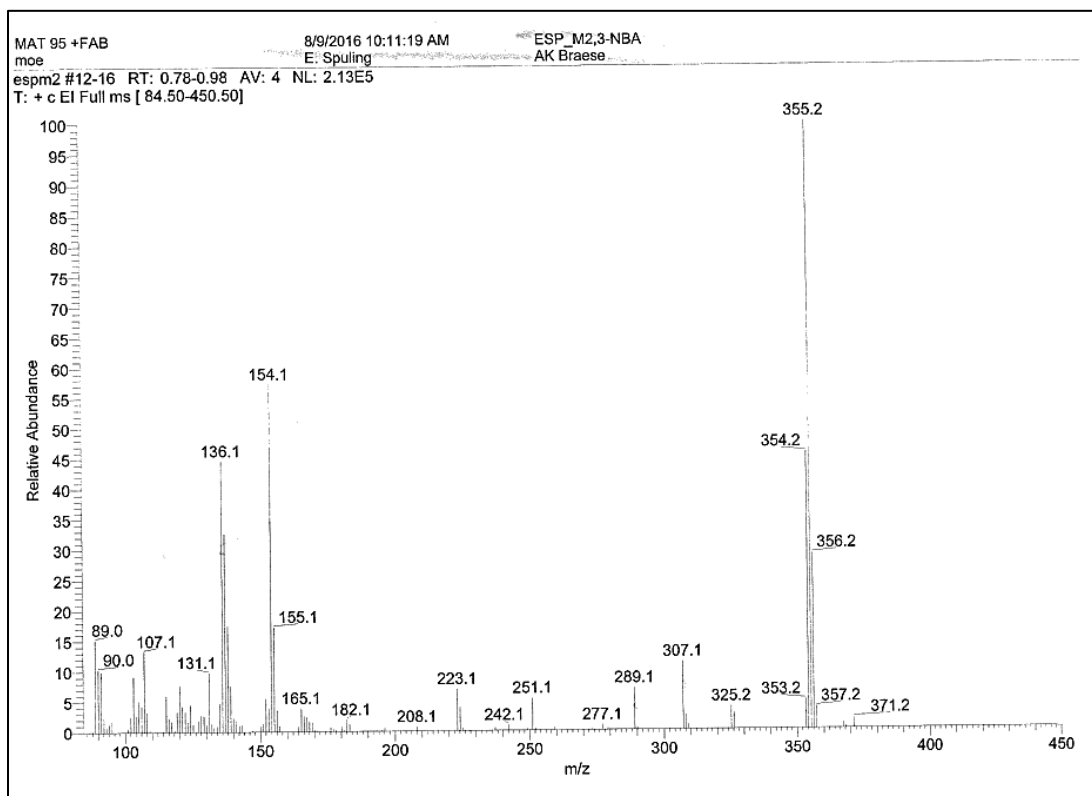
(Fig. 63), IR spectrum of 5-benzylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25a).



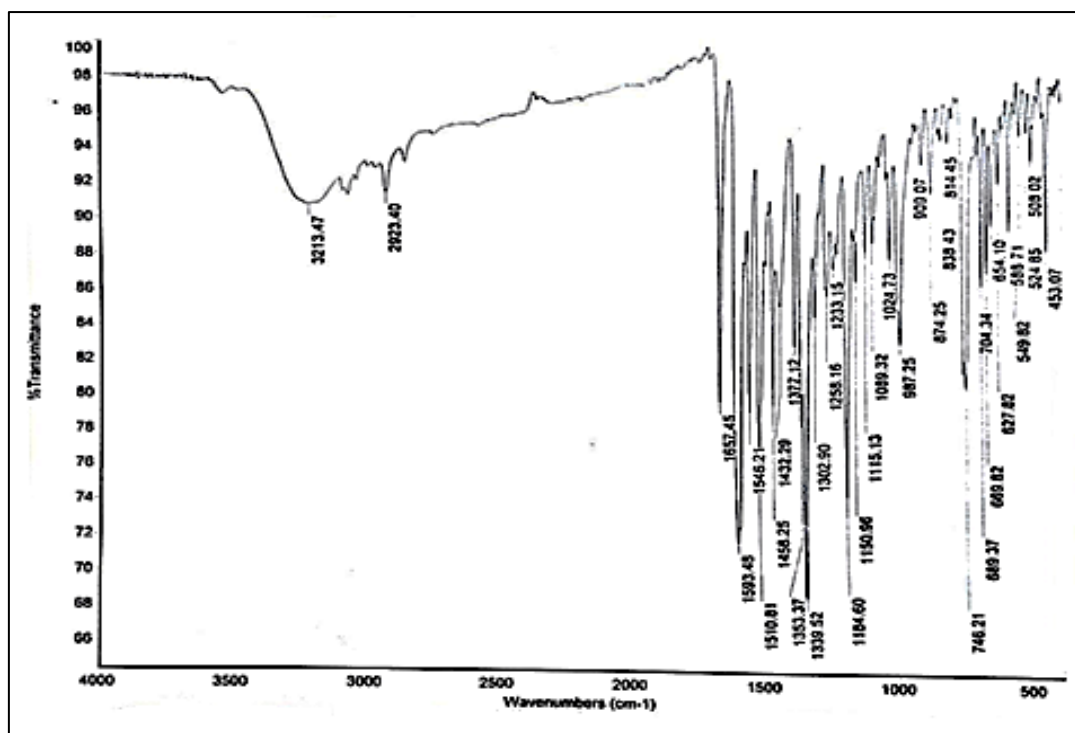
(Fig. 64), ¹H-NMR spectrum of 5-benzylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25a).CDCl₃.



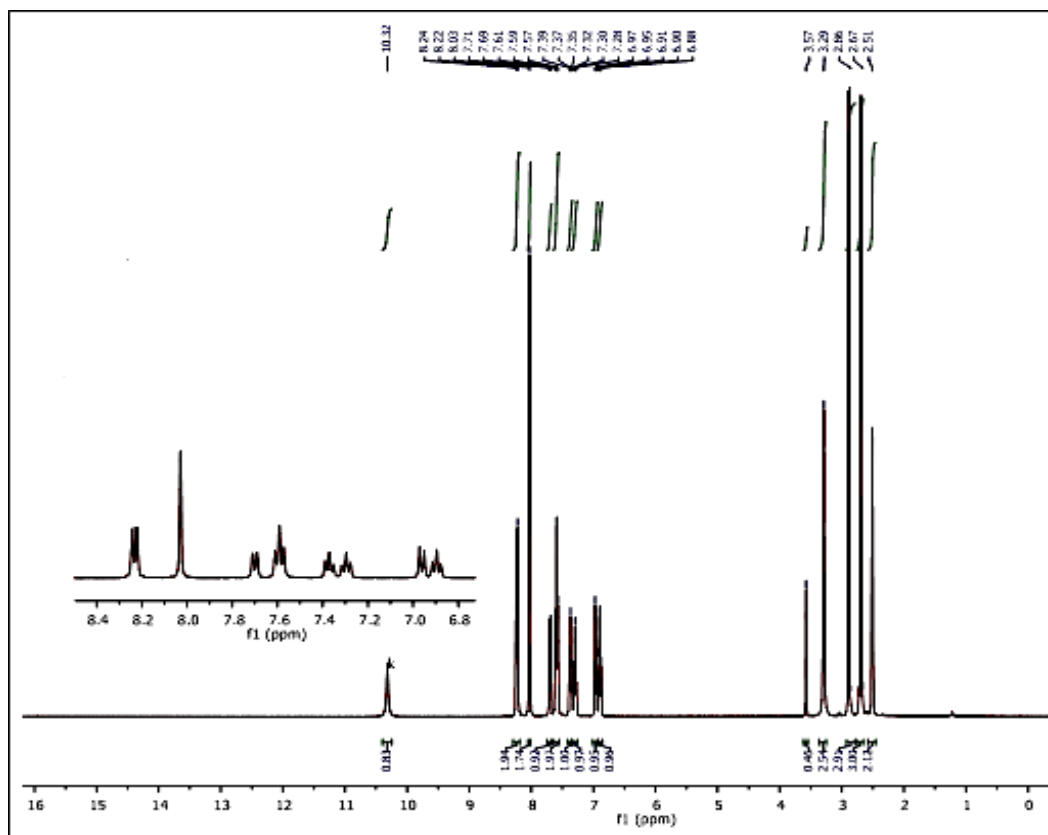
(Fig. 65), ^{13}C -NMR spectrum of 5-benzylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (**25a**). CDCl_3



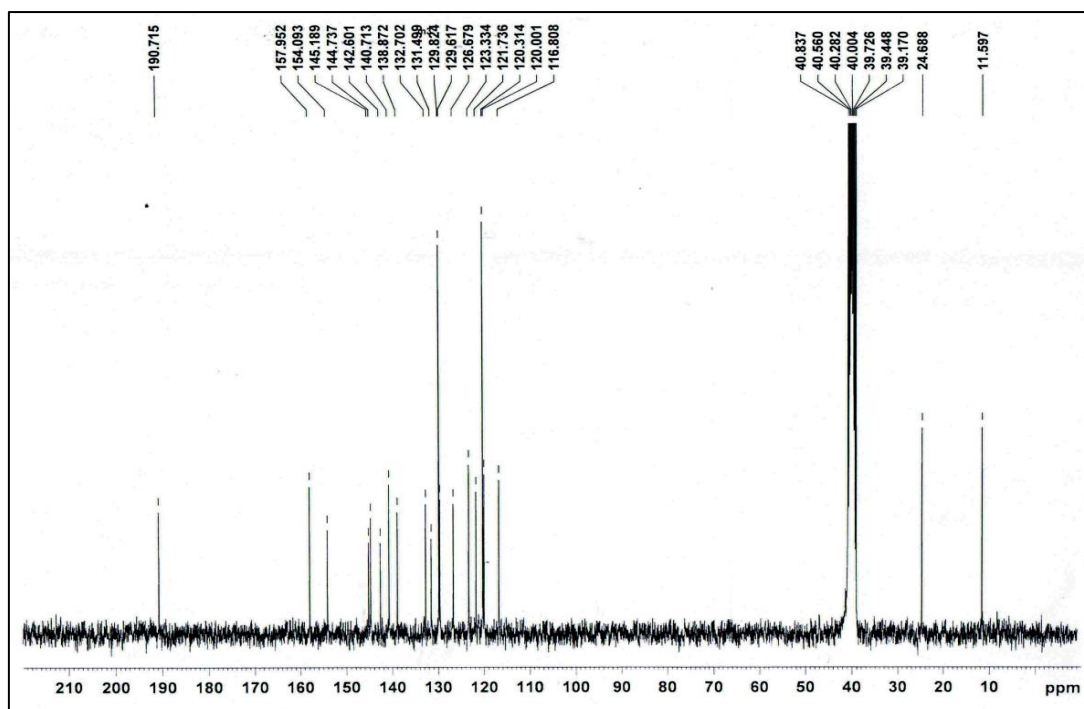
(Fig. 66), Mass spectrum of 5-benzylideneacetyl-3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (**25a**).



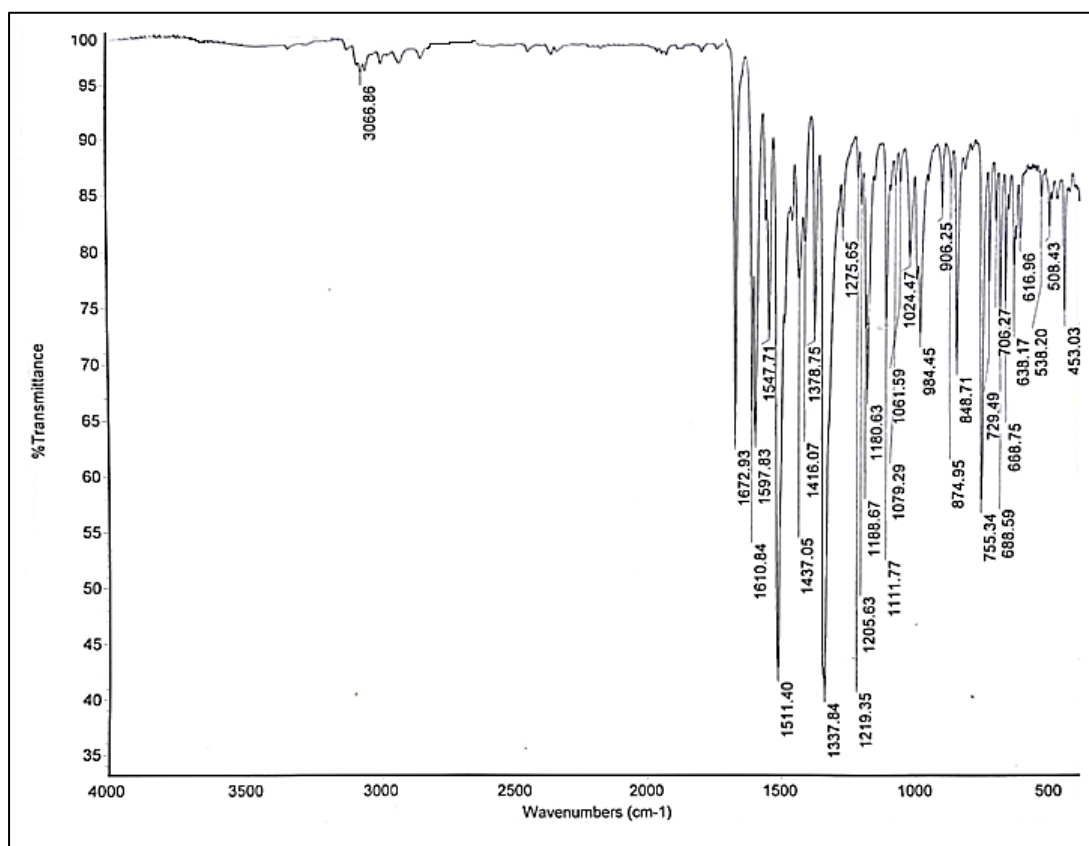
(Fig. 67), IR spectrum of 3,6-dimethyl-5-(2-hydroxylbenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b] pyrazine (**25b**).



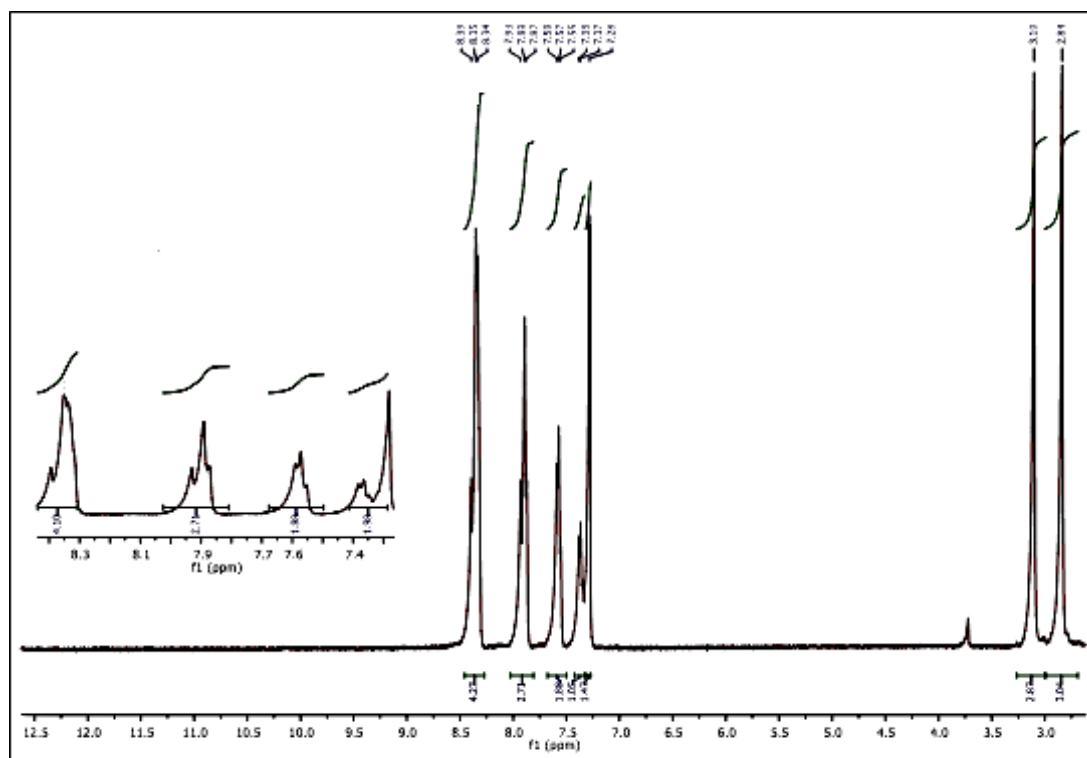
(Fig. 68), ¹H-NMR spectrum of 3,6-dimethyl-5-(2-hydroxylbenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b] pyrazine (**25b**). DMSO-d₆



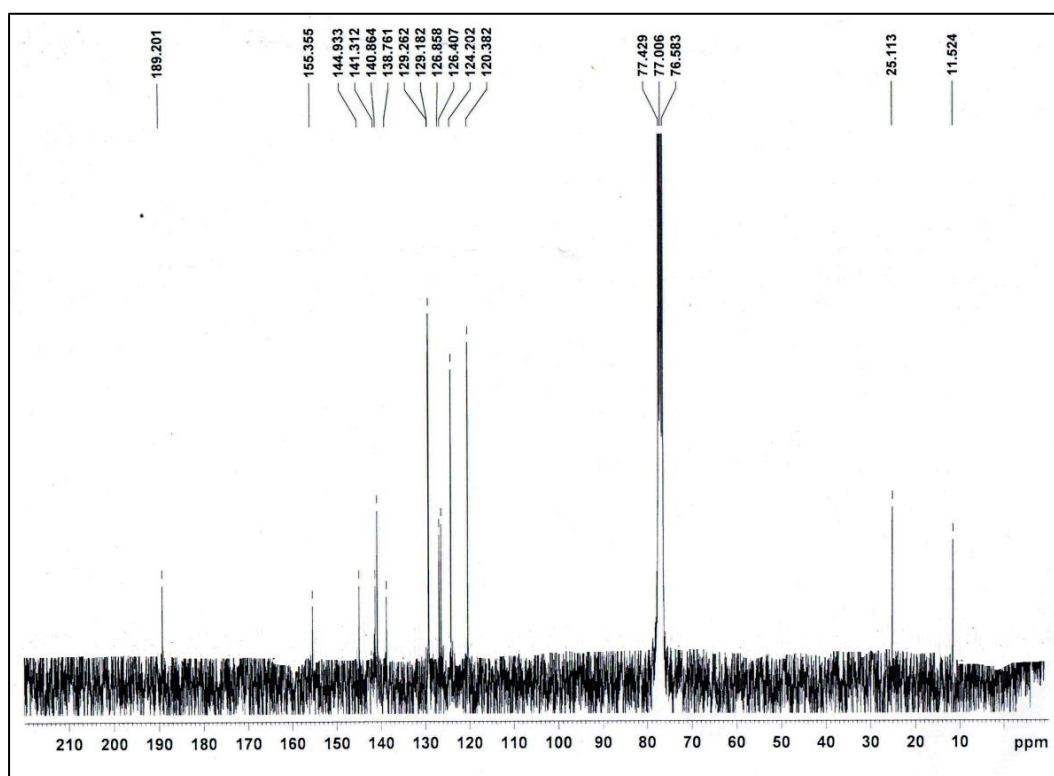
(Fig. 69), ¹³C-NMR spectrum of 3,6-dimethyl-5-(2-hydroxybenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25b). DMSO-d₆



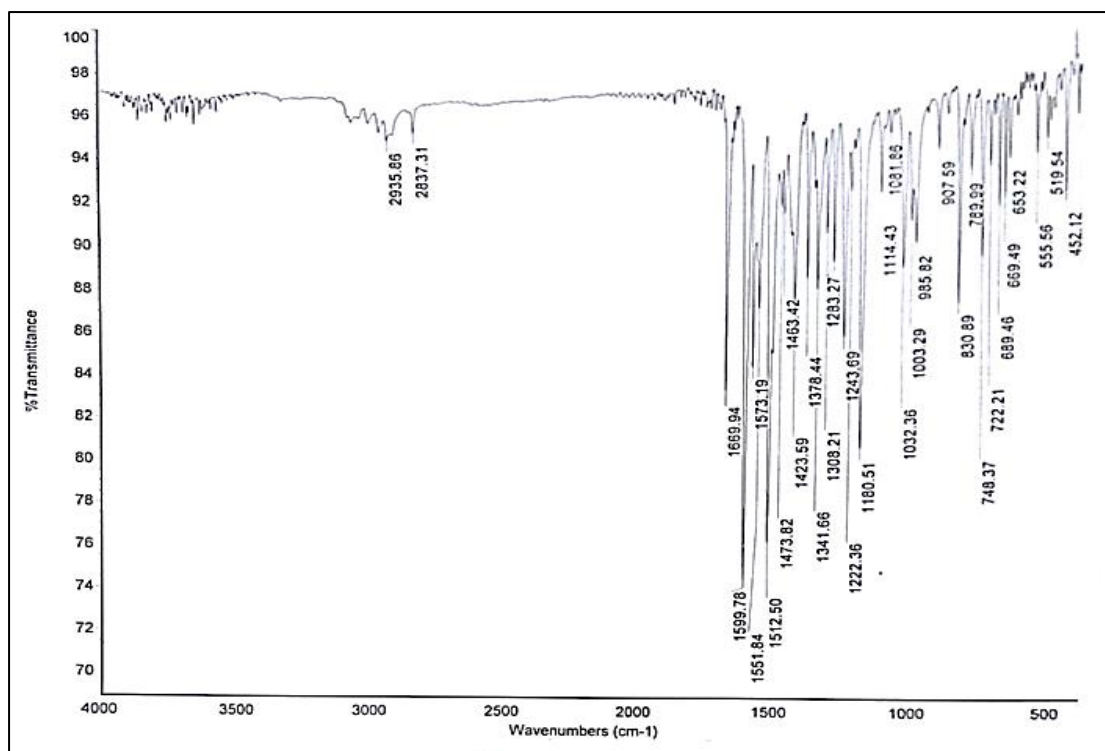
(Fig. 70), IR spectrum of 3,6-dimethyl-5-(2-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25c).



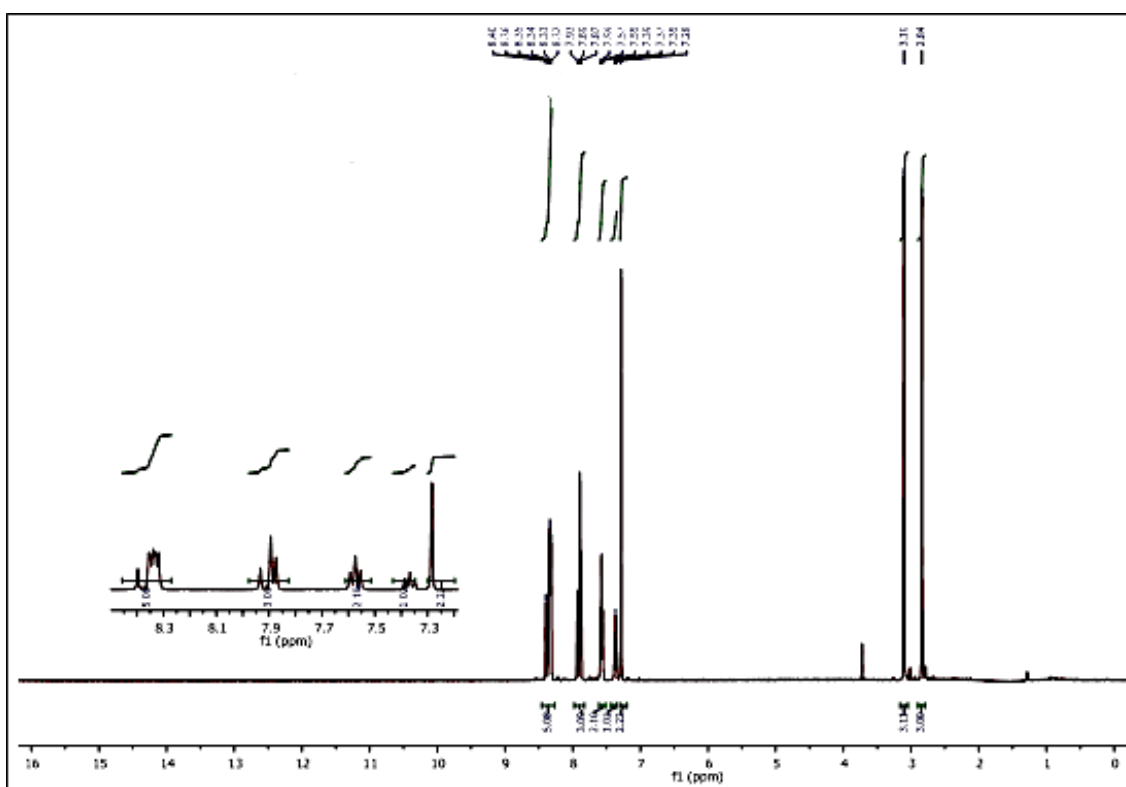
(Fig. 71), ¹H-NMR spectrum of 3,6-dimethyl-5-(2-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25c).CDCl₃.



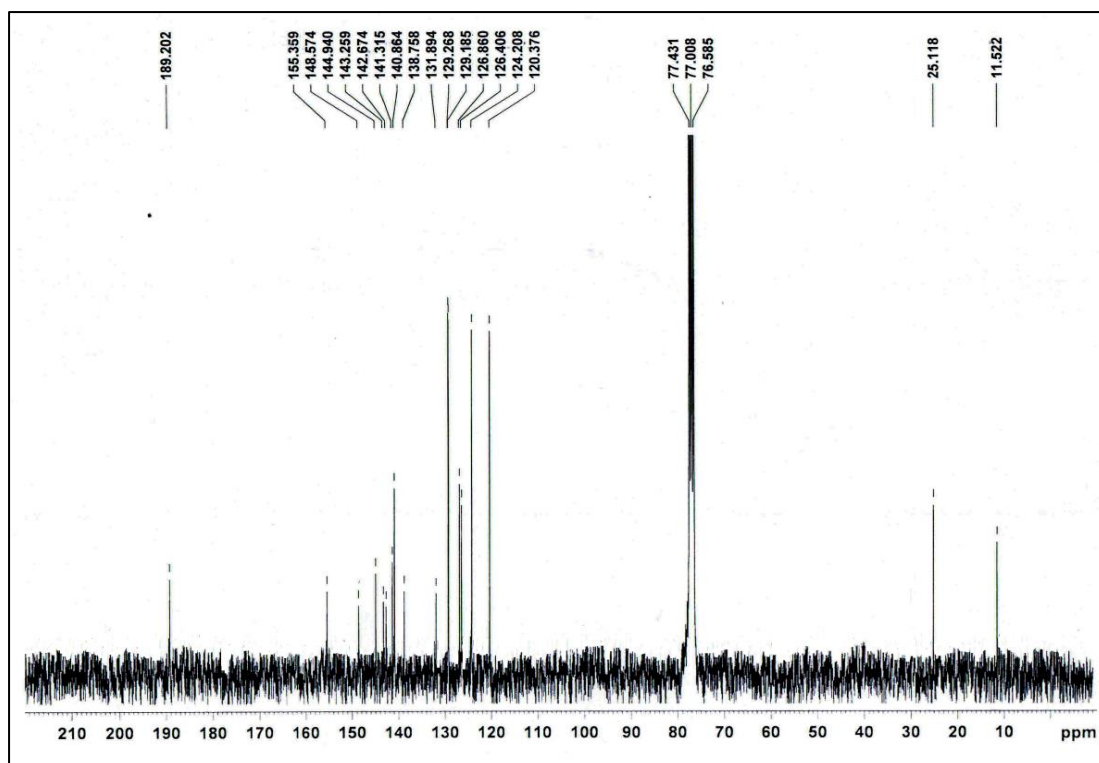
(Fig. 72), ¹³C-NMR spectrum of 3,6-dimethyl-5-(2-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25c).CDCl₃.



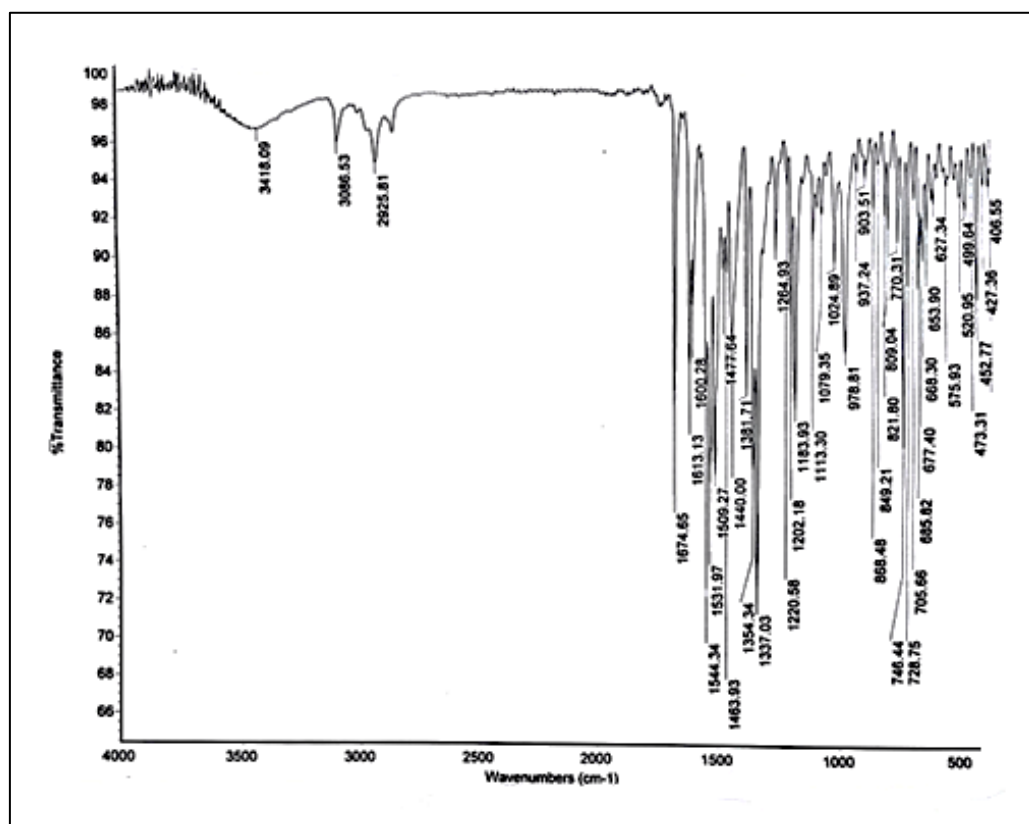
(Fig. 73), IR spectrum of 3,6-dimethyl-5-(4-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (**25d**).



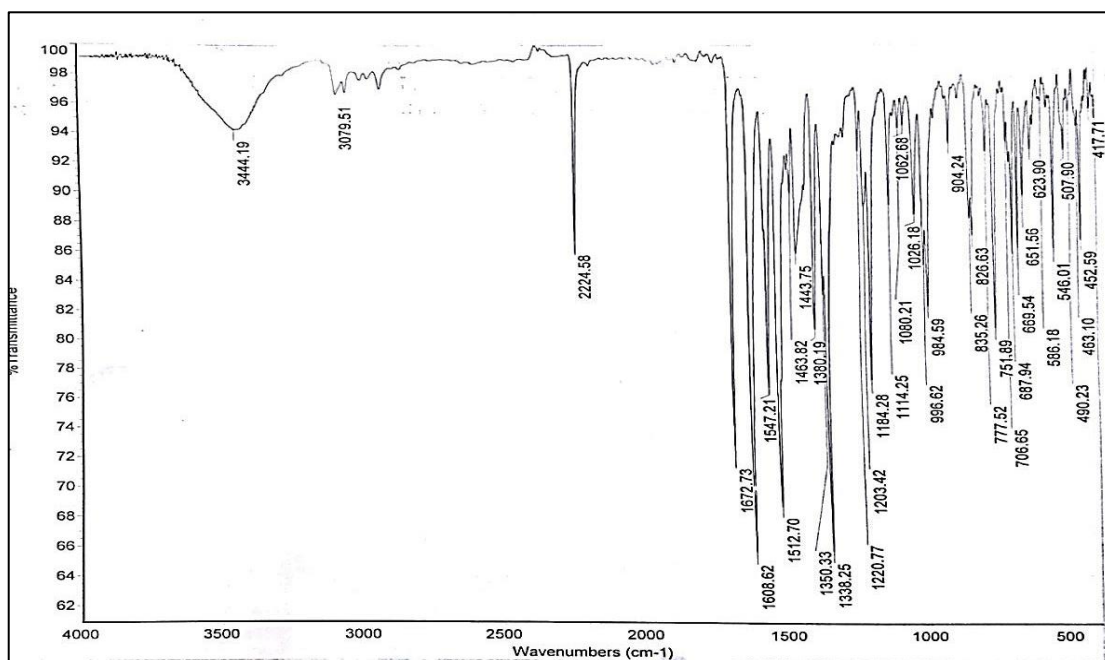
(Fig. 74), ¹H-NMR spectrum of 3,6-dimethyl-5-(4-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (**25d**).CDCl₃.



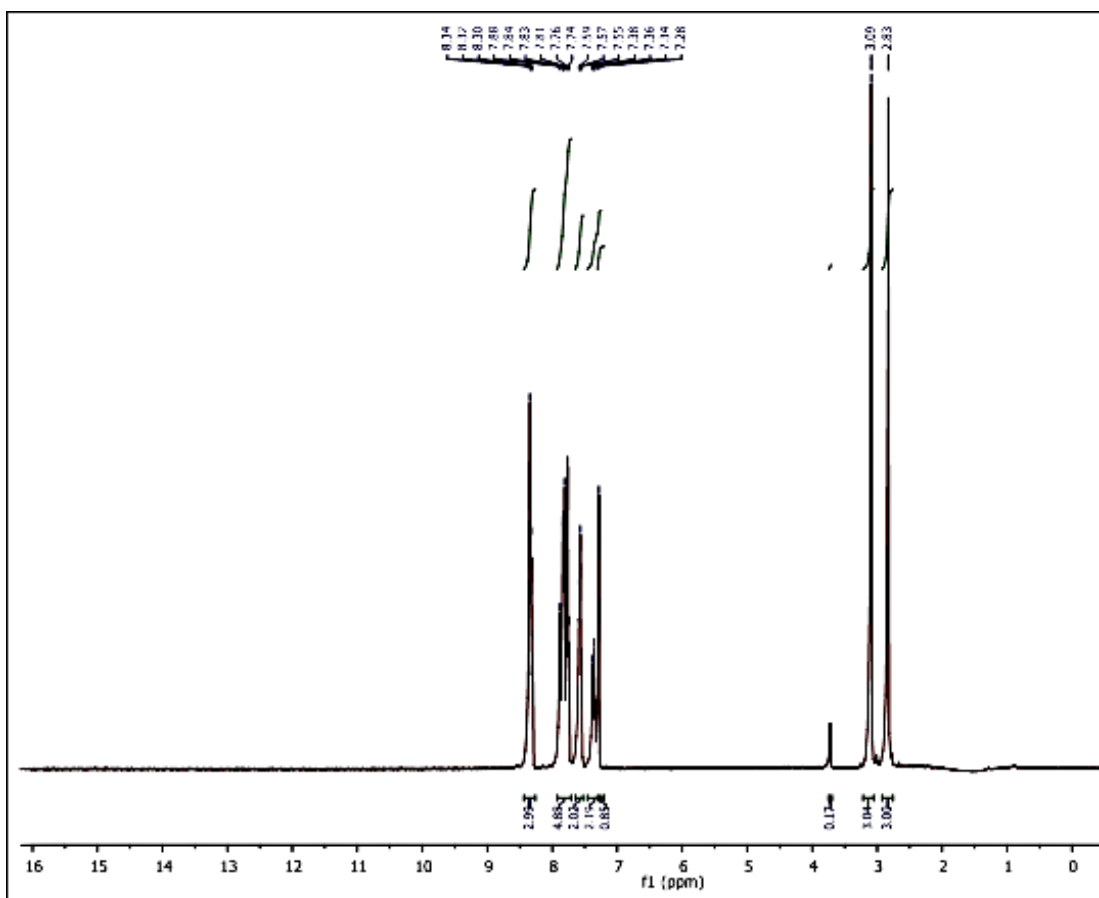
(Fig. 75), ¹³C-NMR spectrum of 3,6-dimethyl-5-(4-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25d).CDCl₃.



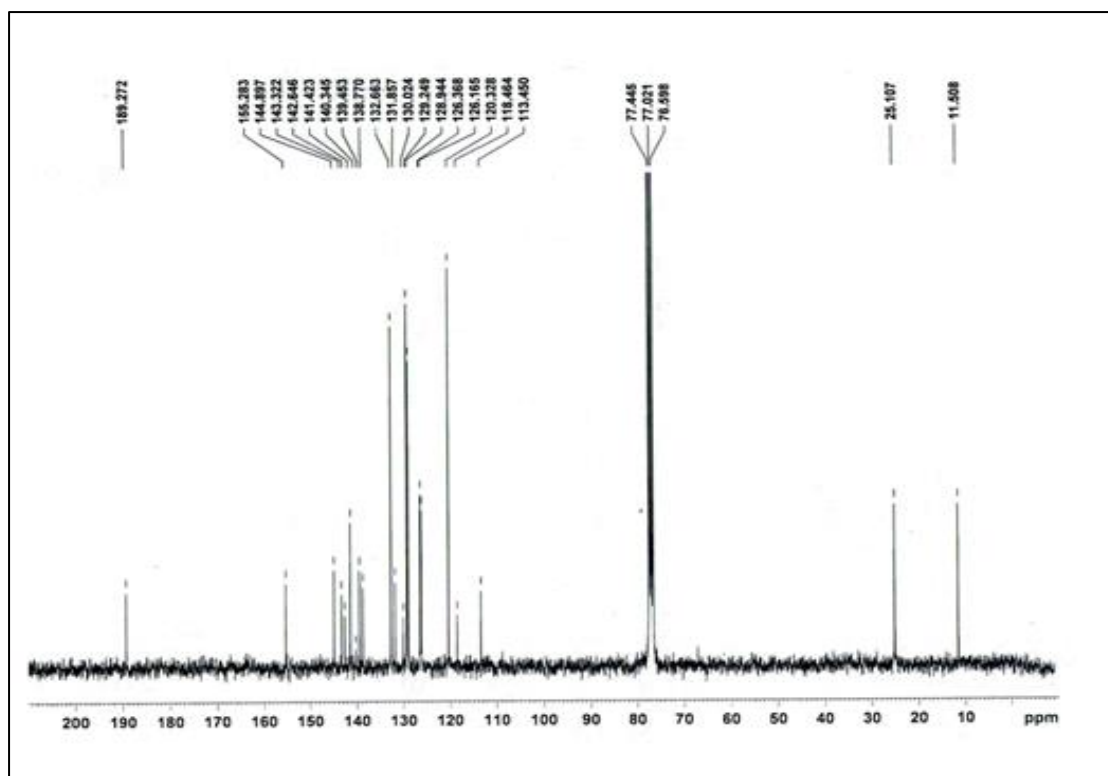
(Fig. 76), IR spectrum of 3,6-dimethyl-5-(3-nitrobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25e).



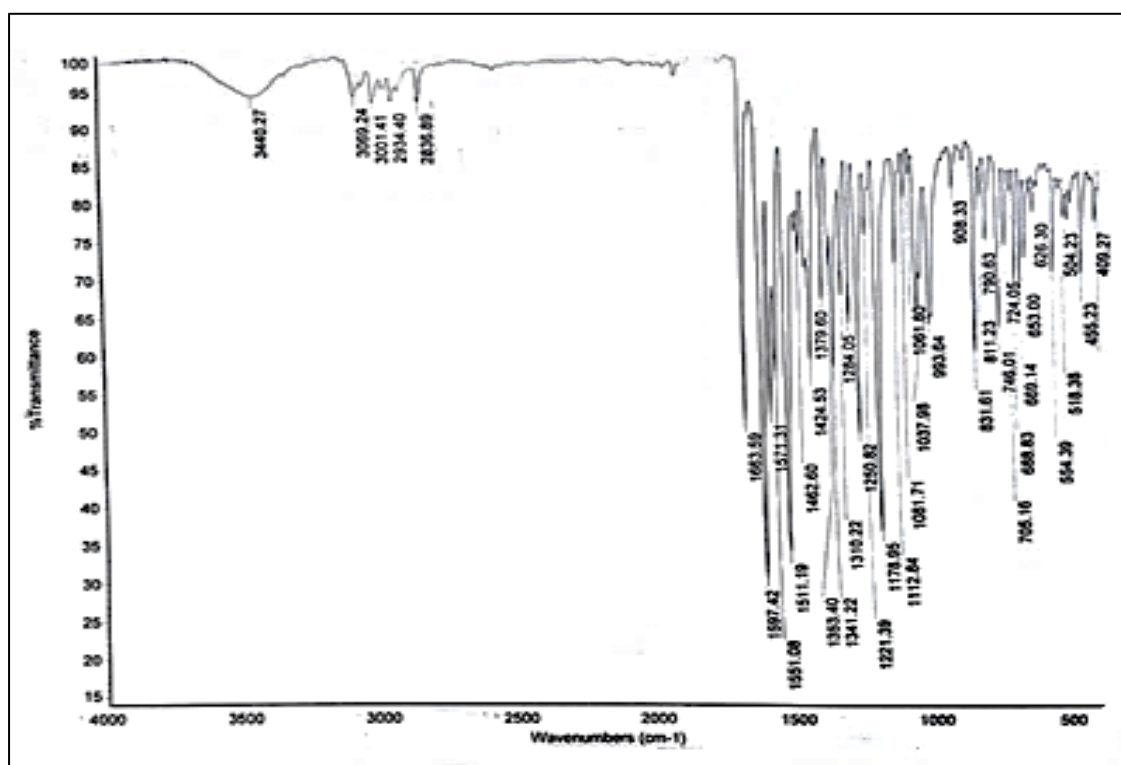
(Fig. 79), IR spectrum of 3,6-dimethyl-5-(4-cyanobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25f)



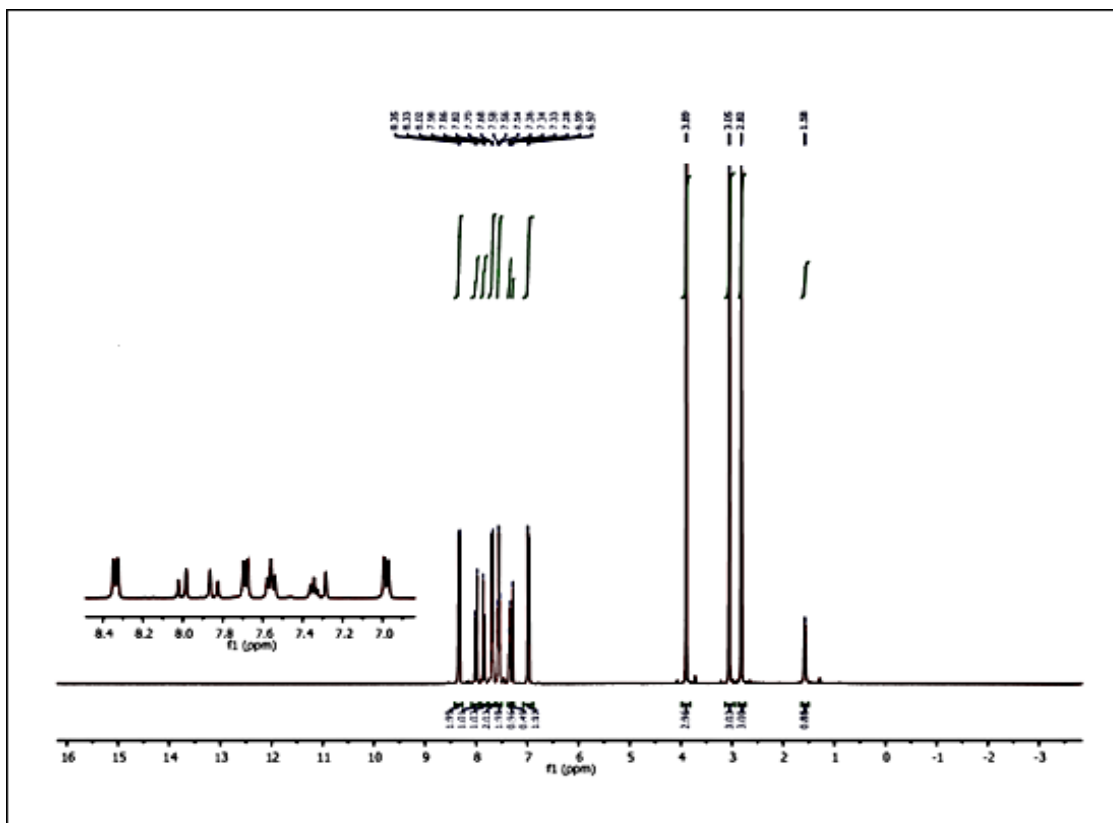
(Fig. 80), ¹H-NMR spectrum of 3,6-dimethyl-5-(4-cyanobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25f).CDCl₃



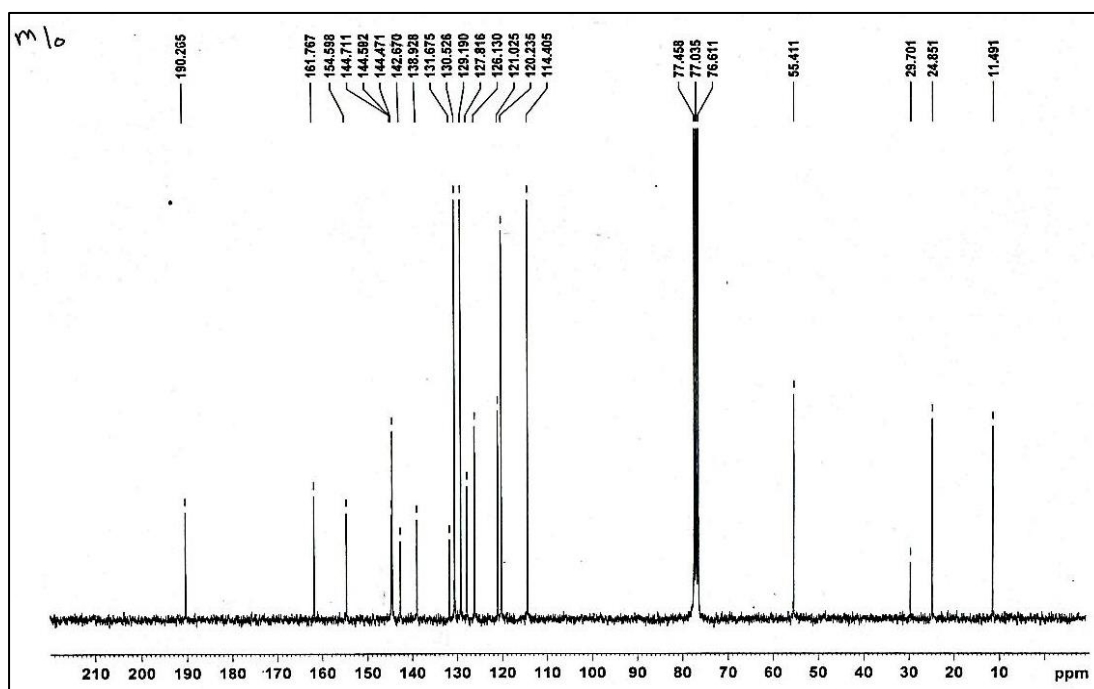
(Fig. 81), ^{13}C -NMR spectrum of 3,6-dimethyl-5-(4-cyanobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25f). CDCl_3



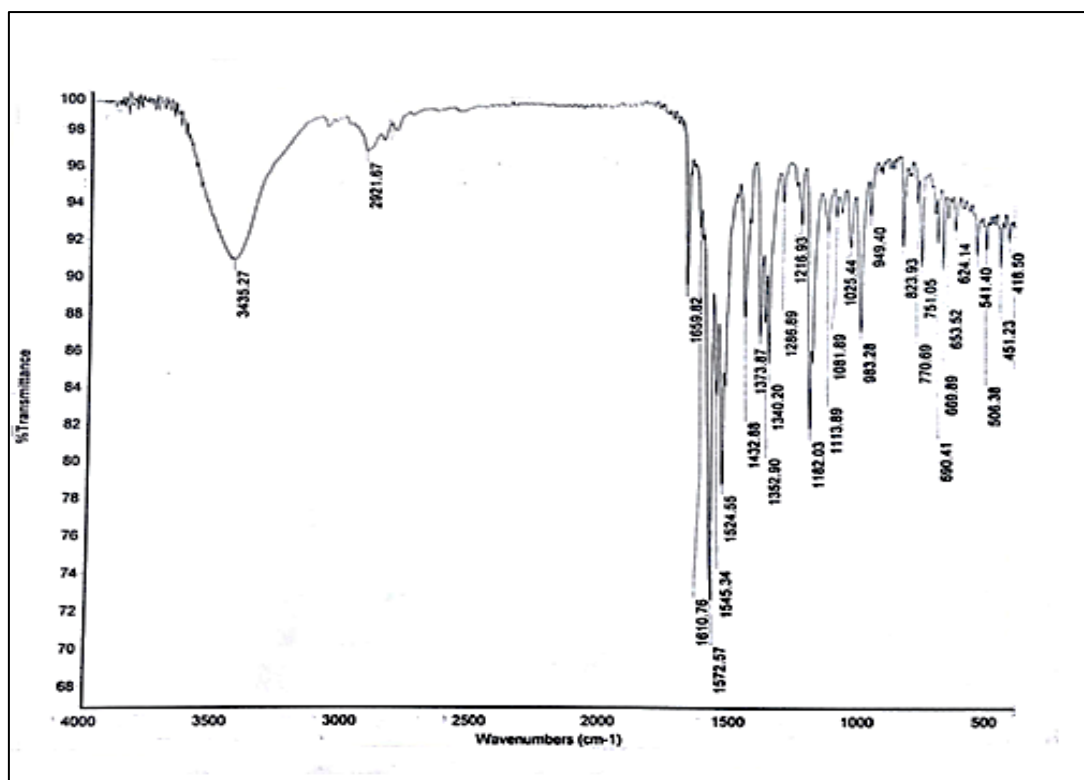
(Fig. 82), IR spectrum of 3,6-dimethyl-5-(4-methoxybenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25g).



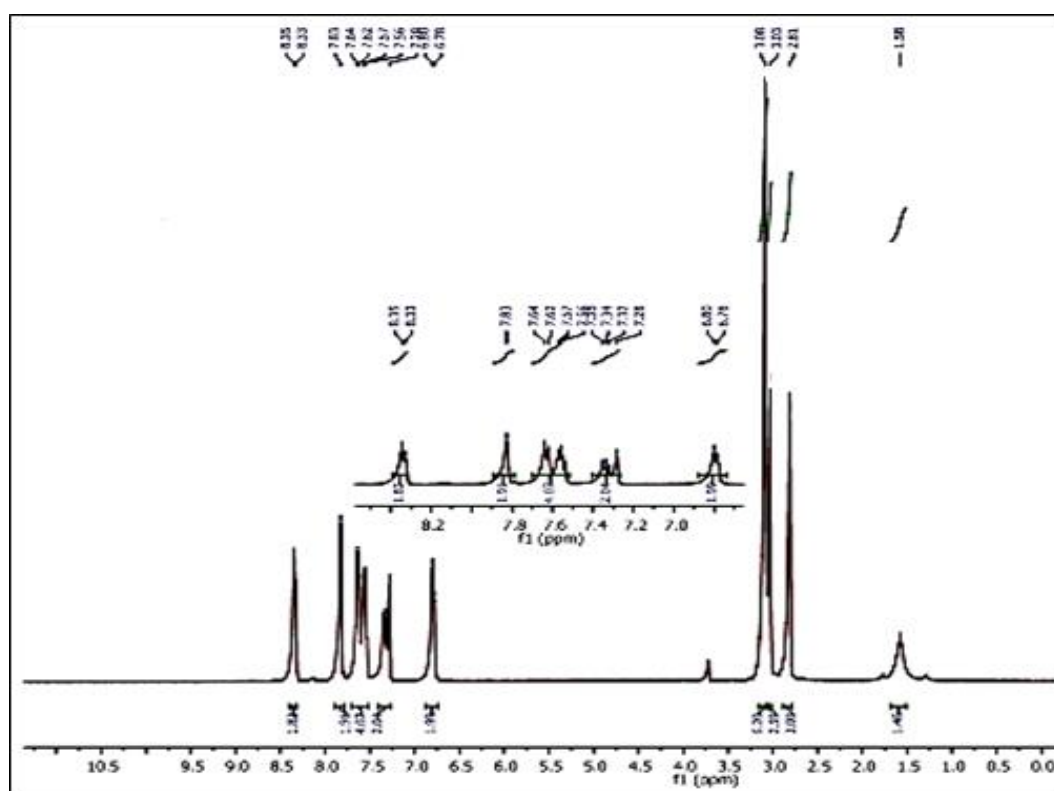
(Fig. 83), ¹H-NMR spectrum of 3,6-dimethyl-5-(4-methoxybenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25g).CDCl₃



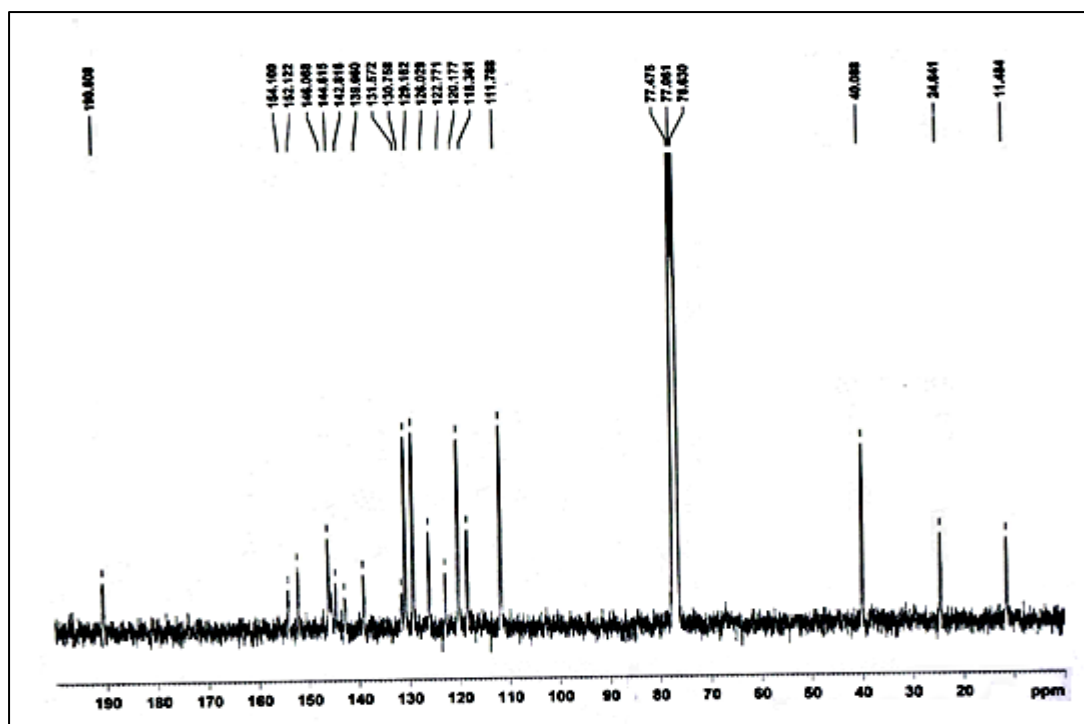
(Fig. 84), ¹³C-NMR spectrum of 3,6-dimethyl-5-(4-methoxybenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25g).CDCl₃



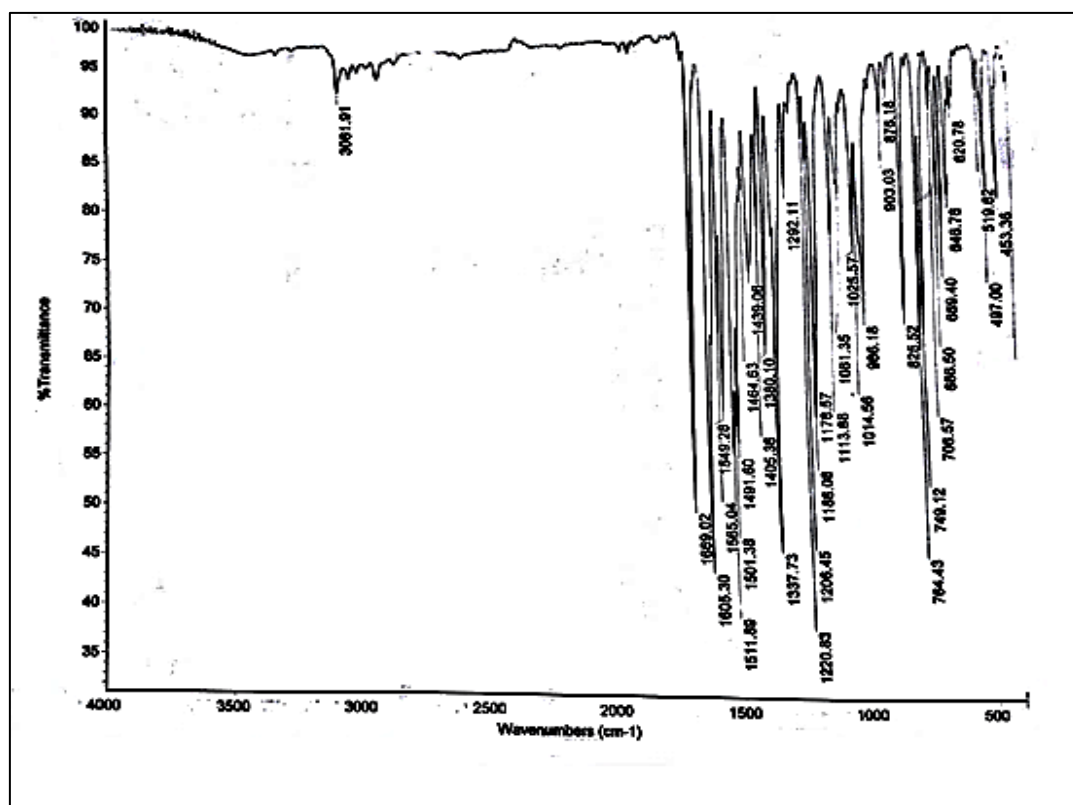
(Fig. 85), IR spectrum of 3,6-dimethyl-5-(4-*N,N*-dimethylaminobenzylideneacetyl)-1-phenyl-1*H*-pyrazolo[3,4-*b*]pyrazine (**25h**).



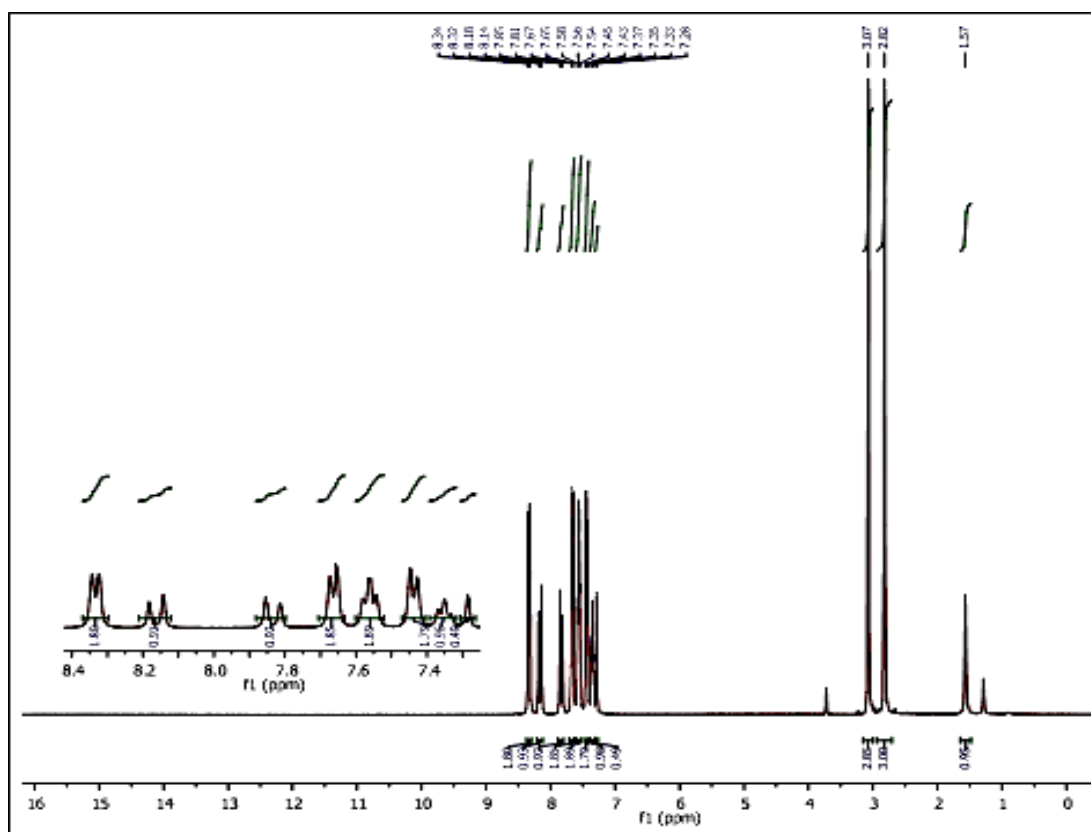
(Fig. 86), ¹H-NMR spectrum of 3,6-dimethyl-5-(4-*N,N*-dimethylaminobenzylideneacetyl)-1-phenyl-1*H*-pyrazolo[3,4-*b*]pyrazine (**25h**). CDCl₃



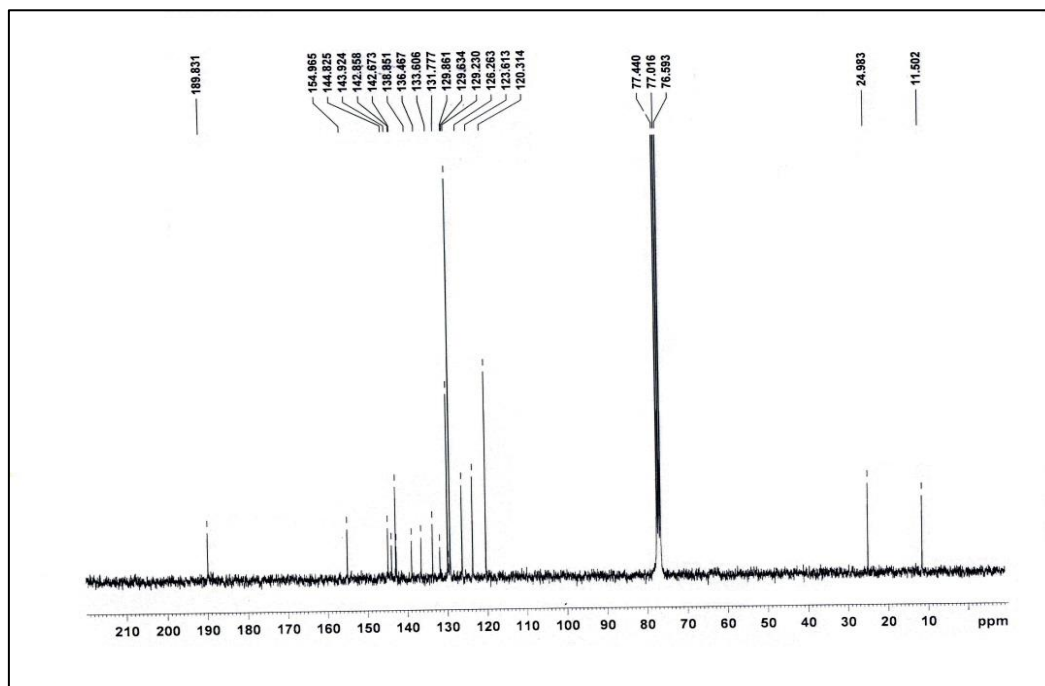
(Fig. 87), ^{13}C -NMR spectrum of 3,6-dimethyl-5-(4-N,N-dimethylaminobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25h). CDCl_3



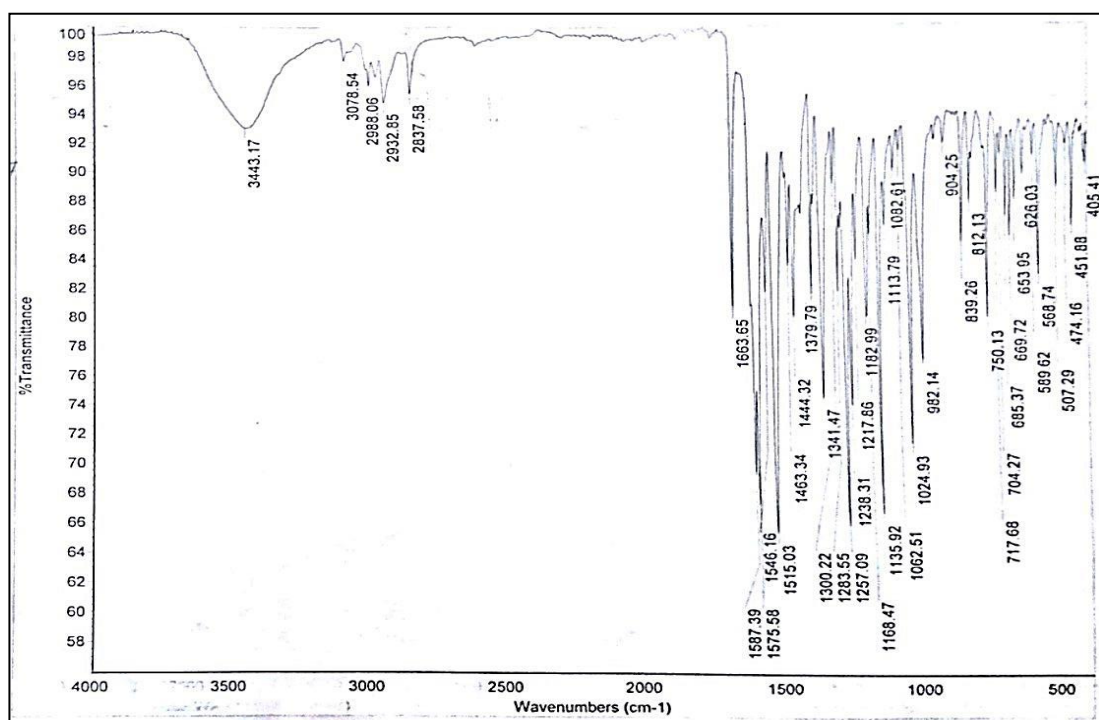
(Fig. 88), IR spectrum of 3,6-dimethyl-5-(4-chlorobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25i)



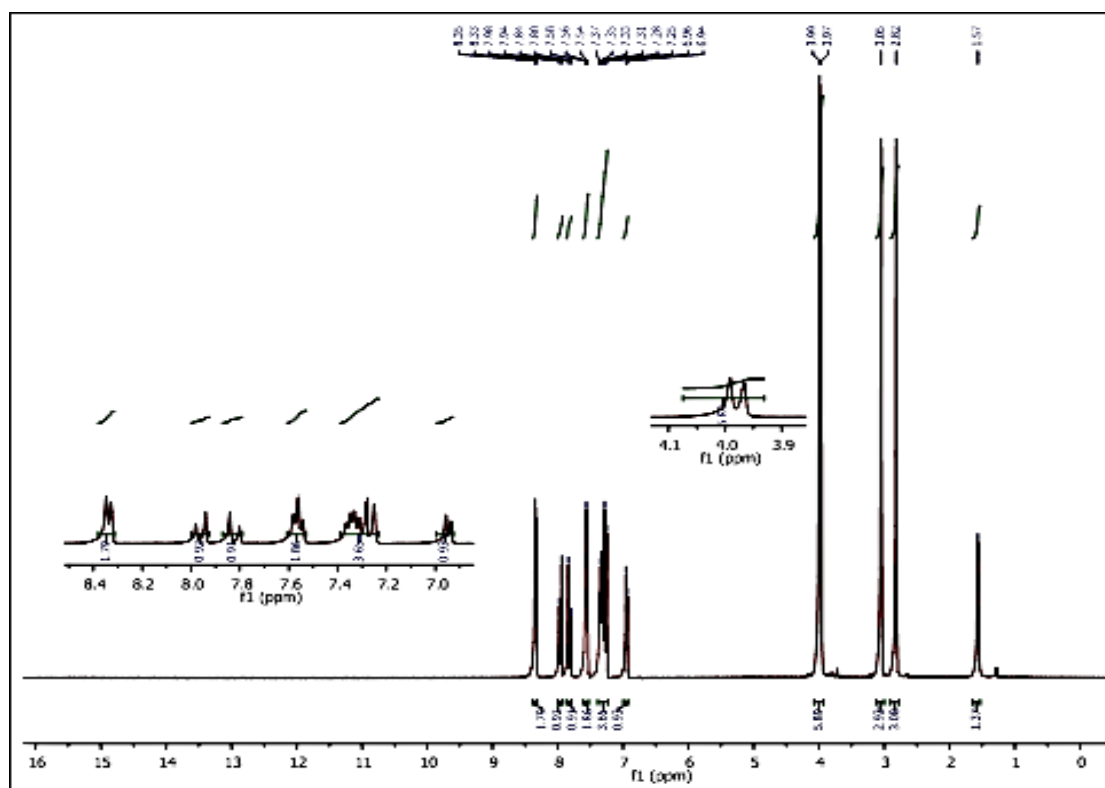
(Fig. 89), ¹H-NMR spectrum of 3,6-dimethyl-5-(4-chlorobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25i). CDCl₃.

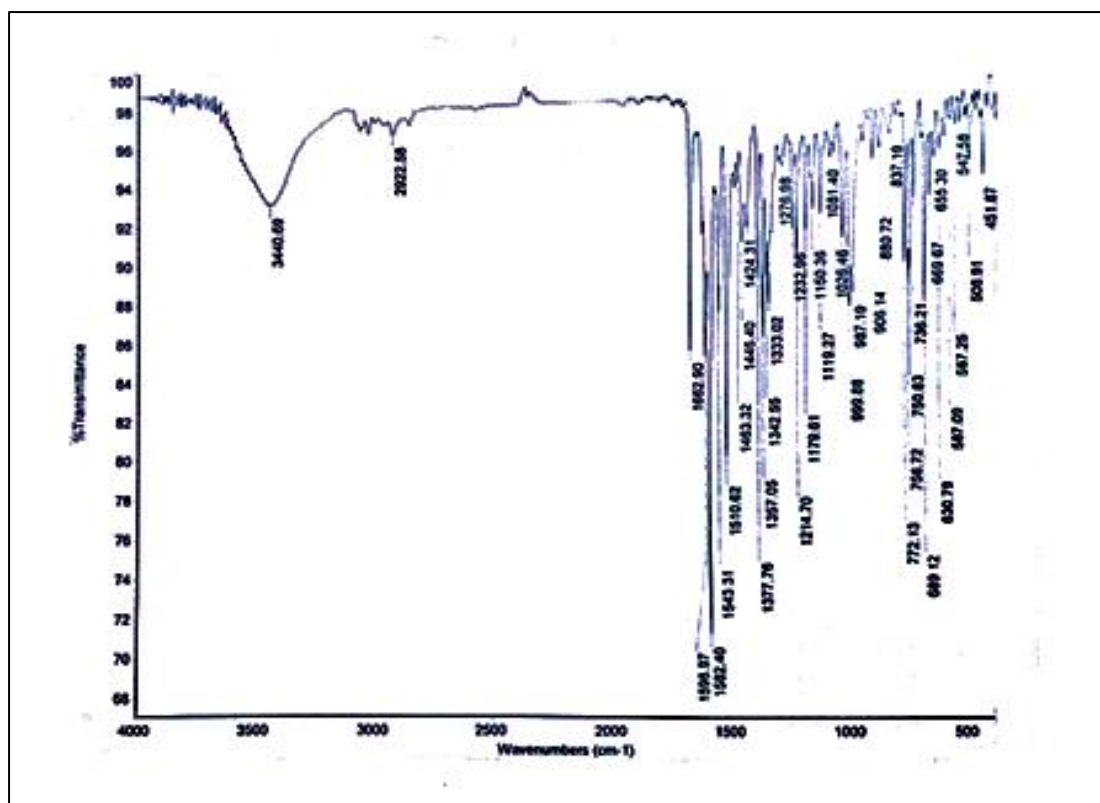


(Fig. 90), ¹³C-NMR spectrum of 3,6-dimethyl-5-(4-chlorobenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25i). CDCl₃.

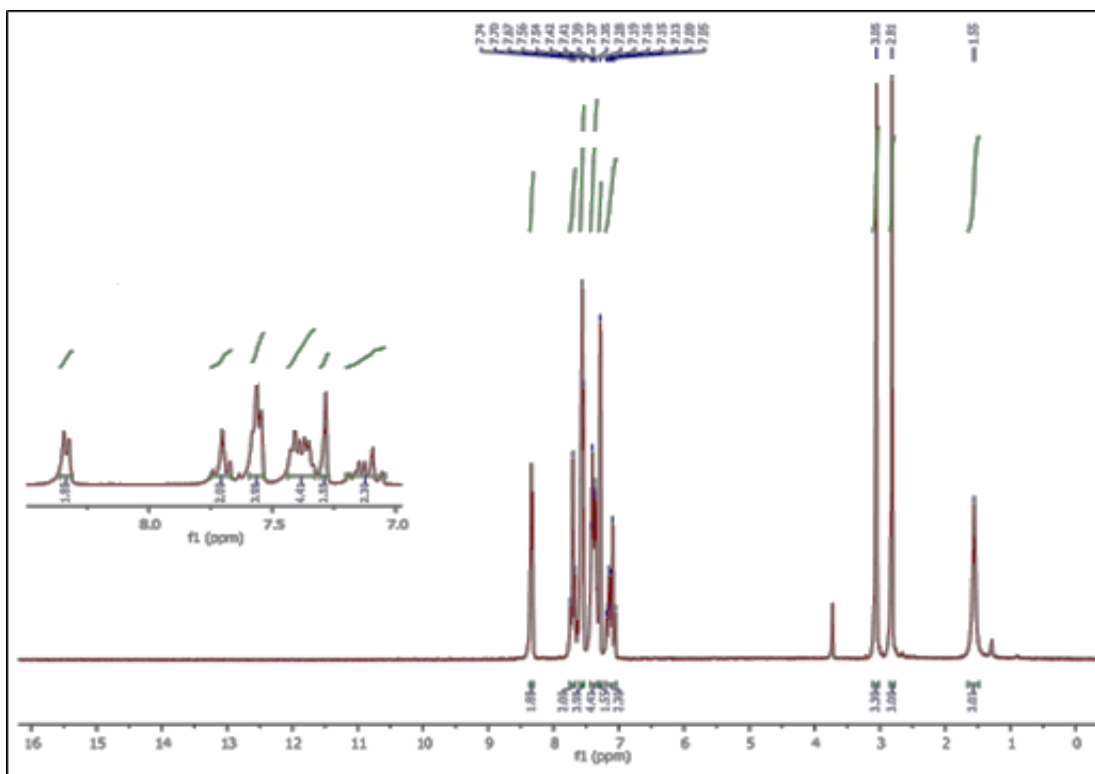


(Fig. 91), IR spectrum of 3,6-dimethyl-5-(3,4-dimethoxybenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25j).

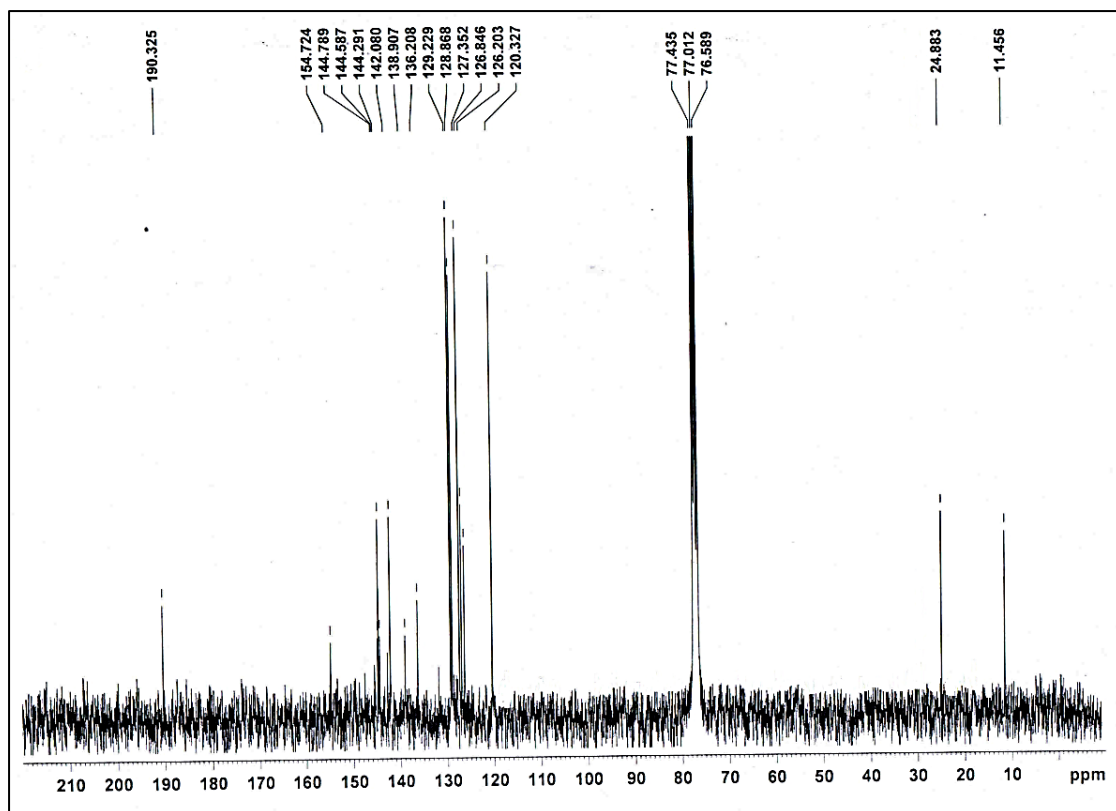




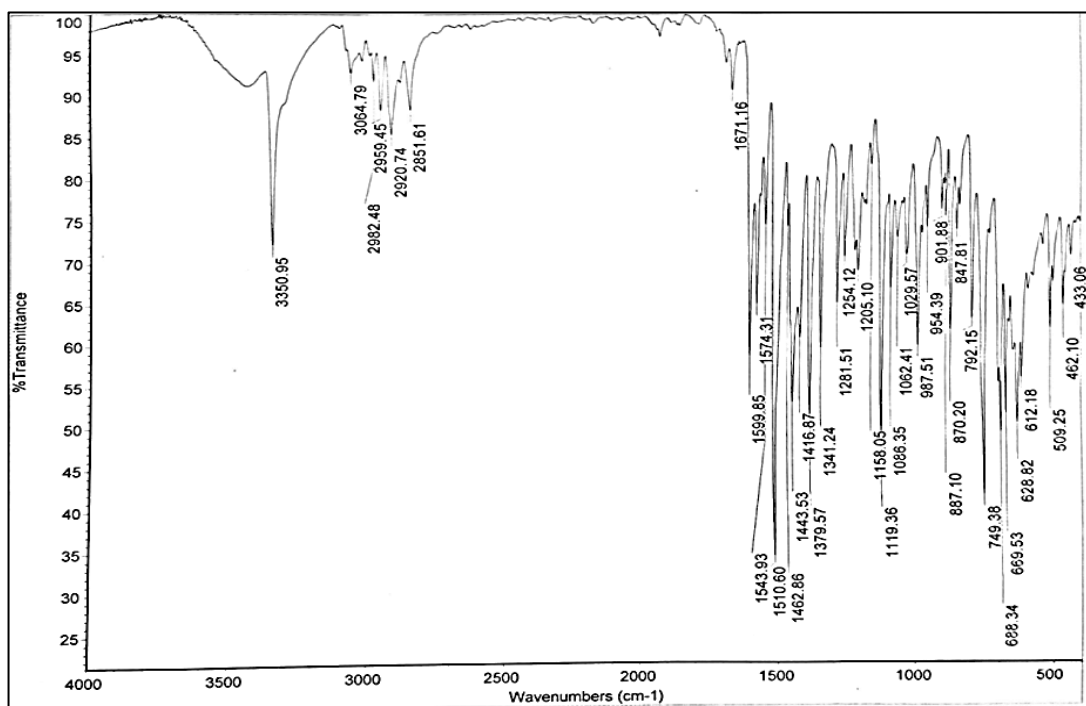
(Fig. 93), IR spectrum of 3,6-dimethyl-5-(ethene-2-ylbenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25k).



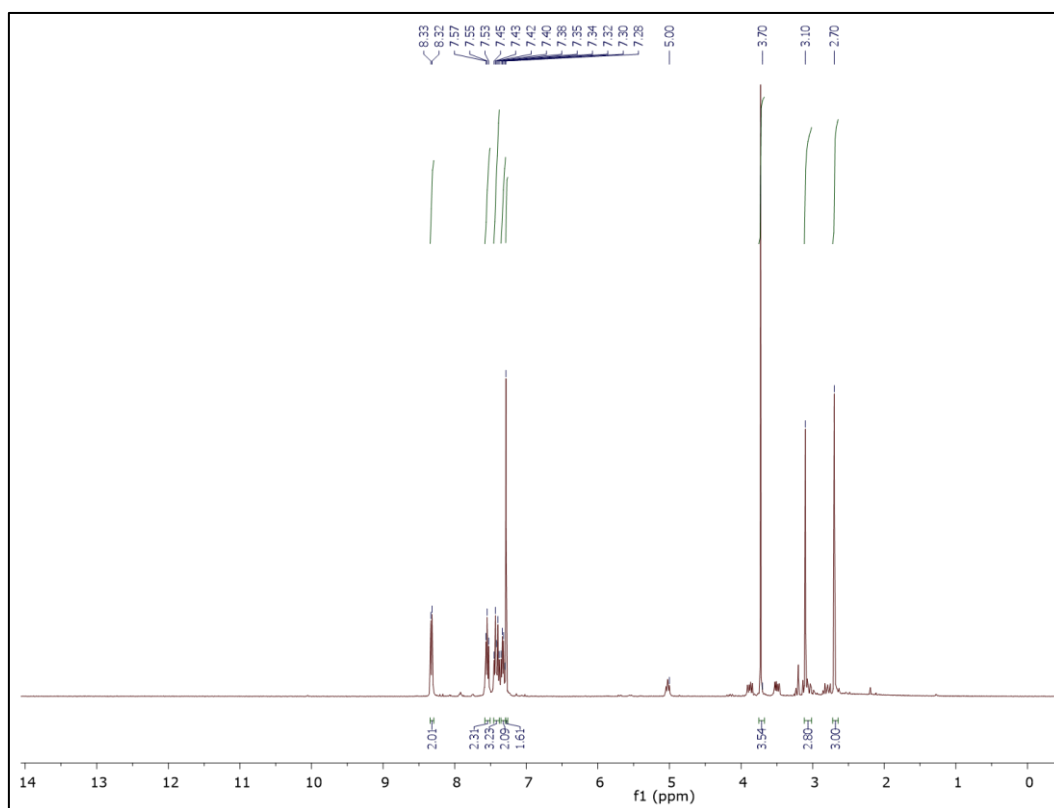
(Fig. 94), ¹H-NMR spectrum of 3,6-dimethyl-5-(ethene-2-ylbenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25k).CDCl₃



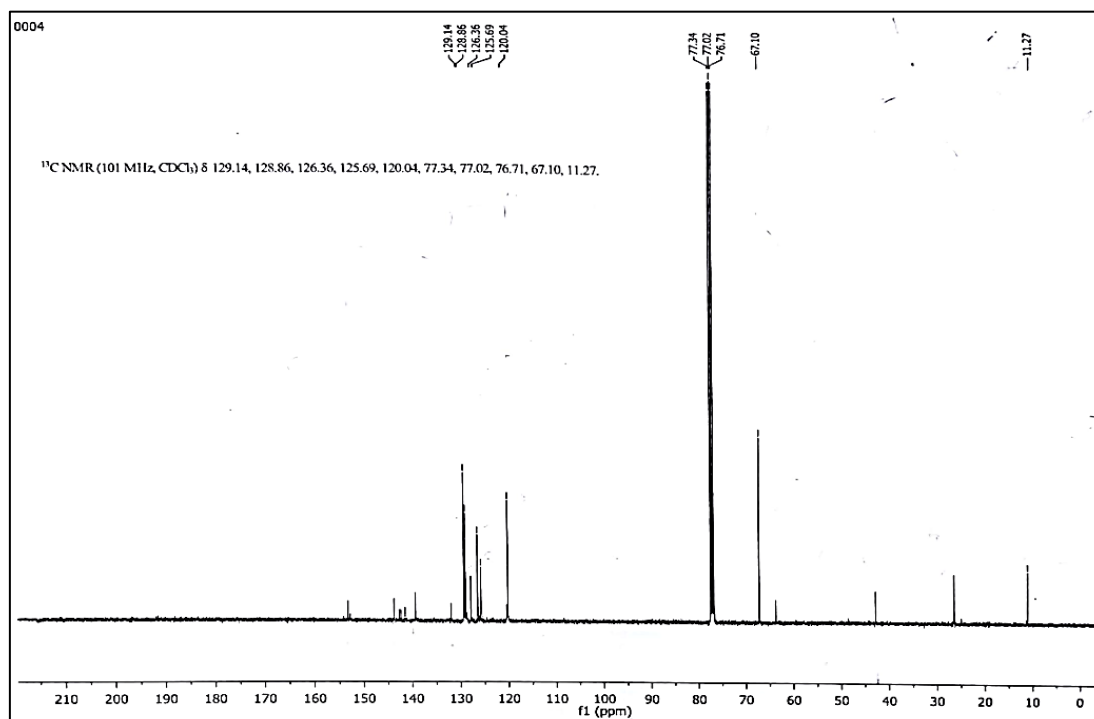
(Fig. 95), ¹³C-NMR spectrum of 3,6-dimethyl-5-(ethene-2-ylbenzylideneacetyl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (25k).CDCl₃



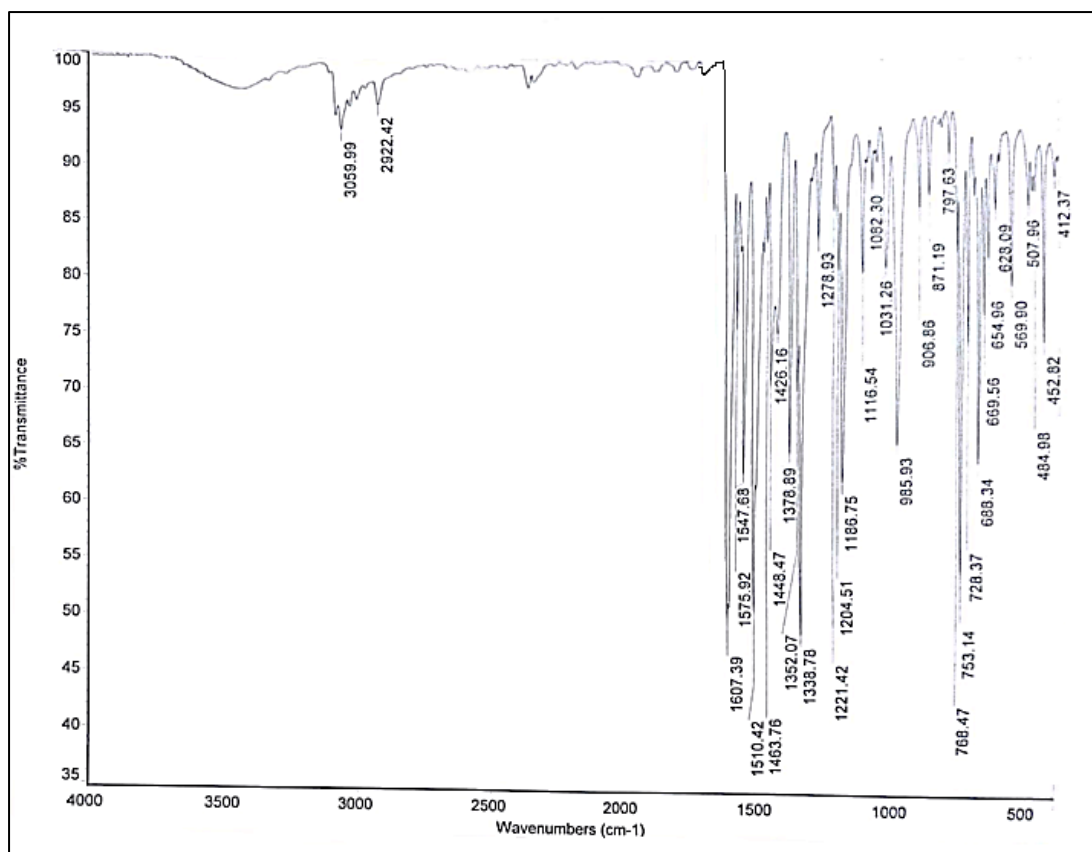
(Fig. 96), IR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (26).



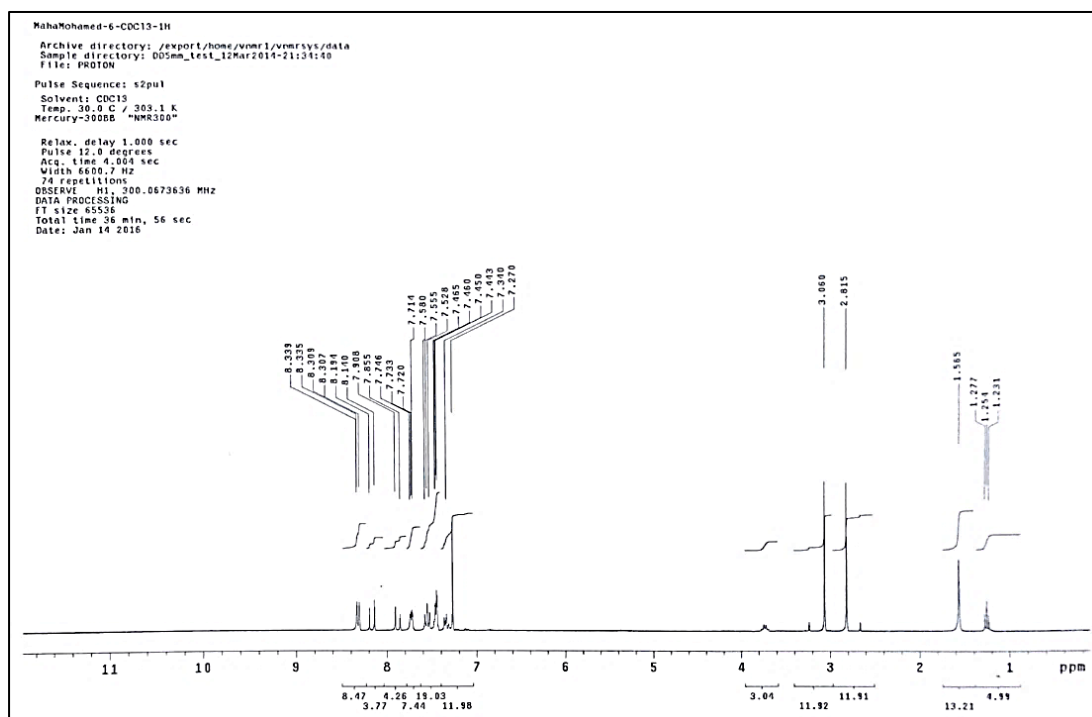
(Fig. 97), ^1H -NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (26). CDCl_3



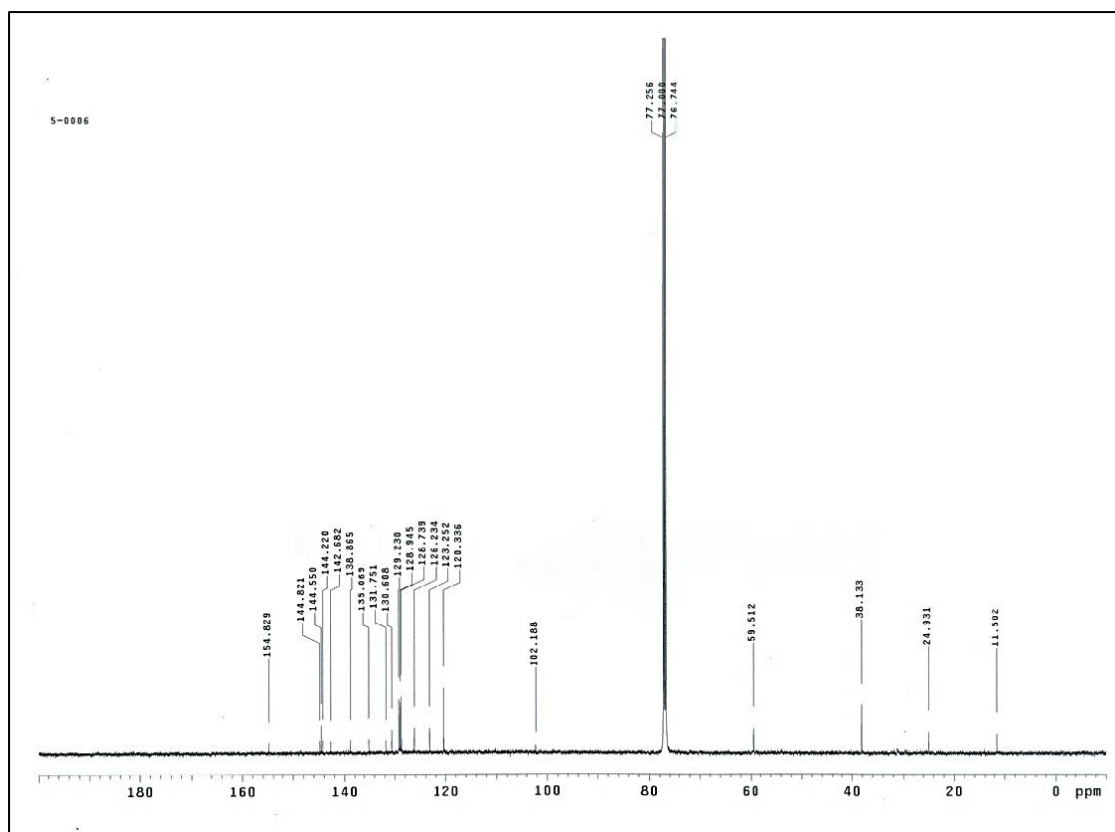
(Fig. 98), ^{13}C -NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine (26). CDCl_3



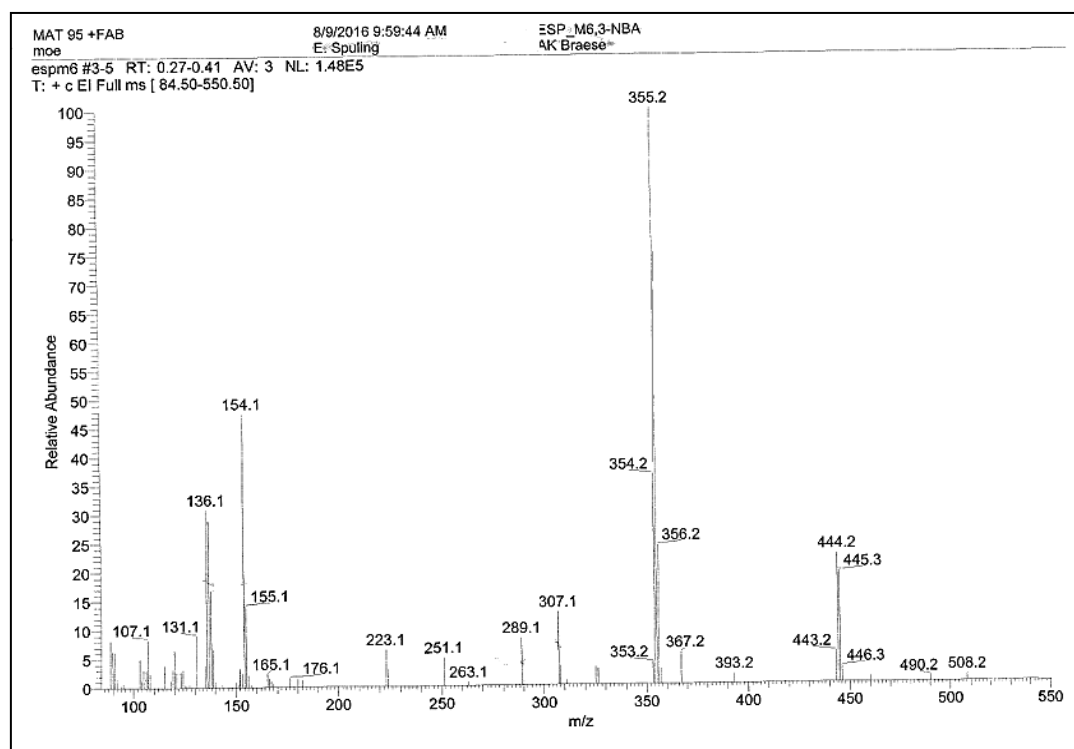
(Fig. 99), IR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1-phenyl-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (27).



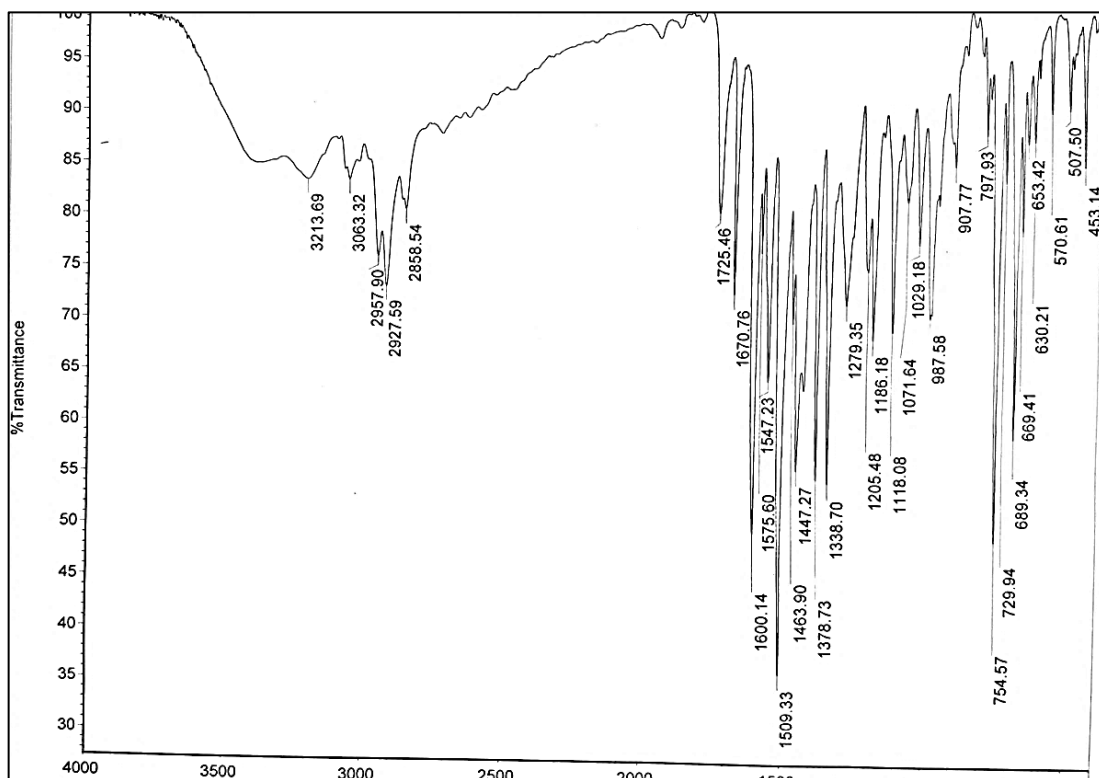
(Fig. 100), ¹H-NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1-phenyl-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (27).CDCl₃



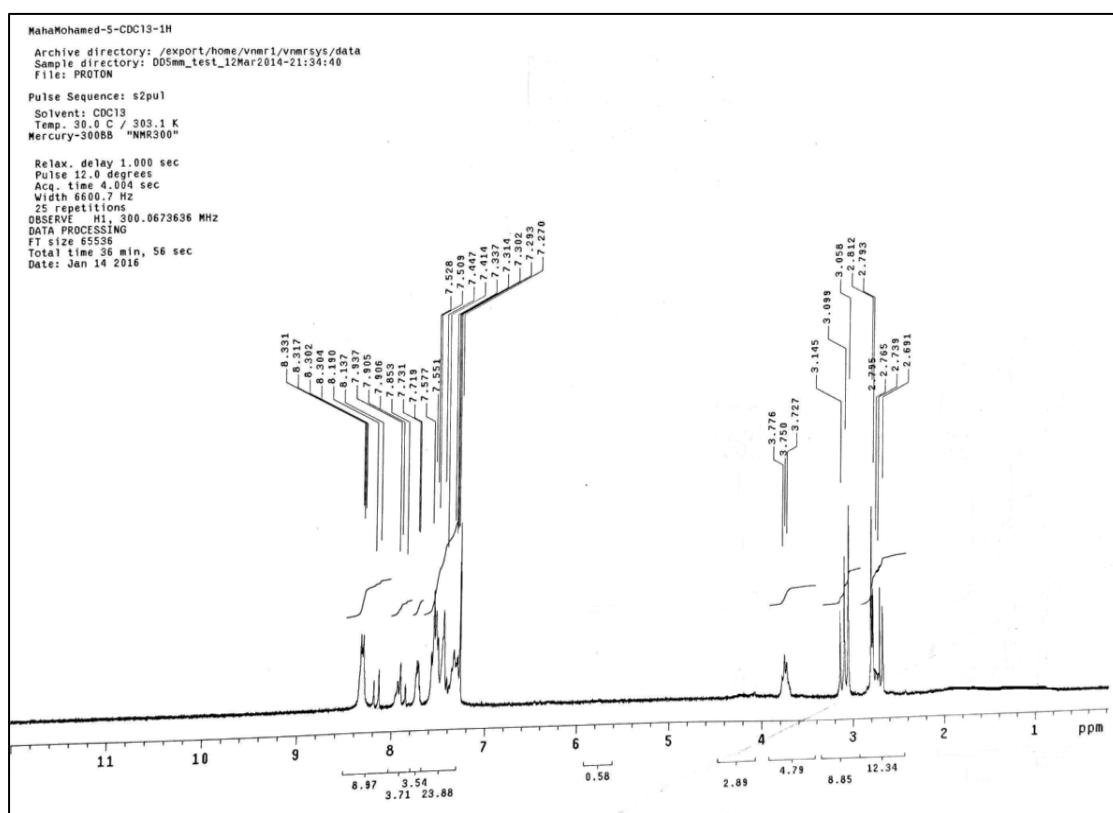
(Fig. 101), ^{13}C -NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1-phenyl-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (27). CDCl_3



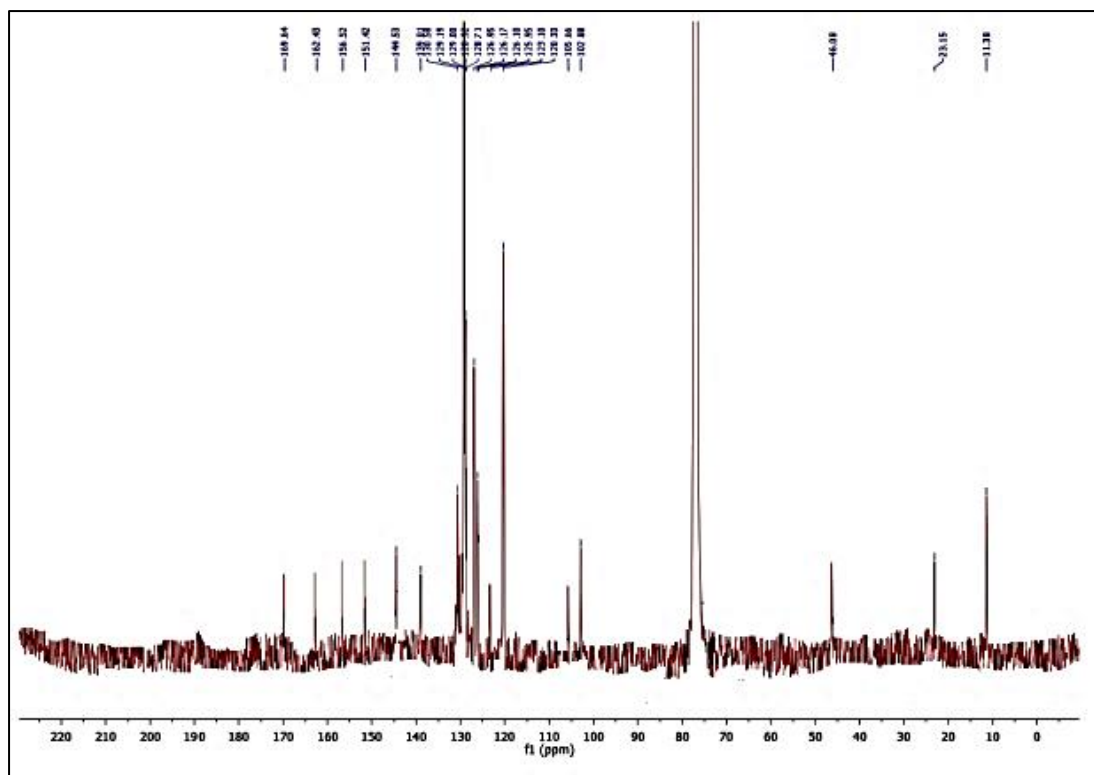
(Fig. 102), Mass spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro-1-phenyl-1H-pyrazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (27).



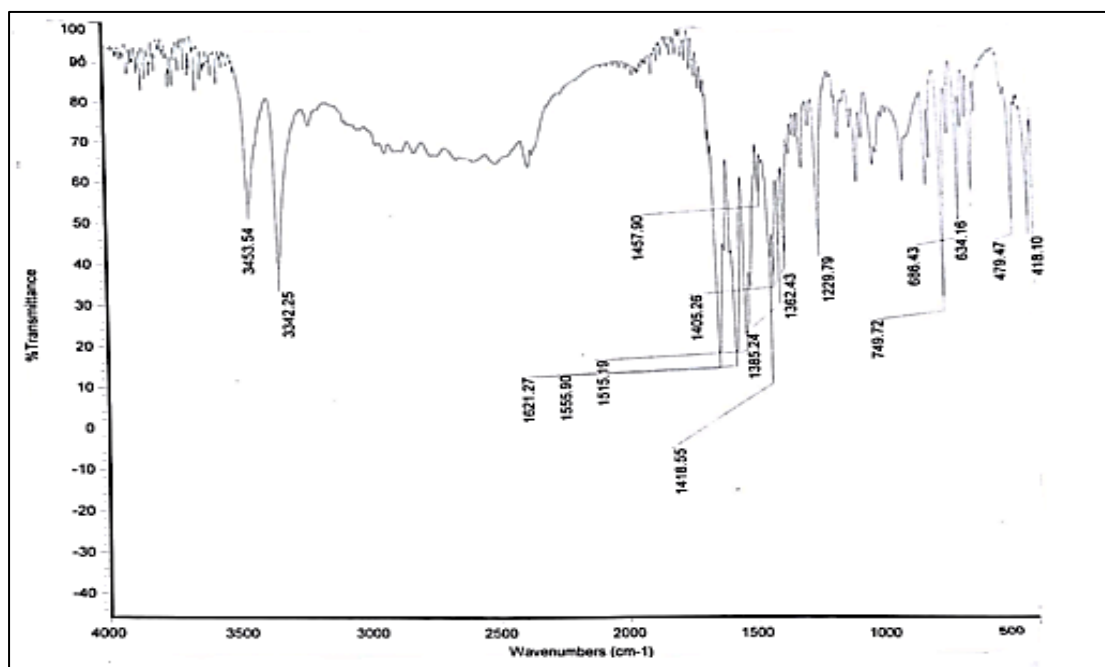
(Fig. 103), IR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro[1,2]oxazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (28).



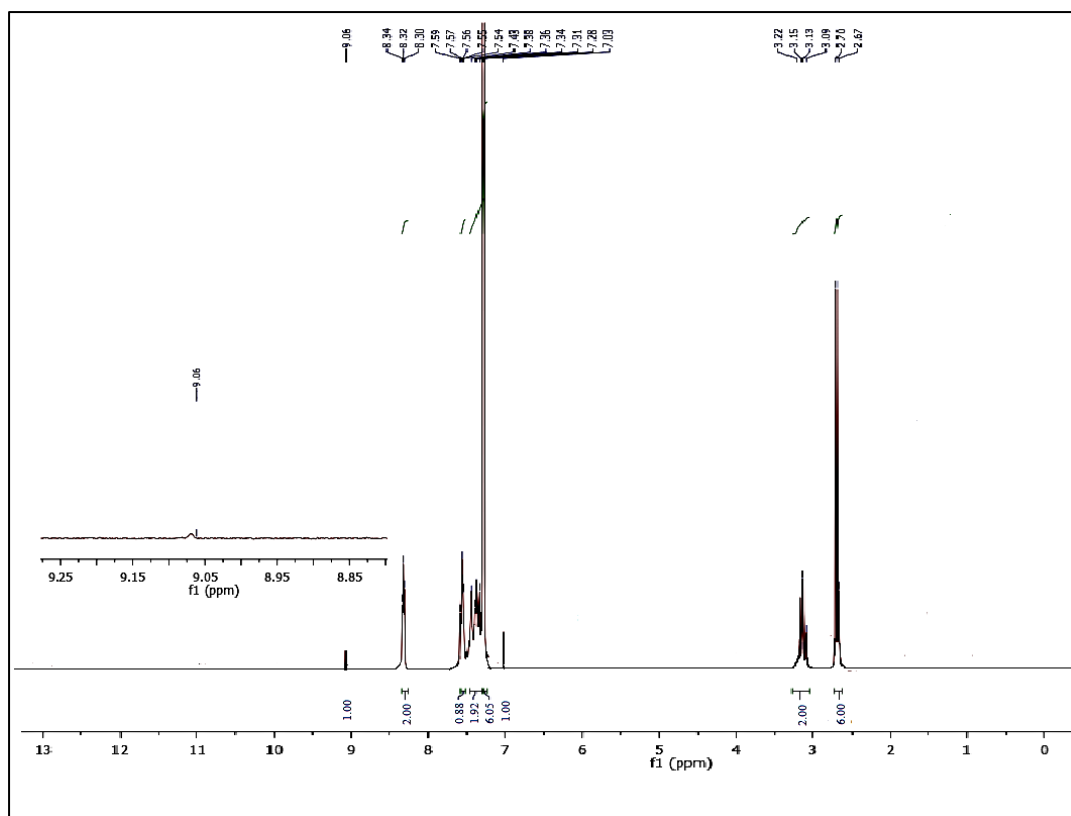
(Fig. 104), ¹H-NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro[1,2]oxazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (28).CDCl₃



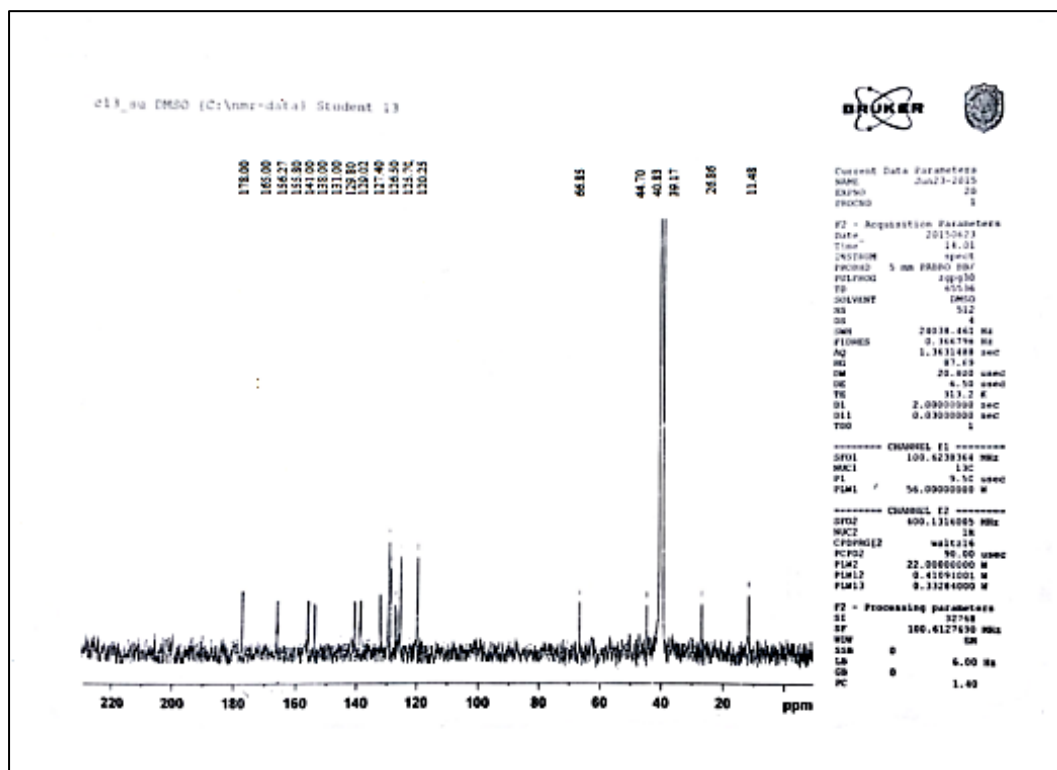
(Fig. 105), ^{13}C -NMR spectrum of 3,6-dimethyl-5-(5-phenyl-4,5-dihydro[1,2]oxazol-3-yl)-1-phenyl-1H-pyrazolo[3,4-b]pyrazine (**28**). CDCl_3



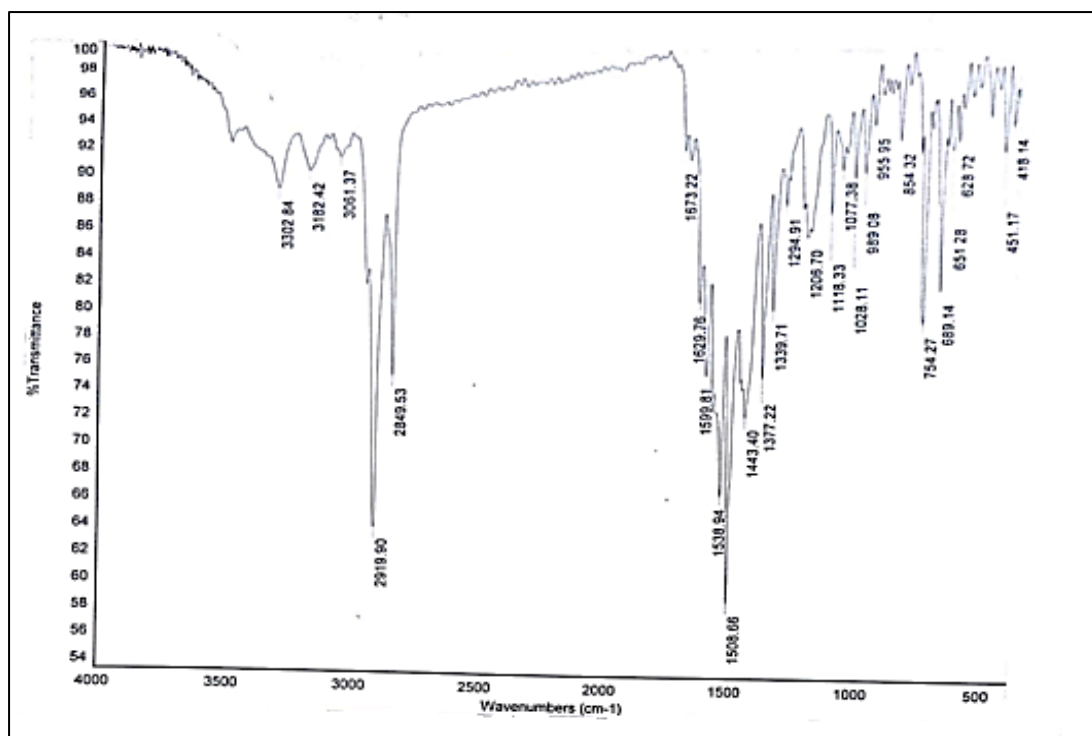
(Fig. 106), IR spectrum of 5-phenyl-4,5-dihydro-3-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-yl)pyrazole-1-carbothioamide (29)



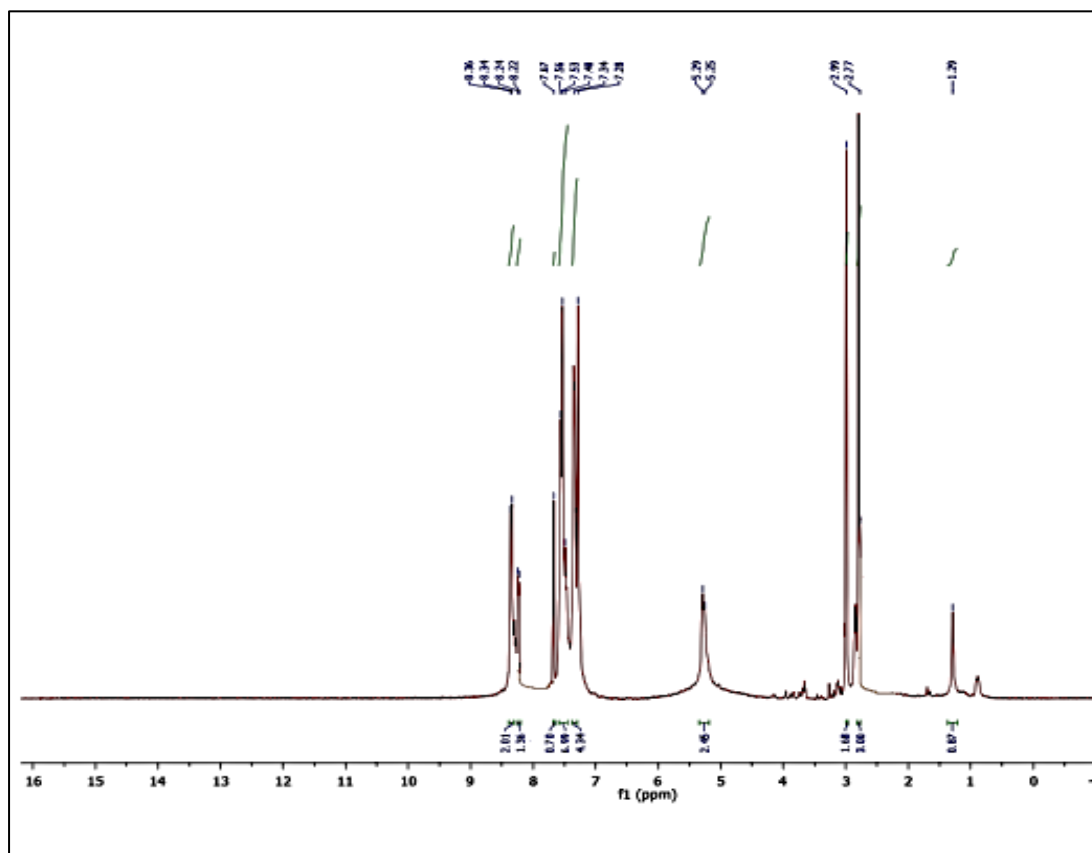
(Fig. 107), ^1H -NMR spectrum of 5-phenyl-4,5-dihydro-3-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-yl)pyrazole-1-carbothioamide (29). CDCl_3



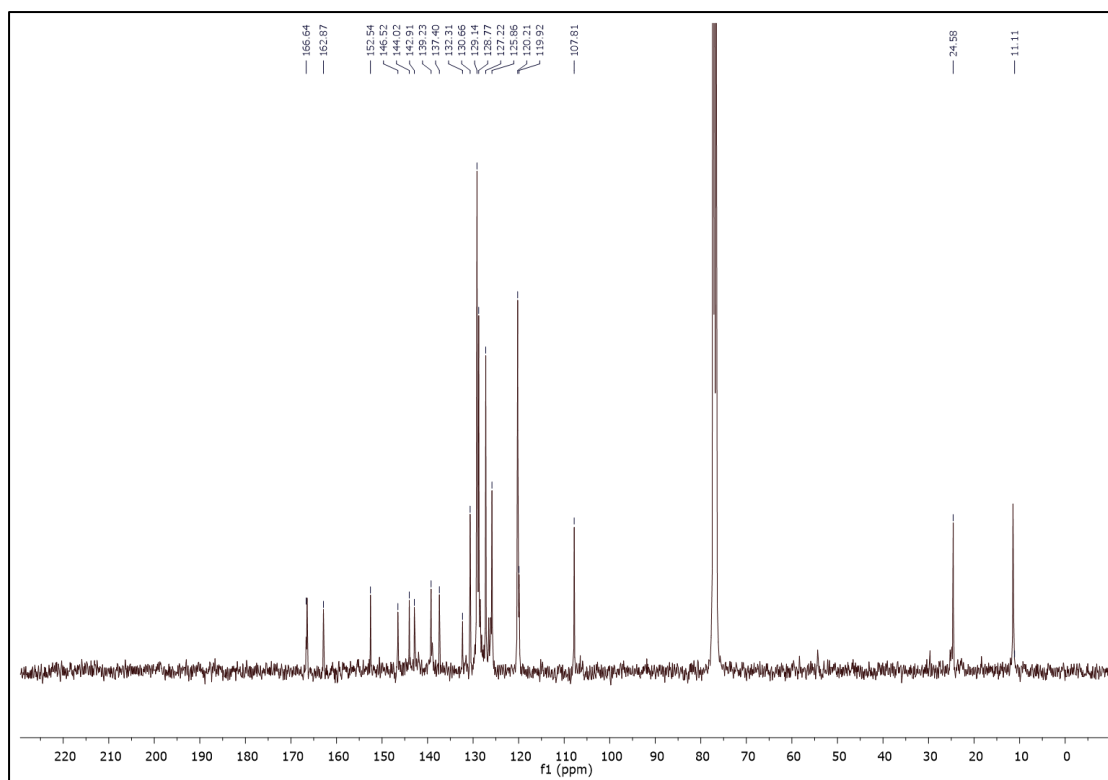
(Fig. 108), ^{13}C -NMR spectrum of 5-phenyl-4,5-dihydro-3-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-*b*]pyrazine-5-yl)pyrazole-1-carbothioamide (29). CDCl_3



(Fig. 109), IR spectrum of 2-amino-4-(4-phenyl)-6-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-yl)pyrimidine (30).



(Fig. 110), ¹H NMR spectrum of 2-amino-4-(4-phenyl)-6-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-yl)pyrimidine (30). CDCl₃



(Fig. 111), IR spectrum of 2-amino-4-(4-phenyl)-6-(3,6-dimethyl-1-phenyl-1H-pyrazolo[3,4-b]pyrazine-5-yl) pyrimidine (**30**).CDCl₃