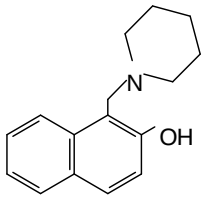
3-Results and Discussion

A targeted series of phenolic Mannich bases were synthesized via a general procedure. The structures of the final products were elucidated by a combination of spectral techniques.

3.1 Synthesis of the Mannich base 1



(1)

The Mannich base 1 was synthesized by addition of formalin to a mixture of β-naphthol and piperidine in absolute ethanol.The UV spectrum of base I (Fig. 1) showed λ_{max} (MeOH) 240.5, 277.5, 329.2 nm.

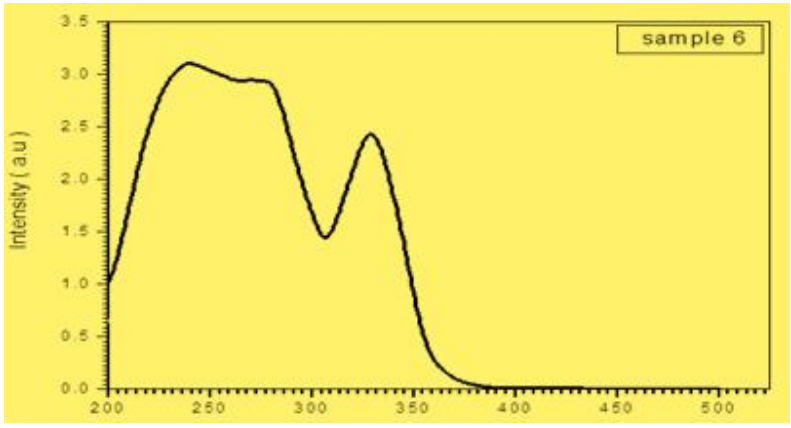


Fig 1: The UV spectrum of compound 1

The IR spectrum (Fig. 2) showed ν (KBr) 707,738,765,786,811,856 (C-H, Ar, bending). 1276(C-N). 1517, 1595(C=C, Ar). 2831, 2854, 2933(C-H, aliphatic), 3053cm^{-1}(OH) .

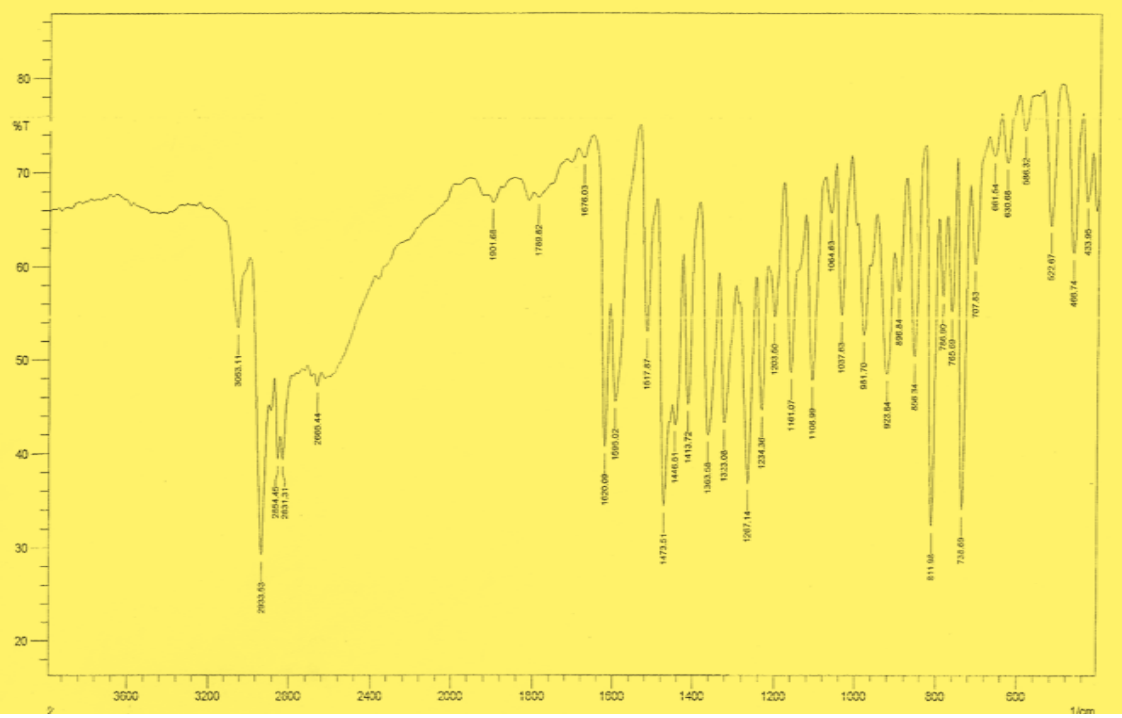


Fig 2: IR spectrum of compound 1

The ^{1}HNMR spectrum (Fig.3) showed:δ1.45(6H) assigned for () ; δ3.99(6H) accounting for the methylene bridge and the remaining methylenes of the piperidine moiety. The aromatic protons appeared at : δ 6.98,7.29,7.39,7.44,7.67 and 7.91ppm.The Mass spectrum (Fig. 4) gave m/z 241 for the molecular ion.

Fig3: ^{1}HNMR spectrum of compound I

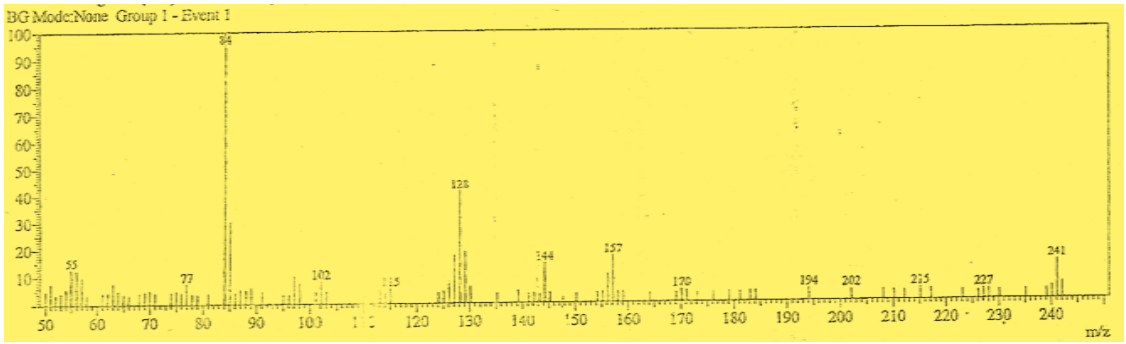
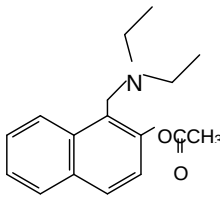


Fig.4: Mass spectrum of compound I

On the basis of the above spectral data structure 1 above was assigned for this Mannich base.

3.2- Synthesis of the Mannich base 2



(2)

The Mannich base 2 was synthesized by adding formalin to a mixture of β-naphthol and diethylamine in absolute ethanol. Then it was converted to the acetyl derivative. The UV spectrum of base 2 (Fig.5) showed λ_{max} (MeOH) 239 nm.

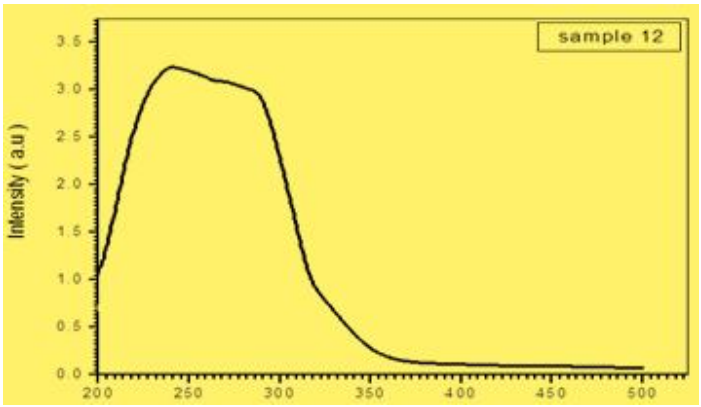


Fig 5: The UV spectrum of compound 2

The IR spectrum (Fig.6) showed ν (KBr) 746,813,858 (C-H,Ar. bending), 1236 (C-N). 1510,1562(C=C, Ar). 1357, 1407, 1433, 1460(C-H, aliphatic), 3419(N-H), 3284 (OH), 1685 (C=O) cm^{-1}.

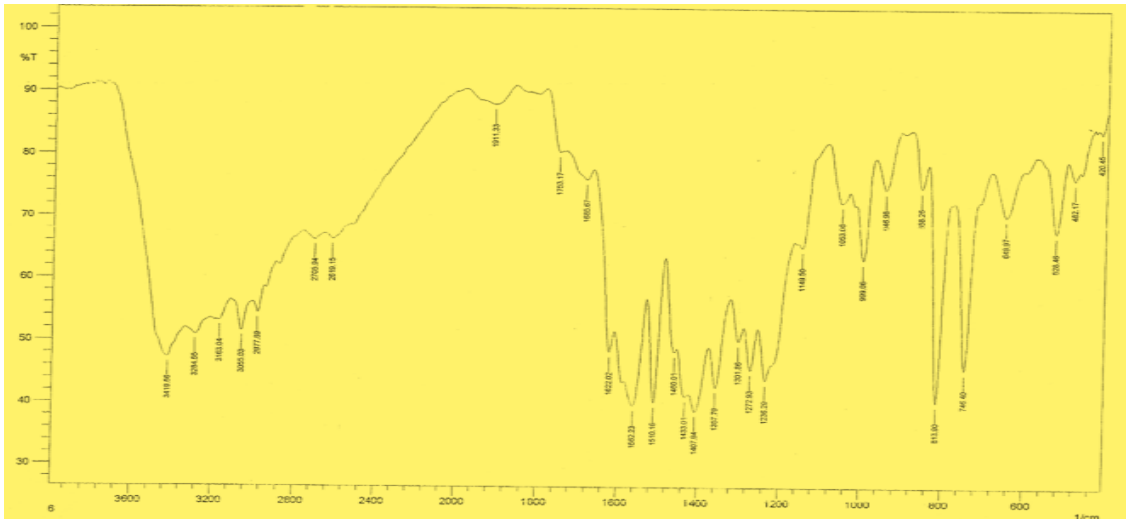


Fig 6: The IR spectrum of compound 2

The ^{1}HNMR spectrum (Fig. 7) showed: δ1.06(6H) assigned for two methyl groups ; δ1.84(6H) accounting for three methylenes linked to nitrogen; δ2.69(3H) attributed to the methyl of the acetate group.The aromatic protons appeared at : δ6.91-7.31(m),δ7.42-7.92(m) and 8.24(d).The Mass spectrum (Fig. 8) gave m/z 271 for the molecular ion.

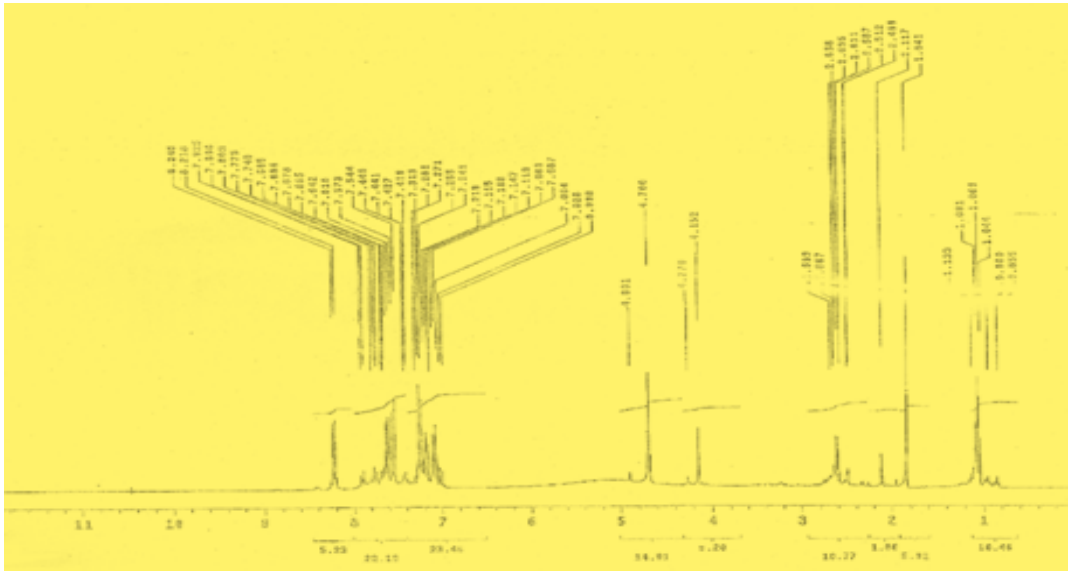


Fig7: ^{1}HNMR spectrum of compound 2

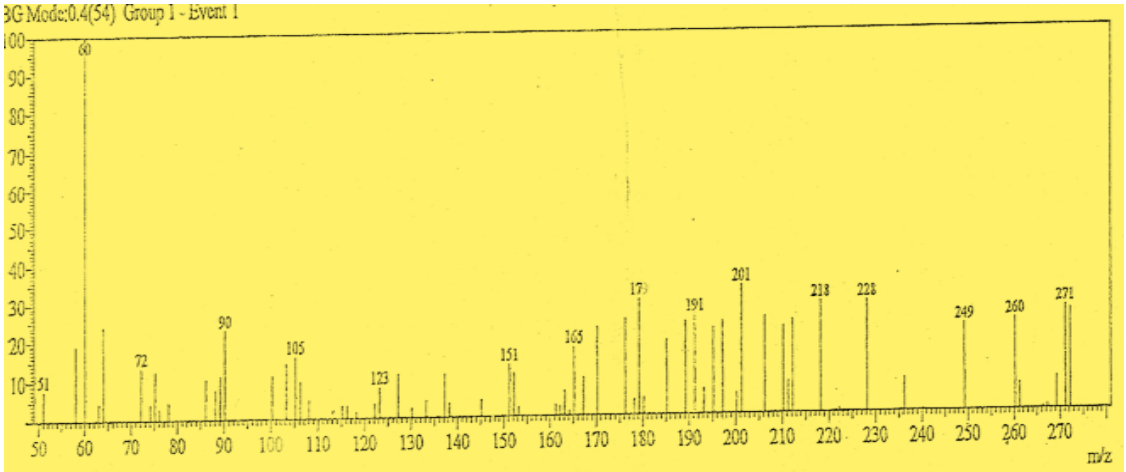
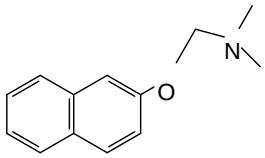


Fig.8: Mass spectrum of compound 2

On the basis of the above spectral data structure 2 above was assigned for this Mannich base.

3.3- Synthesis of the Mannich base 3



(3)

The Mannich base 3 was synthesized by adding formalin to a mixture of β-naphthol and dimethylamine in absolute ethanol. The UV spectrum of base 3 (Fig.9) showed λ_{max} (MeOH) 239,277,332 nm.

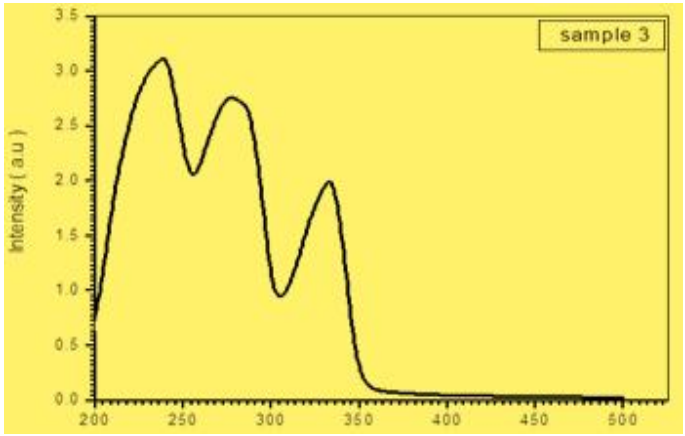


Fig 9: The UV spectrum of compound 3

The IR spectrum (Fig. 10) showed ν (KBr) : 667,742,810,858(C-H Ar bending), 1355 (C-N), 1512, 1593, 1620 (C=C Ar), 2941 (C-H aliphatic), 3051 (N-H) , 3325cm^{-1} (OH).

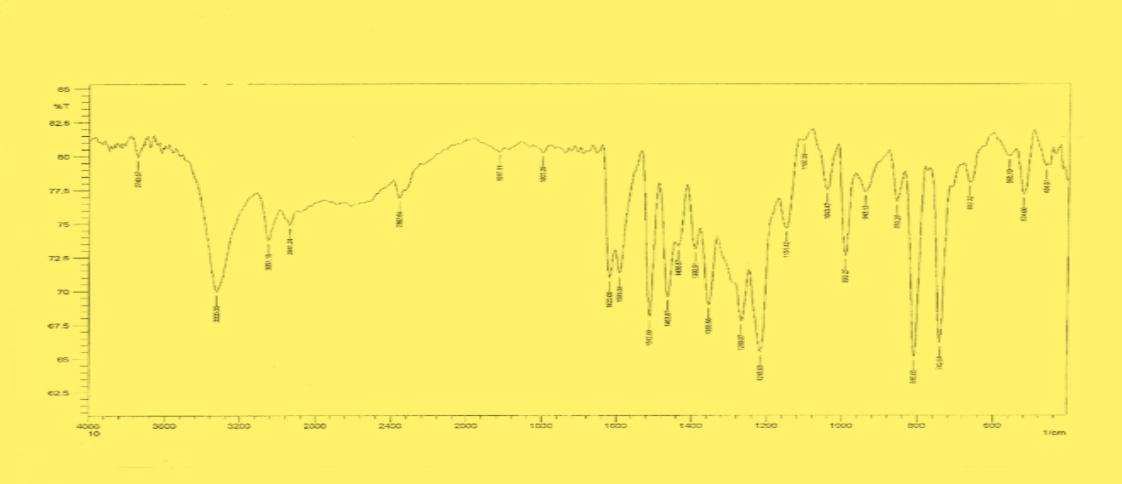


Fig 10: The IR spectrum of compound 3

The ^{1}HNMR spectrum (Fig. 11) showed: δ3.81(6H) assigned for two methyl groups ; δ4.71(2H) accounting for a methylene linked to nitrogen and oxygen; δ2.69(3H) attributed to the methyl of the acetate group.The aromatic protons appeared at : δ7.39,δ7.59,7.83 and 8.20.The Mass spectrum (Fig 12) gave m/z 201 for the molecular ion.

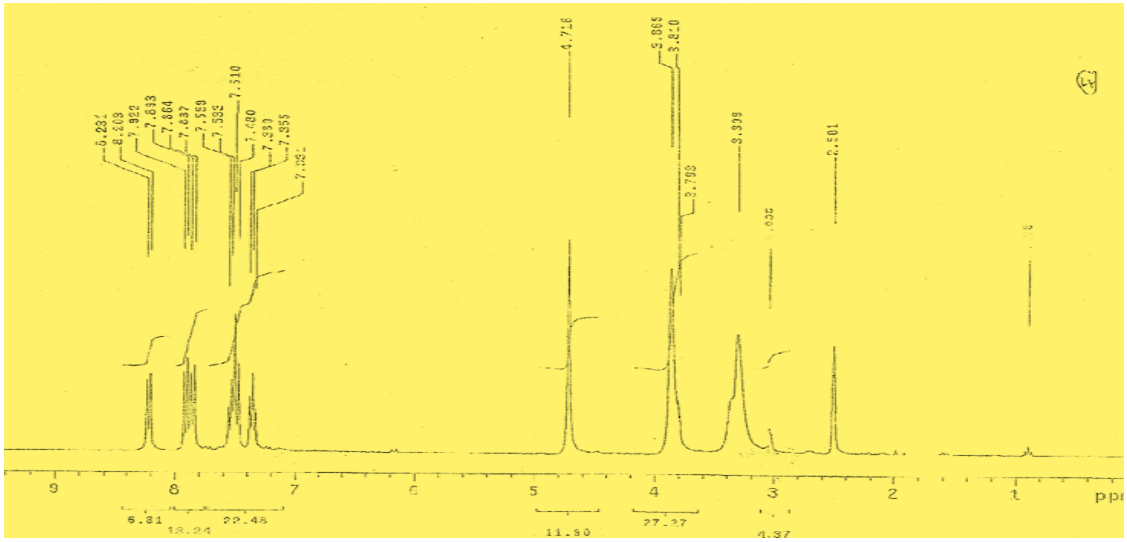


Fig11: ^{1}HNMR spectrum of compound 3

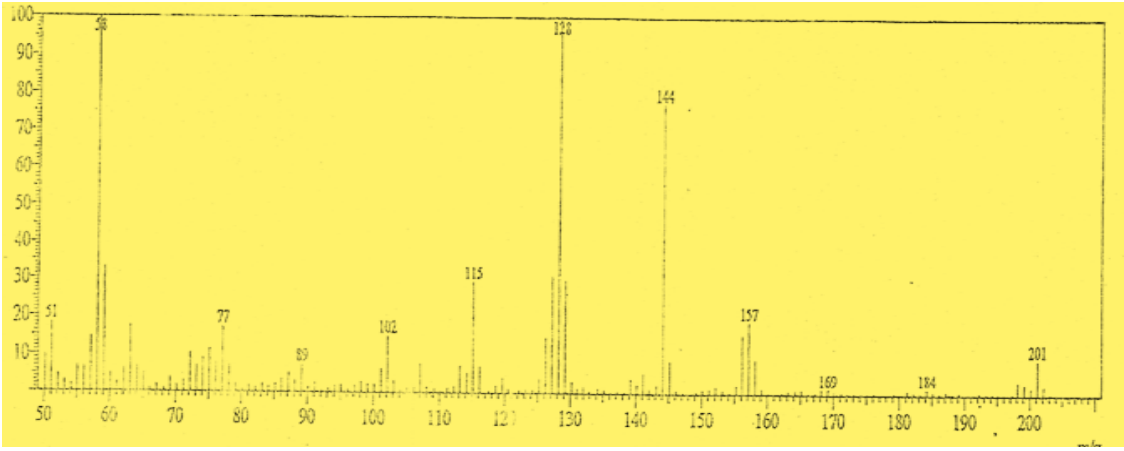
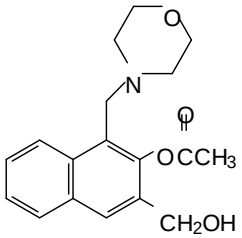


Fig12: The Mass spectrum of compound 3

On the basis of the above spectral data structure 3 above was assigned for this Mannich base.

3.4- Synthesis of the Mannich base 4



(4)

The Mannich base 4 was synthesized by adding formalin to a mixture of β-naphthol and morpholine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 4 (Fig.13) showed λ_{max} (MeOH) 236,276,327 nm.

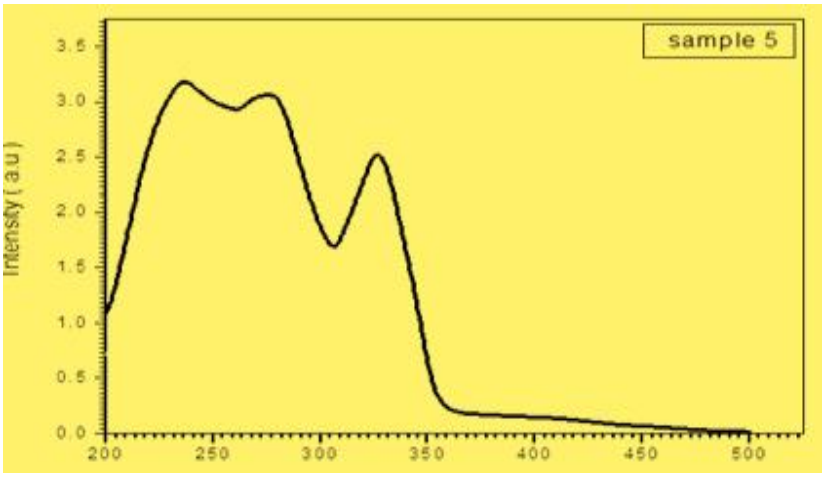


Fig 13: The UV spectrum of compound 4

The IRspectrum (Fig.14)showed ν (KBr) 703,752,823,864(C-H, Ar bending), 1251 (C-N), 1514, 1579, 1606 (C=C Aromatic),1698 (C=O),2750,2882 (C-H aliphatic), 3450cm^{-1} (N-H).

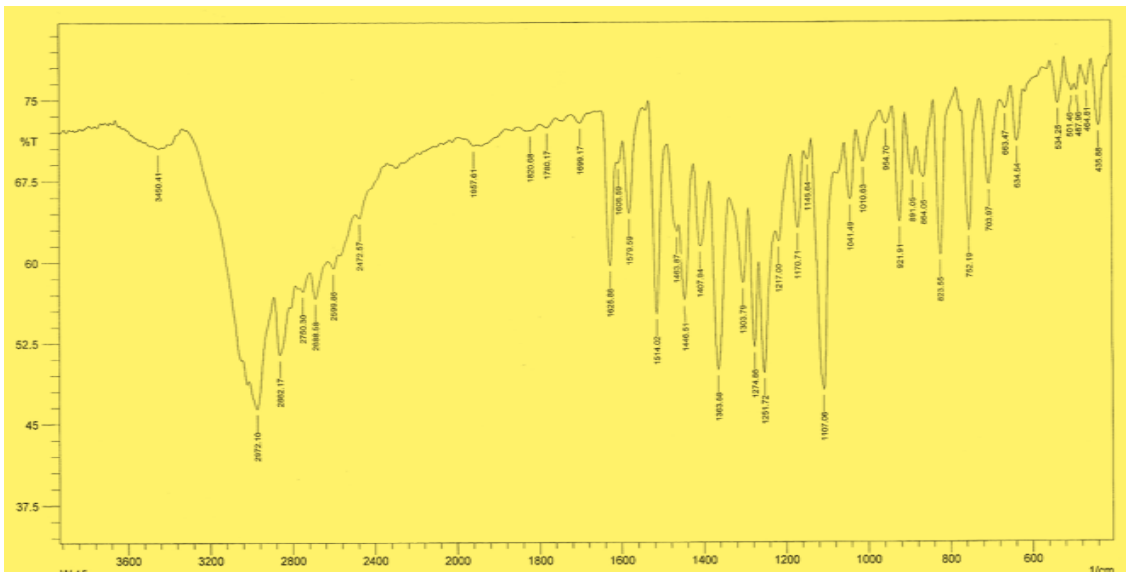


Fig 14: The IR spectrum of compound 4

The ^{1}HNMR spectrum (Fig. 15) showed: δ3.81(6H) assigned for one methyl group and three methylenes linked to nitrogen ; δ4.71(2H) accounting for two methylenes linked to oxygen; δ2.69(3H) attributed to the methyl of the acetate group.The aromatic protons appeared at : δ7.33,δ7.51,7.85 and 8.23.The Mass spectrum (Fig 16) gave m/z 317for the (M^{+} + 2H).

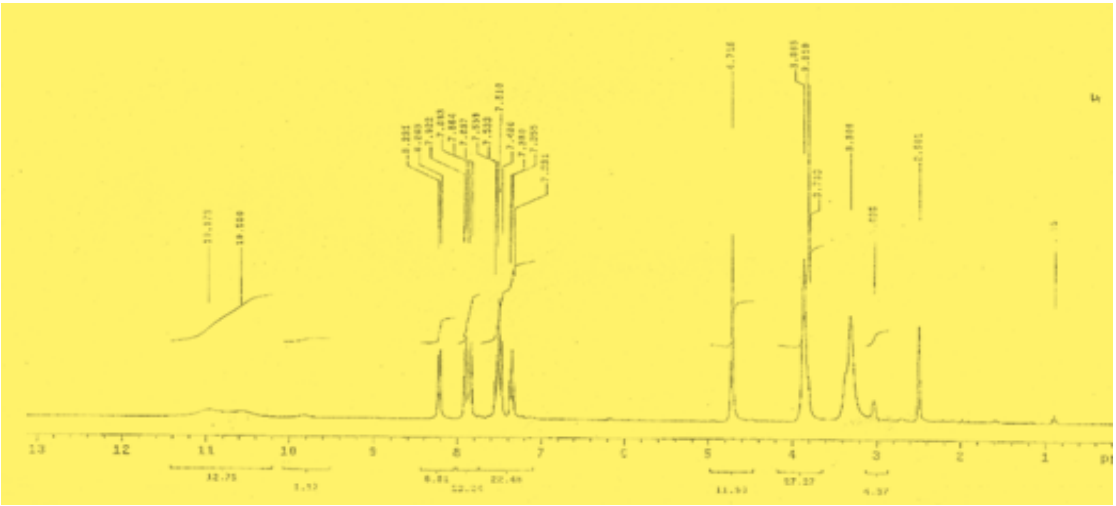


Fig15: ^{1}HNMR spectrum of compound 4

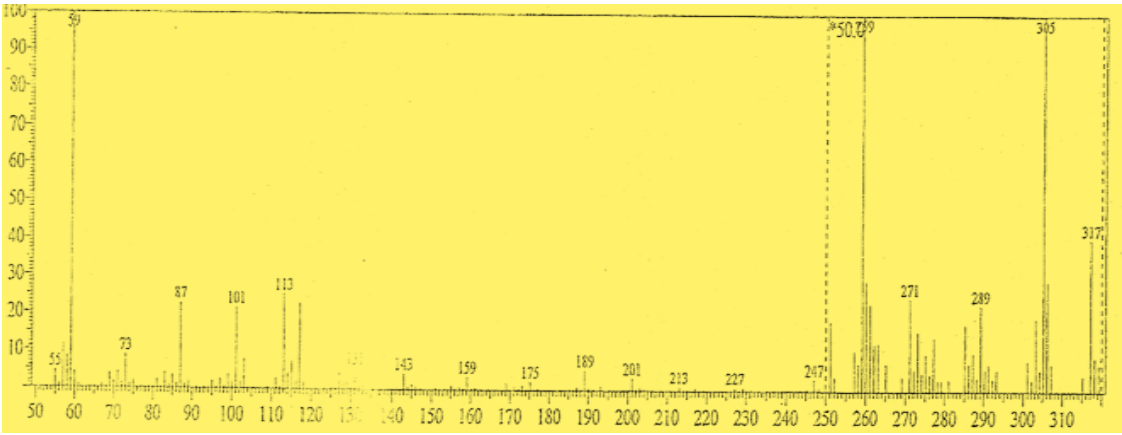
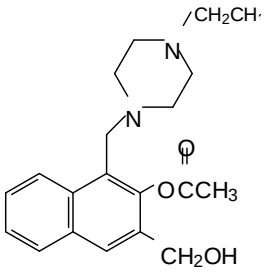


Fig 16: The Mass spectrum of compound 4

On the basis of the above spectral data structure 4 above was assigned for this Mannich base.

3.5 Synthesis of the Mannich base 5



(5)

The Mannich base 5 was synthesized by adding formalin to a mixture of β-naphthol and N-ethylpiperazine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 5 (Fig.17) showed λ_{max} (MeOH) 237,280 nm.

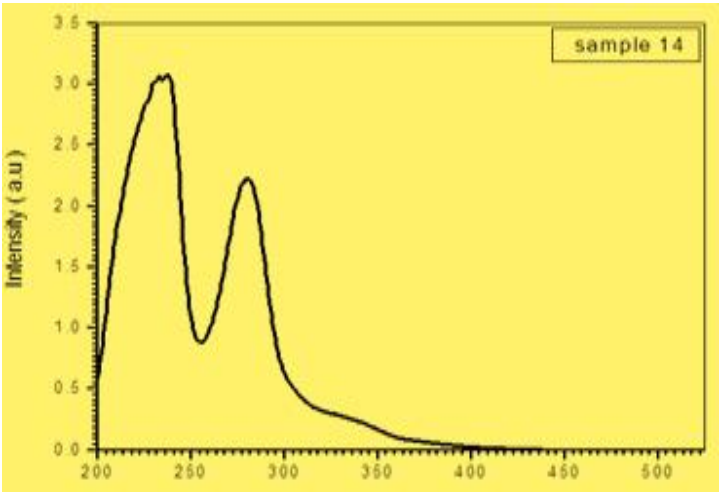


Fig 17: The UV spectrum of compound 5

The IR spectrum (Fig. 18) showed ν (KBr) :702, 744, 811, 854 (C-H, Ar. bending), 1280(C-N). 1510(C=C Ar),1733 (C=O) , 2945 (C-H aliphatic), 3433cm^{-1} (N-H).

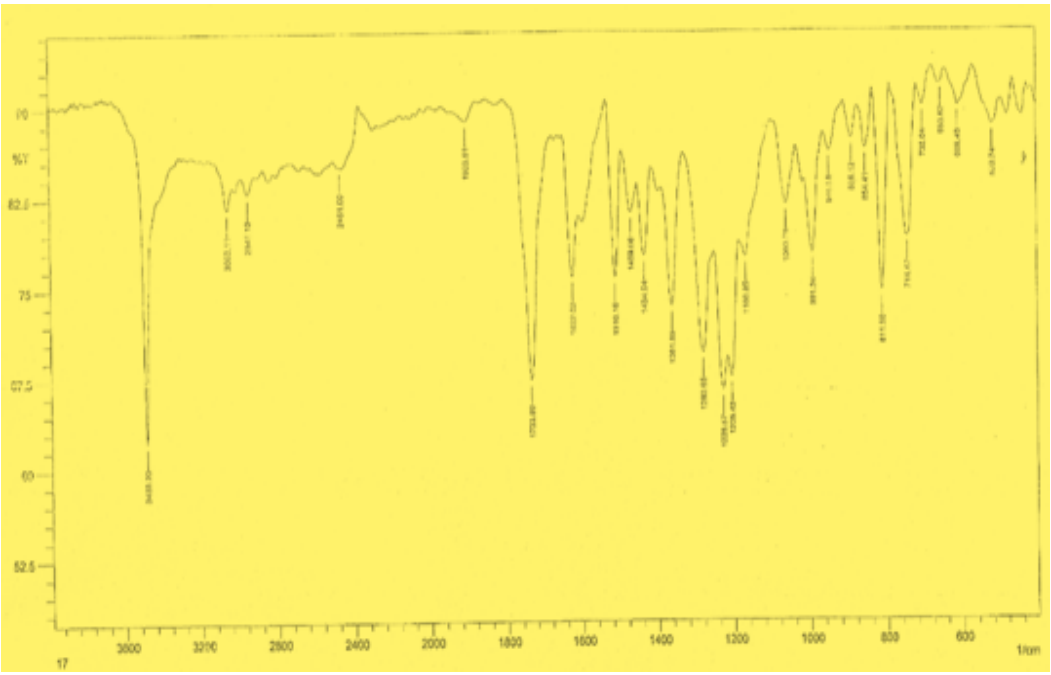


Fig 18: The IR spectrum of compound 5

The ^{1}HNMR spectrum (Fig. 19) showed: δ1.84- 2.45(m,6H) assigned for one ethyl group and six methylenes ; δ4.01(2H) accounting for a methyl group; δ2.69(3H) attributed to the methyl of the acetate group.The aromatic protons appeared at : δ7.12- ,δ7.95(m,6H).The Mass spectrum (Fig 20) gave m/z 342 for M^{+}.

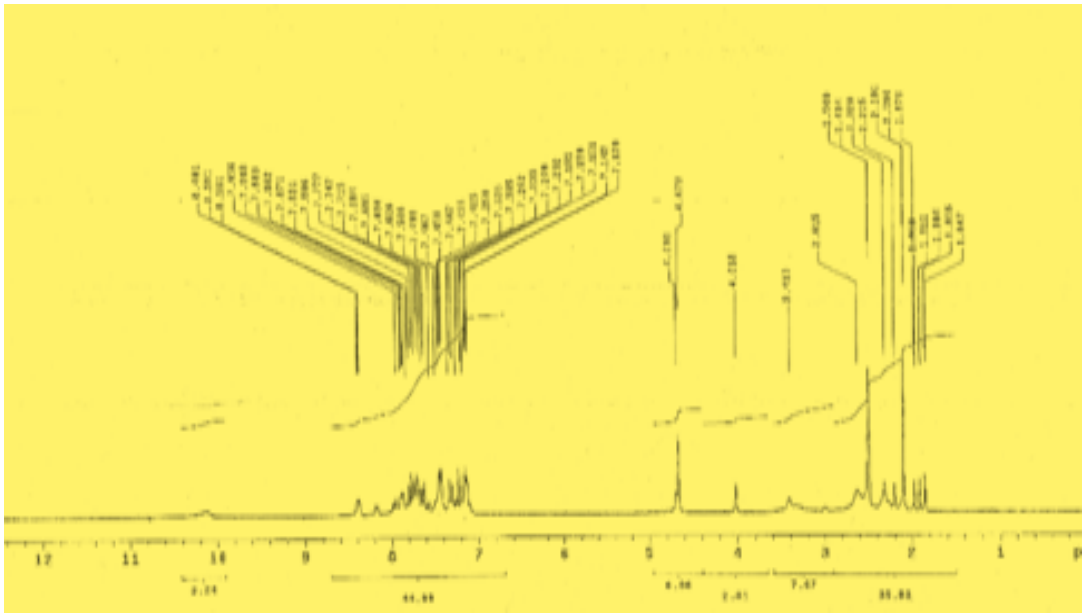


Fig19: ^{1}HNMR spectrum of compound 5

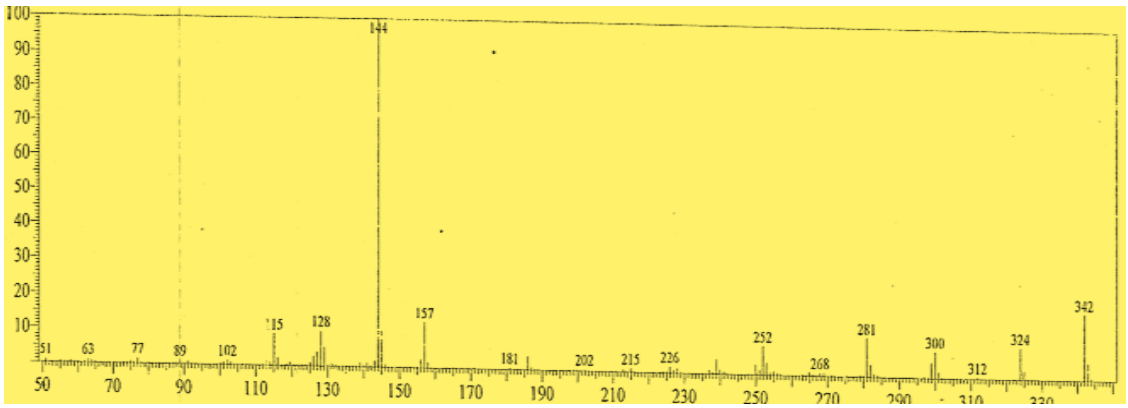
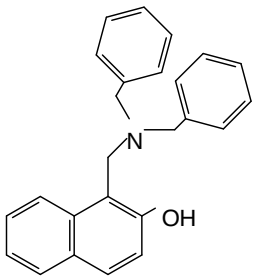


Fig 20: The Mass spectrum of compound 5

On the basis of the above spectral data structure 5 above was assigned for this Mannich base.

3.6 Synthesis of the Mannich base 6

The Mannich base 6 was synthesized by adding formalin to a mixture of



(6)

β-naphthol and dibenzylamine in absolute ethanol. The UV spectrum of base 6 (Fig.21) showed λ_{max} (MeOH) 235,279,327 nm.

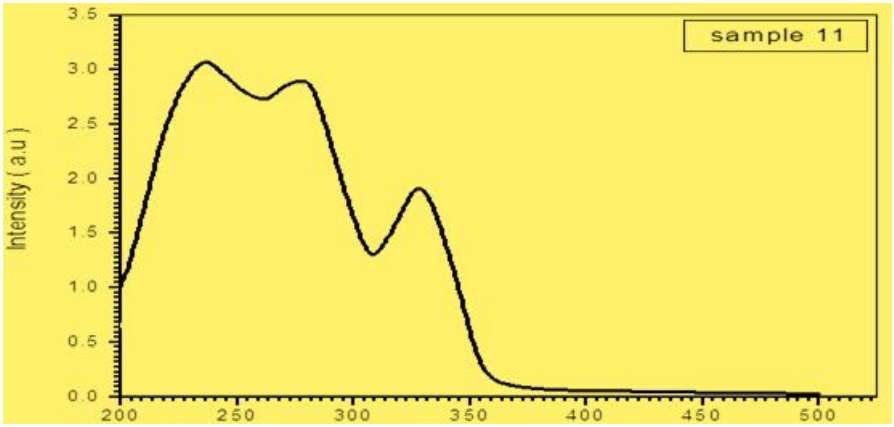


Fig 21: The UV spectrum of compound 6

The IR spectrum (Fig. 22) showed ν (KBr). 700,750, 817, 854 (C-H, Ar. bending), 1261 (C-N), 1515, 1593 (C=C, Ar.), 2852, 2896, 2916(C-H aliphatic) , 3028cm^{-1}(N-H).

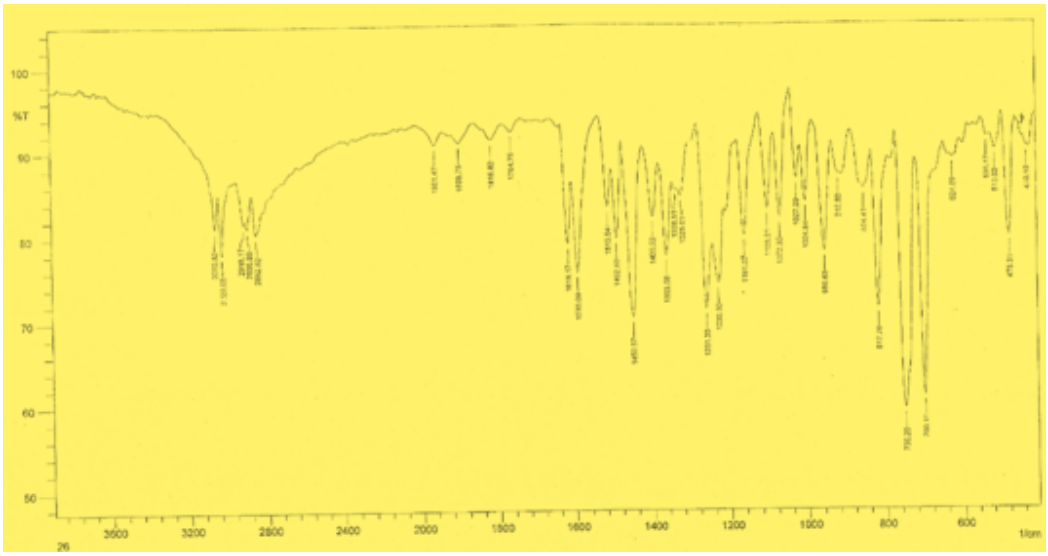


Fig 22: The IR spectrum of compound 6

The ^{1}HNMR spectrum (Fig.23) showed: δ3.57(4H) assigned for two methylene groups ; δ4.00(2H) accounting for a methylene function.The aromatic protons appeared at : δ7.03, 7.30 and 7.38- 7.84(m).The Mass spectrum (Fig 24) gave m/z 353 for M^{+}.

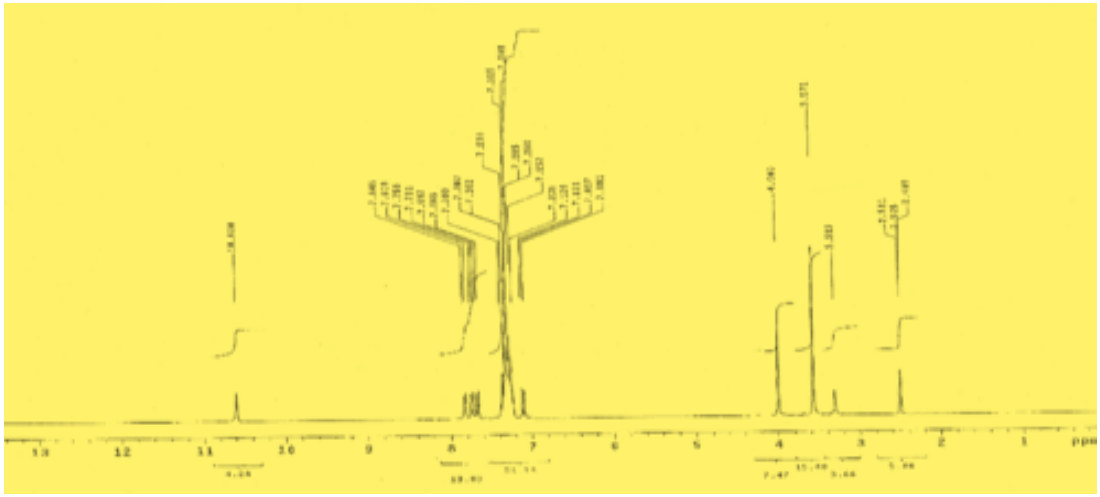


Fig23: ^{1}HNMR spectrum of compound 6

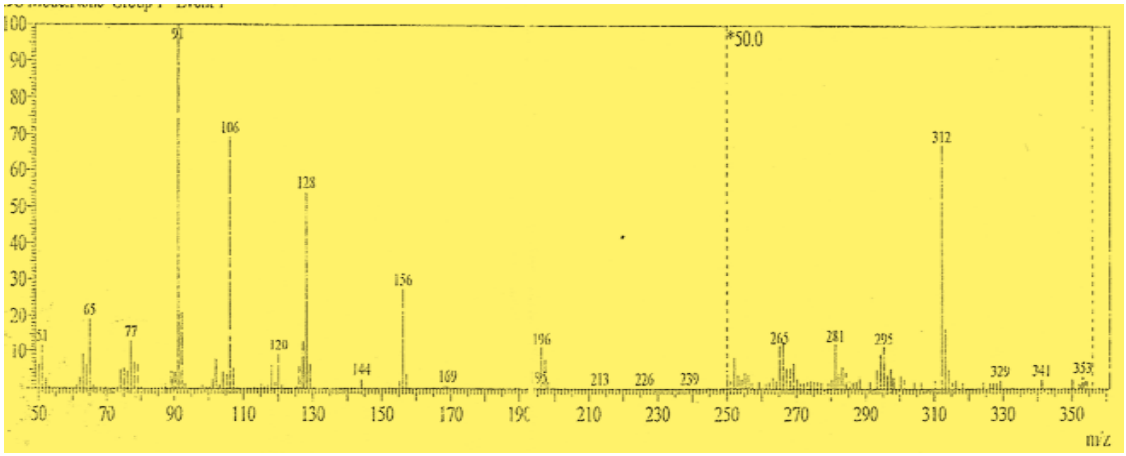
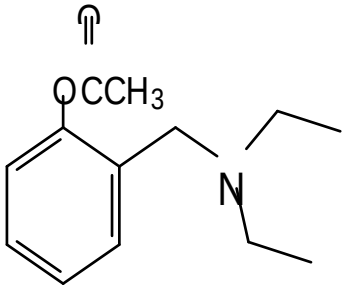


Fig 24: The Mass spectrum of compound 6

On the basis of the above spectral data structure 6 above was assigned for this Mannich base.

3.7 Synthesis of the Mannich base 7



(7)

The Mannich base 7 was synthesized by adding formalin to a mixture of phenol and diethylamine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 7 (Fig.25) showed λ_{max} (MeOH) 237,280 nm.

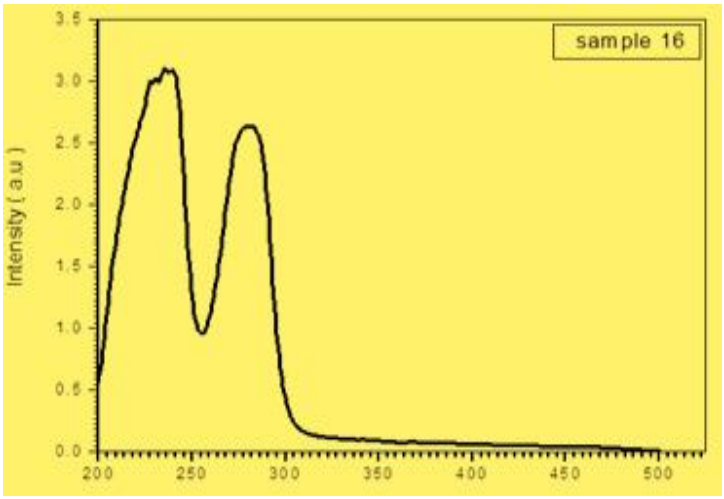


Fig. 25: The UV spectrum of compound 7

The IR spectrum (Fig .26) showed ν (KBr): 761,827 (C-H, Ar., bending), 1269 (C-N), 1510, 1577 (C=C Ar), 1600(C=O) , 2935, 2979 (C-H,aliphatic). 3001 (N-H) cm-1.

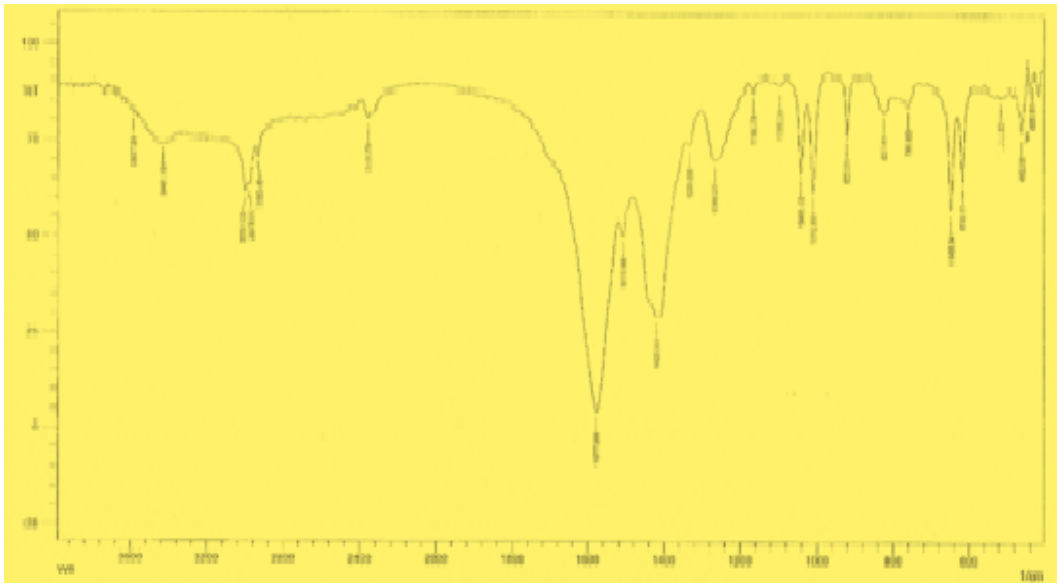


Fig. 26: The IR spectrum of compound 7

The ^{1}HNMR spectrum (Fig.27) showed: δ1.00 ,δ1.67 (10H) assigned for two ethyl groups.The aromatic protons appeared as multiplet at : δ6.63-6.94ppm.The Mass spectrum (Fig 28) gave m/z 221 for M^{+}.

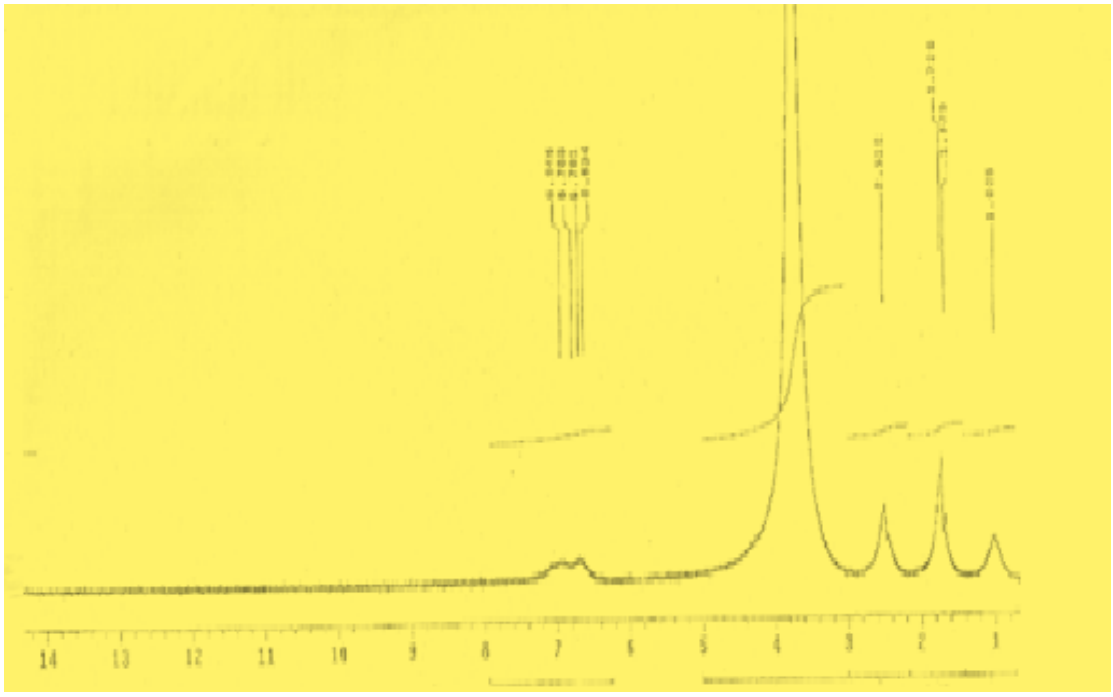
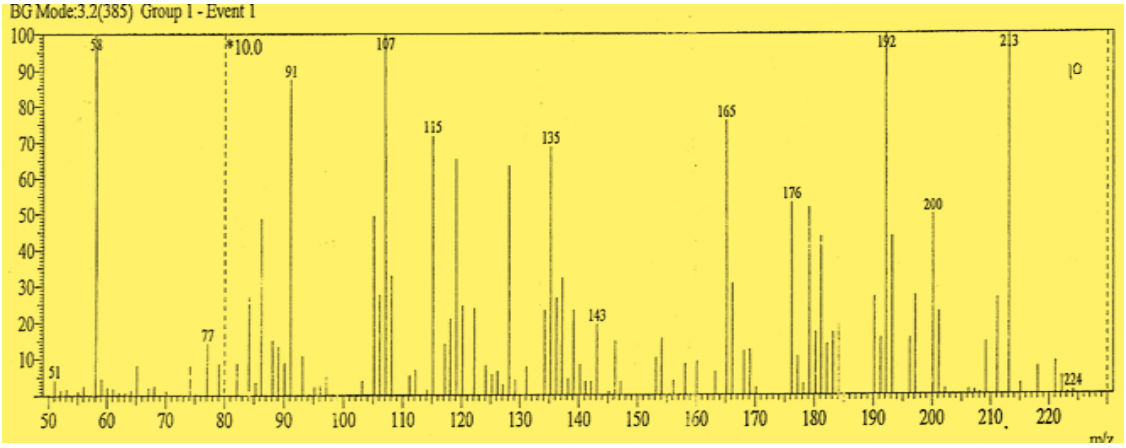


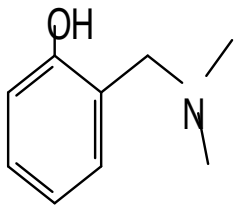
Fig27: ^{1}HNMR spectrum of compound 7



. Fig 28: The Mass spectrum of compound 7

On the basis of theabove spectral data structure 7 above was assigned for this Mannich base.

3.8Synthesis of the Mannich base 8



(8)

The Mannich base 8 was synthesized by adding formalin to a mixture of phenol and dimethylamine in absolute ethanol. The UV spectrum of base 8 (Fig.29) showed λ_{max} (MeOH) 243,327 nm.

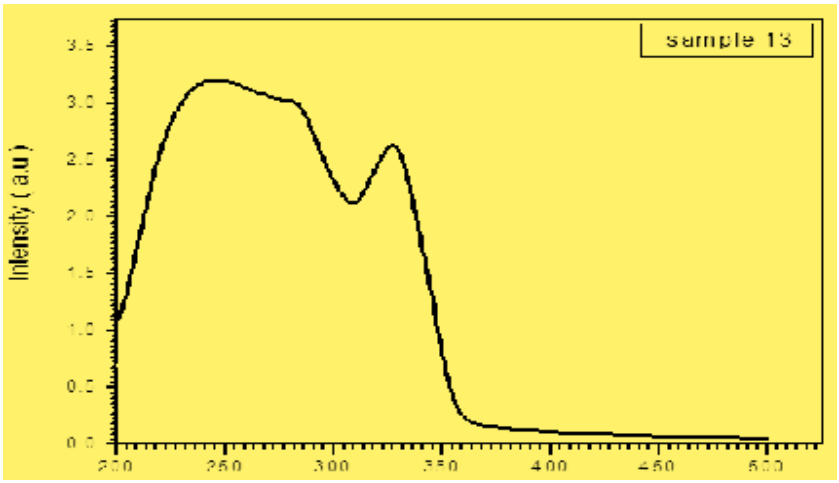


Fig. 29: The UV spectrum of compound 8

The IR spectrum (Fig.30) showed ν (KBr).653, 759, 825 (C-H, Ar., bending). 1170, 1249, 1373 (N-C). 1512, 1562,(C=C ,Ar.), 2929 (C-H ,aliphatic), 3014 cm^{-1}(OH).

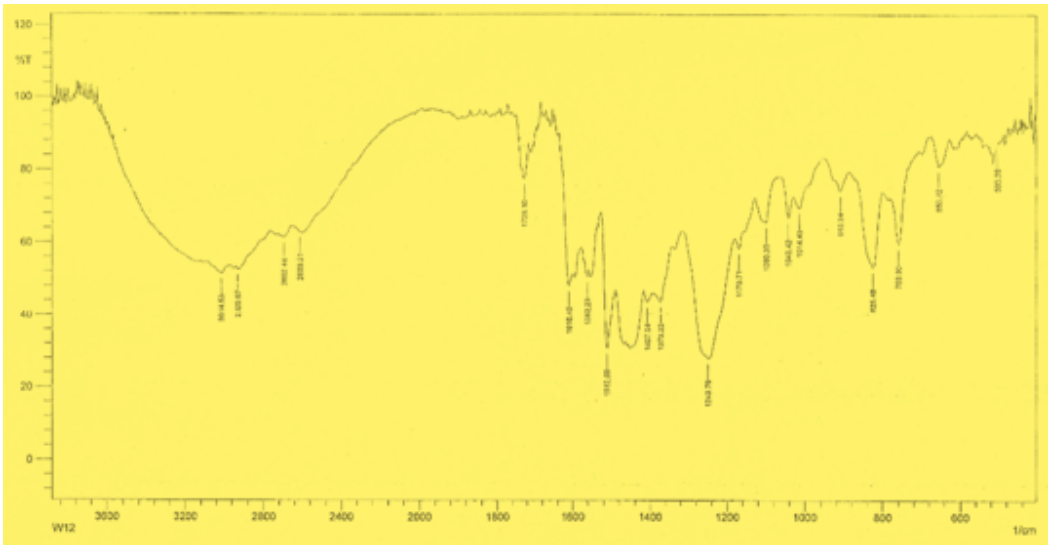


Fig. 30: The IR spectrum of compound 8

The ^{1}HNMR spectrum (Fig.31) showed: δ2.10 (6H) assigned for two methyl groups.The resonance at δ3.55(2H) accounts for a methylene function. The aromatic protons appeared as multiplet at : δ6.64-7.15ppm.The Mass spectrum (Fig 32) gave m/z 151 for M^{+}.

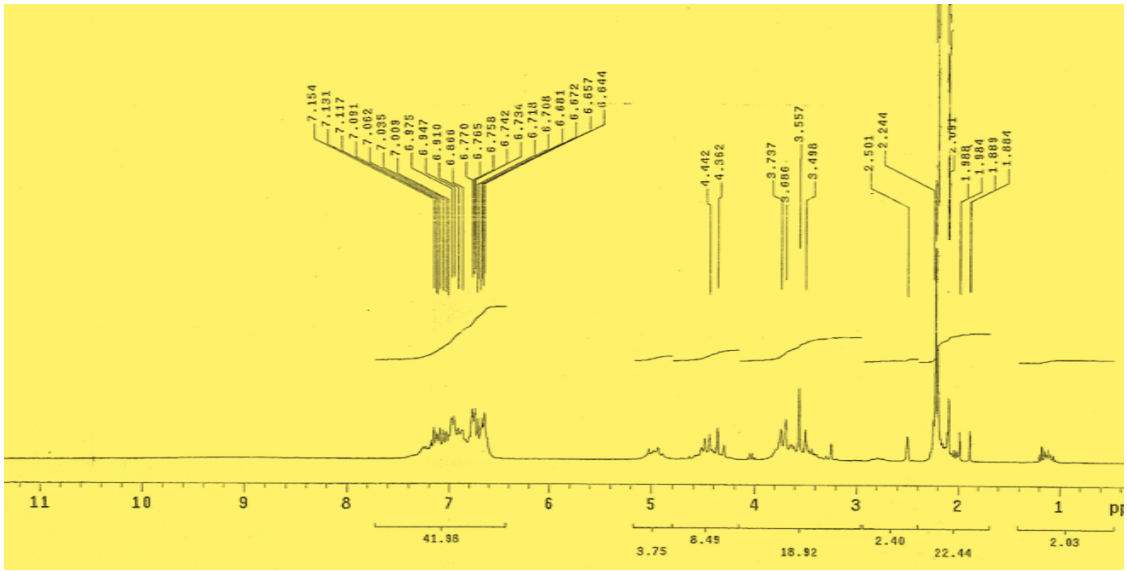


Fig.31: ^{1}HNMR spectrum of compound 8

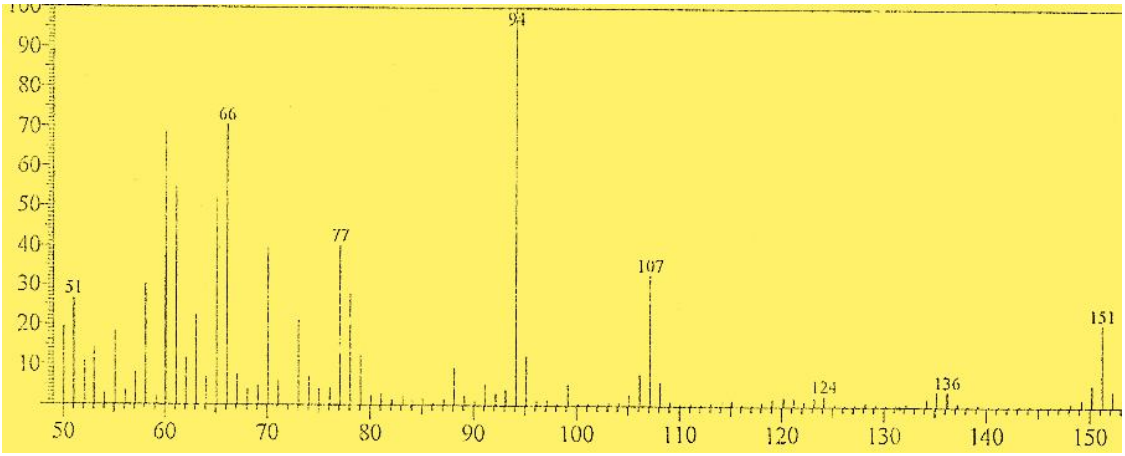
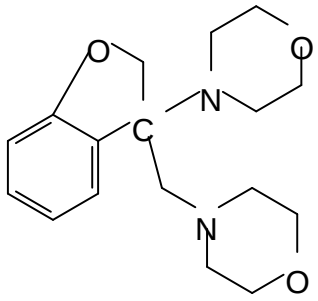


Fig.32: The Mass spectrum of compound 8

On the basis of the above spectral data structure 8 above was assigned for this Mannich base.

3.9Synthesis of the Mannich base 9



(9)

The Mannich base 9 was synthesized by adding formalin to a mixture of phenol and morpholine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 9 (Fig.33) showed λ_{max} (MeOH) 251 nm.

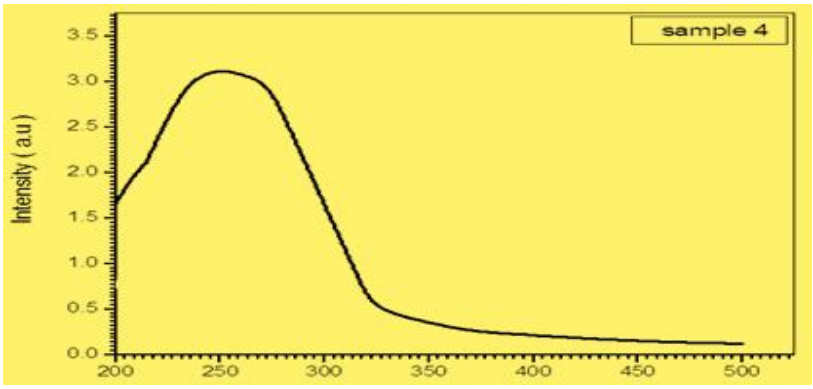


Fig 33: The UV spectrum of compound 9

The IR spectrum (Fig .34) showed ν (KBr) :721,757,800,829,864 (C-H, Ar., bending), 1255 (C-N), 1494, 1579(C=C ,Ar.), 2852, 2958cm^{-1} (C-H, aliphatic).

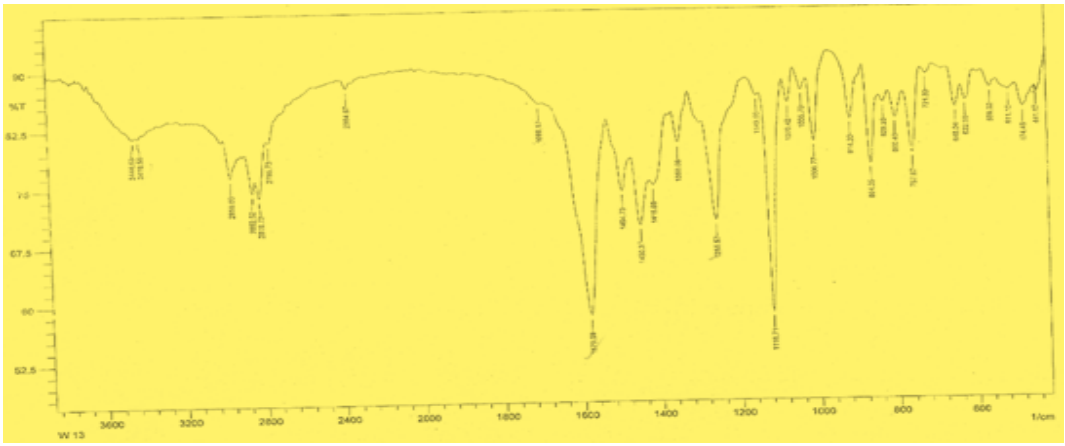


Fig 34: The IR spectrum of compound 9

The ^{1}HNMR spectrum (Fig.35) showed: δ1.66(4H) assigned for two methylenes ;δ3.58 (10H) assigned for eightmethylenes.The aromatic protons appeared as multiplet at : δ6.70-6.78ppm.The Mass spectrum (Fig. 36) gave m/z 305 for (M^{+}+H^{+}).

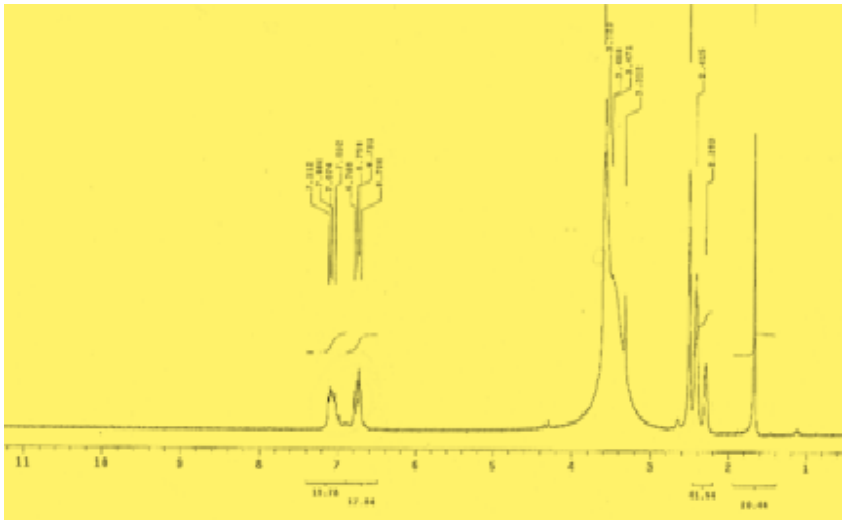


Fig35: ^{1}HNMR spectrum of compound 9

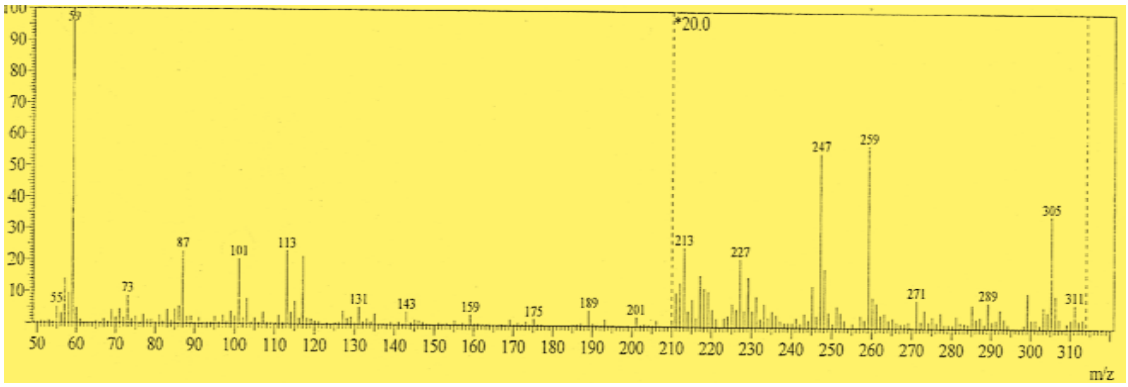
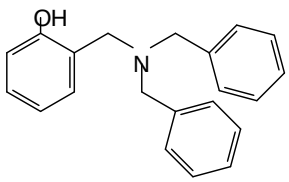


Fig.36: The Mass spectrum of compound 9

On the basis of the above spectral data structure 9 above was assigned for this Mannich base.

3.10Synthesis of the Mannich base 10



(10)

The Mannich base 10 was synthesized by adding formalin to a mixture of phenol and dibenzylamine in absolute ethanol. The UV spectrum of base 10 (Fig.37) showed λ_{max} (MeOH) 238,291 nm.

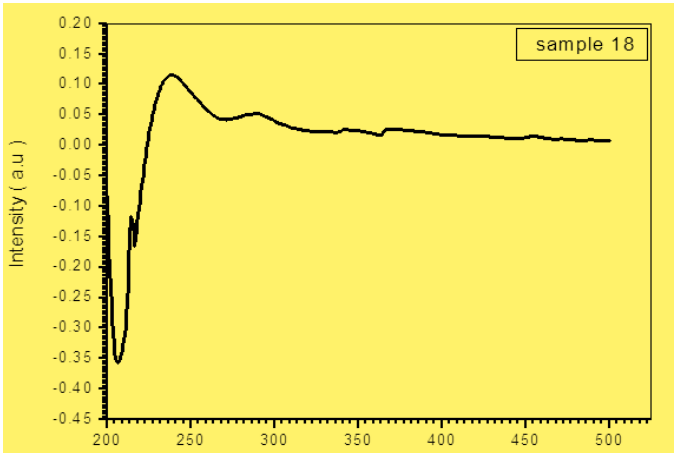


Fig.37: The UV spectrum of compound 10

The IR spectrum (Fig.38) showed ν (KBr): 698,743, 821,858 (C-H, Ar., bending), 1253, 1299, 1325, 1365(C-N), 1490,1559 (C=C, Ar.) ,2711, 2808, 2925 (C-H aliphatic), 3028cm^{-1}(OH).

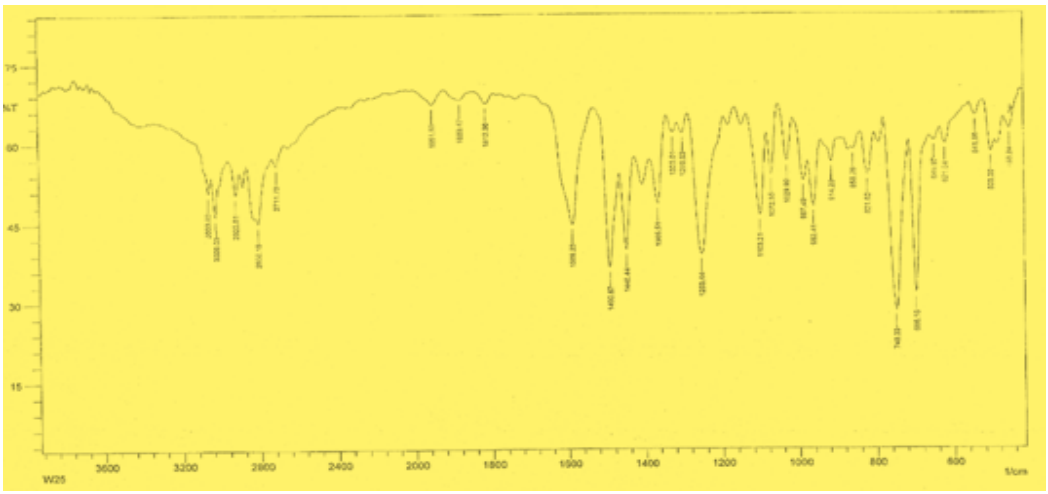


Fig.38: The IR spectrum of compound 10

The ^{1}HNMR spectrum (Fig.39) showed: δ3.31-3.46 (m,6H) assigned for three methylene groups.The aromatic protons appeared as multiplets at : δ6.70-6.76,δ6.85-7.09 and 7.19-7.50 ppm.The Mass spectrum (Fig 40) gave m/z 303 for M^{+}.

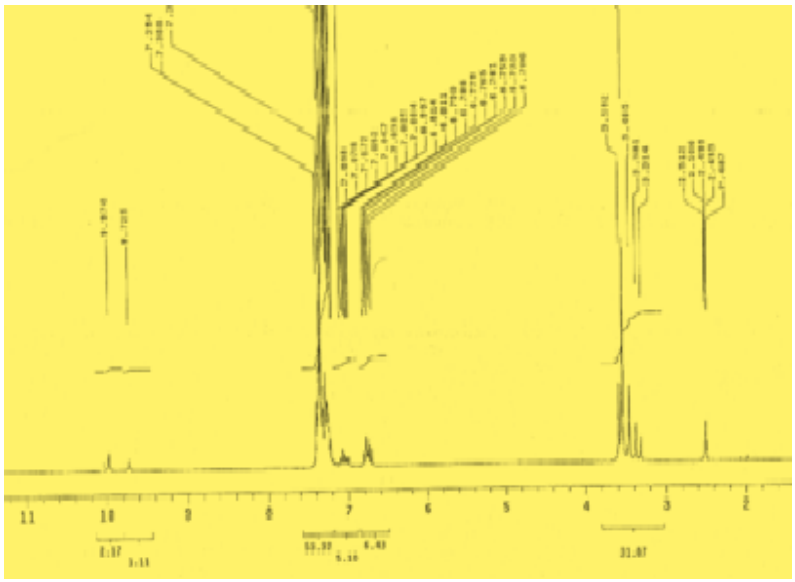


Fig.39: ^{1}HNMR spectrum of compound 10

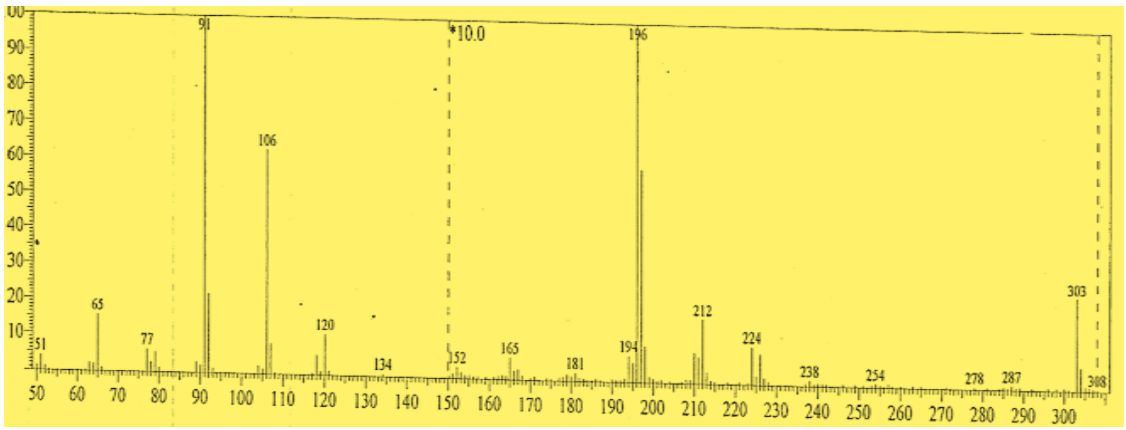
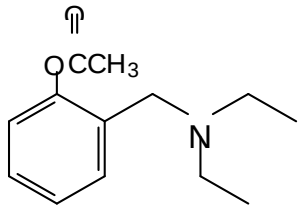


Fig.40: The Mass spectrum of compound 10

On the basis of the above spectral data structure 10 above was assigned for this Mannich base.

3.11 Synthesis of the Mannich base 11



(11)

The Mannich base 11 was synthesized by adding formalin to a mixture of o-cresol and diethylamine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 11 (Fig.41) showed λ_{max} (MeOH) 236,277 nm.

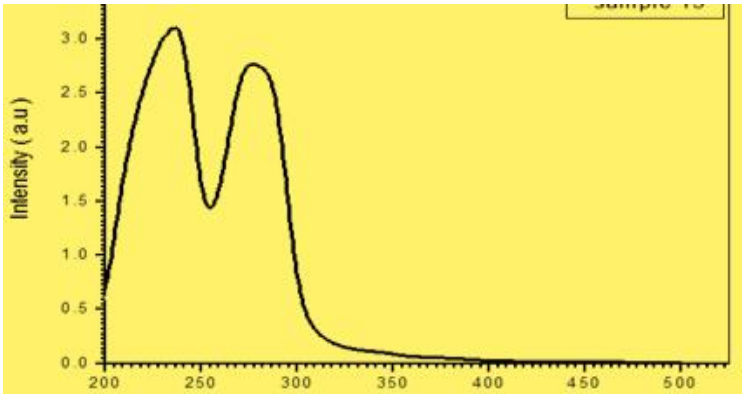


Fig.41: The UV spectrum of compound 11

The IR spectrum (Fig.42) showed ν (KBr): 777, 825, 881 (C-H, Ar.,bending), 1271 (C-N), 1577 (C=C, Ar.), 2933, 2821, 2972cm^{-1}(C-H aliphatic).

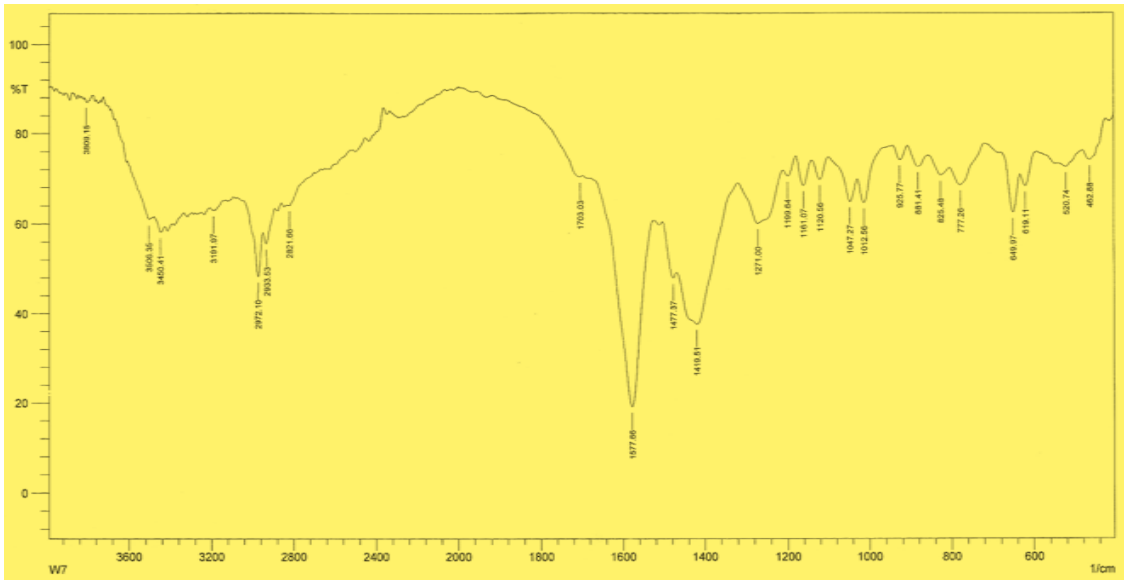


Fig.42: The IR spectrum of compound 11

The ^{1}HNMR spectrum (Fig.43) showed: δ1.02,δ1.64 (10H) assigned for two ethyl groups.The resonance at δ2.07 account for a methyl function. The aromatic protons appeared as multiplet at : δ6.40-7.00 ppm.The Mass spectrum (Fig.44) gave m/z 235 for M^{+}.

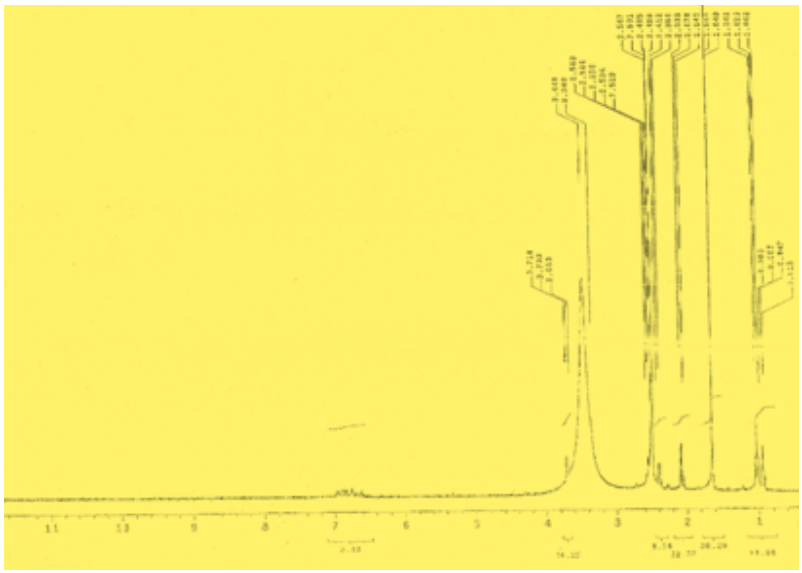


Fig.43: ^{1}HNMR spectrum of compound 11

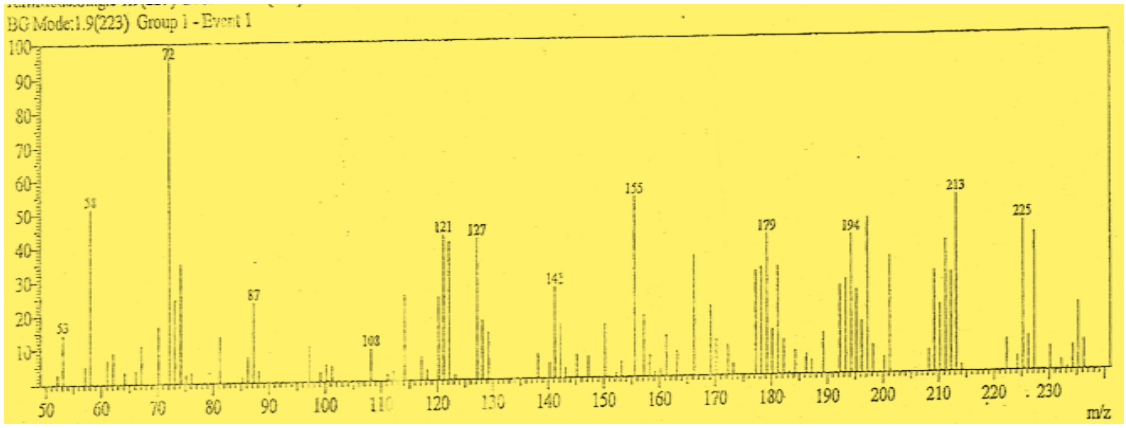
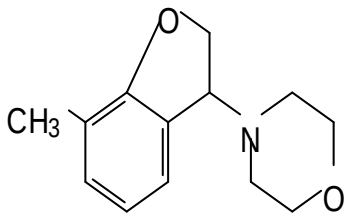


Fig.44: The Mass spectrum of compound 11

On the basis of theabove spectral data structure 11 above was assigned for this Mannich base.

3.12 Synthesis of the Mannich base 12



(12)

The Mannich base 12 was synthesized by adding formalin to a mixture of o-cresol and morpholine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 12 (Fig.45) showed λ_{max} (MeOH) 230,274 nm.

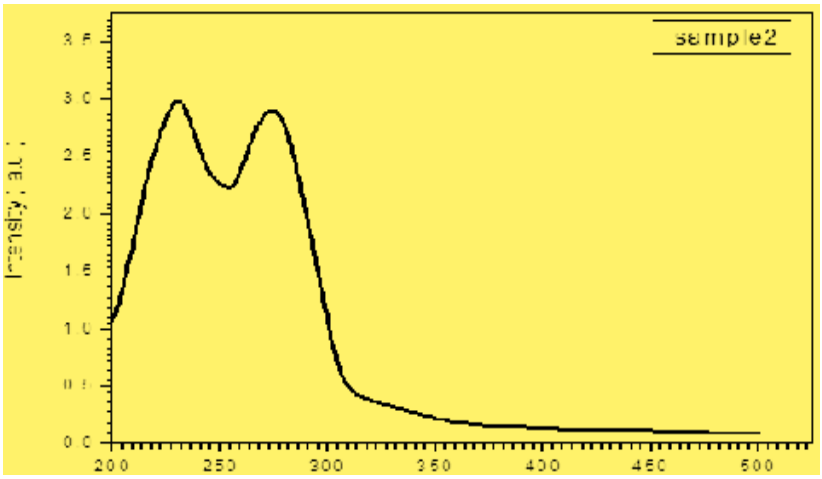


Fig.45: The UV spectrum of compound 12

The IR spectrum (Fig.46) showed ν (KBr): 698, 744, 767, 800,852 (C-H, Ar., bending), 1234 (C-N) ,1515, 1577 (C=C, Ar.) , 2866, 2972 cm^{-1}(C-H aliphatic). .

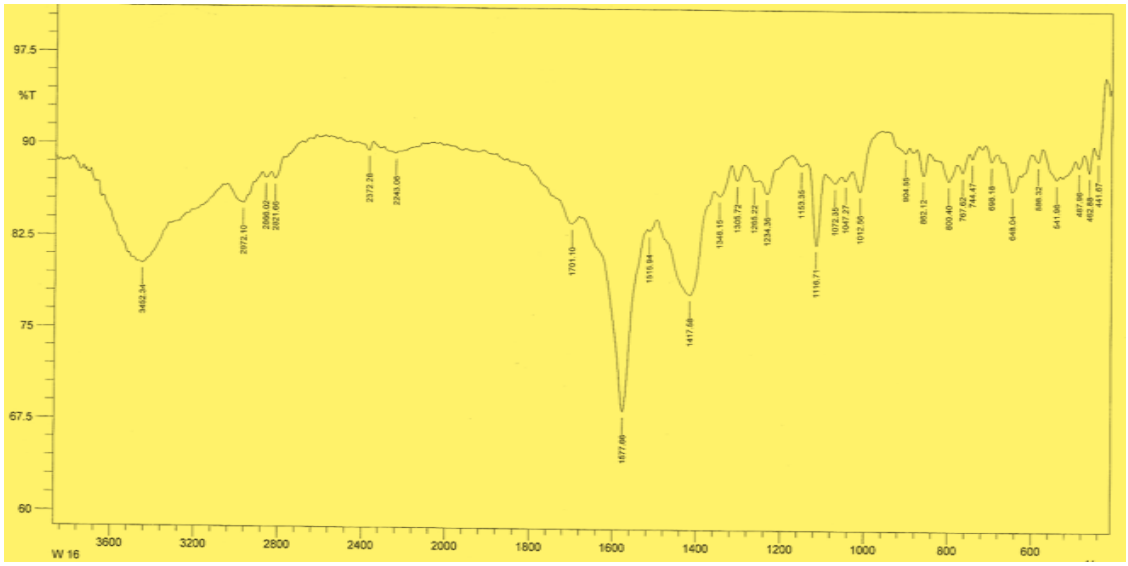


Fig.46: The IR spectrum of compound 12

The ^{1}HNMR spectrum (Fig.47) showed: δ1.64 (6H) assigned for two methyl groups.The resonance at δ2.07 account for a methylene function. The signal at 3.62 was assigned for two methyl groups,The aromatic protons appeared

as multiplet at : δ6.62-7.00 ppm.The Mass spectrum (Fig.48) gave m/z 220 for M^++H^+.

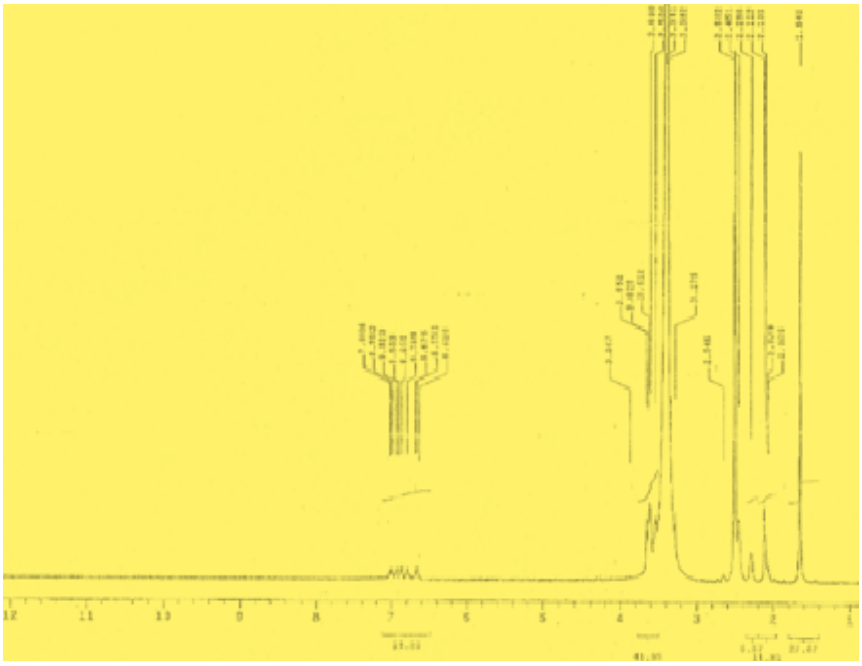


Fig.47: ^{1}HNMR spectrum of compound 12

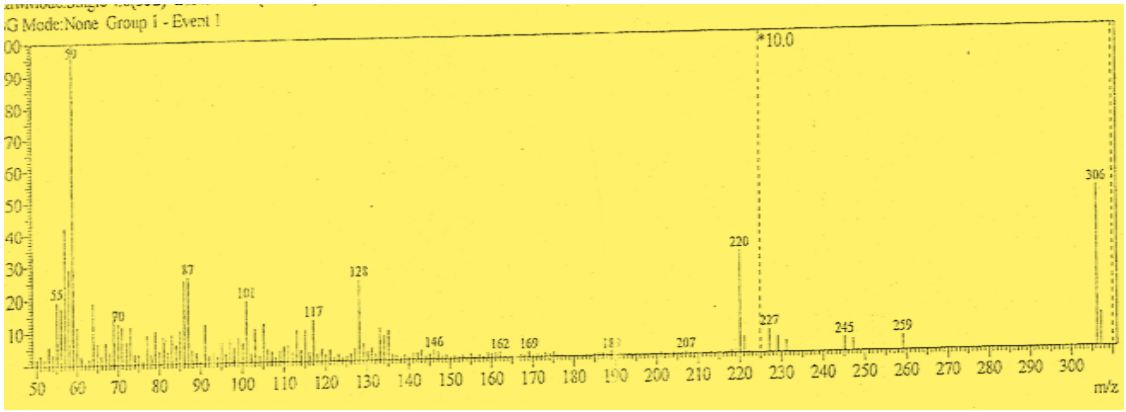
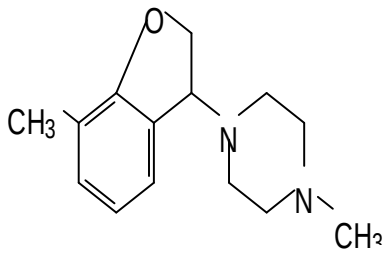


Fig.48: The Mass spectrum of compound 12

On the basis of the above spectral data structure 12 above was assigned for this Mannich base.

3.13Synthesis of the Mannich base 13



(13)

The Mannich base 13 was synthesized by adding formalin to a mixture of o-cresol and N-methylpiperazine in absolute ethanol. Then the base was acetylated. The UV spectrum of base 13 (Fig.49) showed λ_{max} (MeOH) 203,234,281 nm.

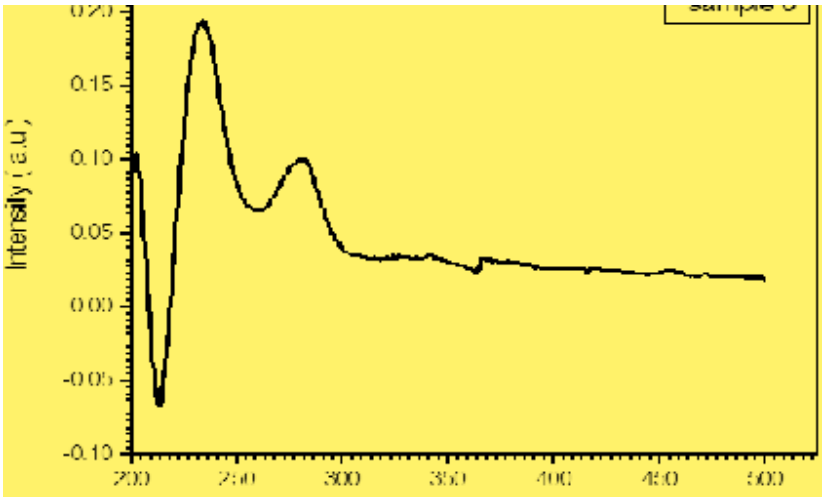


Fig.49: The UV spectrum of compound 13

The IR spectrum (Fig.50)showedν (KBr): 686,734,761,827,885,901,981(C-H,aromatic bending),1181, 1232, 1276, 1313, 1359(C-N),1467(C=C, Ar.), 2837, 2950 cm^{-1}(C-H, aliphatic).

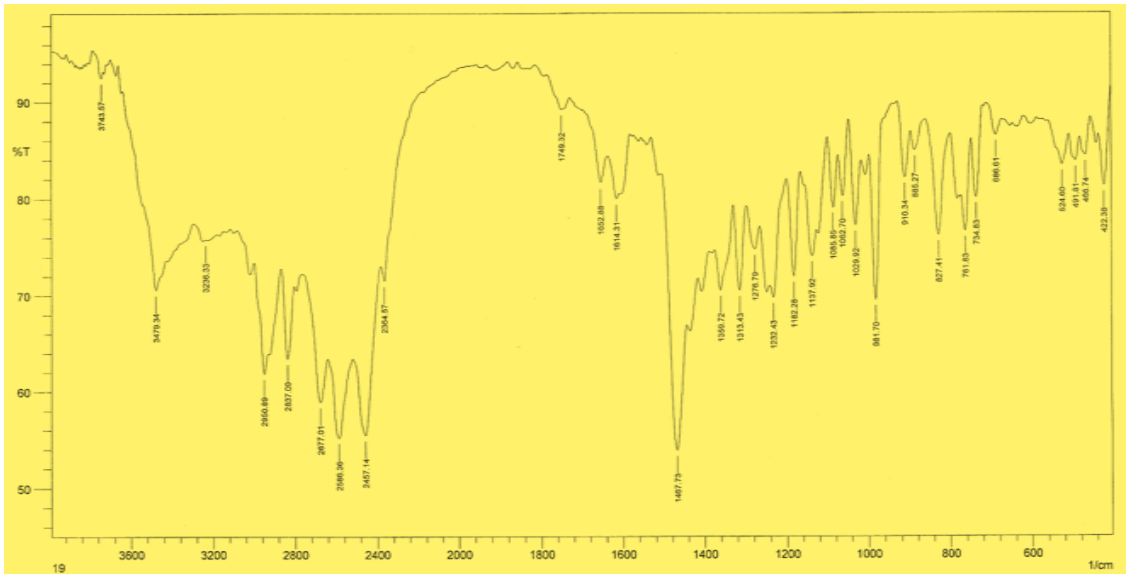


Fig.50: The IR spectrum of compound 13

The ^{1}HNMR spectrum (Fig.51) showed: δ2.13 (6H) assigned for two methyl groups.The multiplets at δ2.28- 2.49(4H) and δ2.79-3.71(7H) account for three methylenes and a methine function,The aromatic protons appeared at : δ6.65 and δ7.00 ppm.The Mass spectrum (Fig.52) gave m/z 232 for M^{+}.

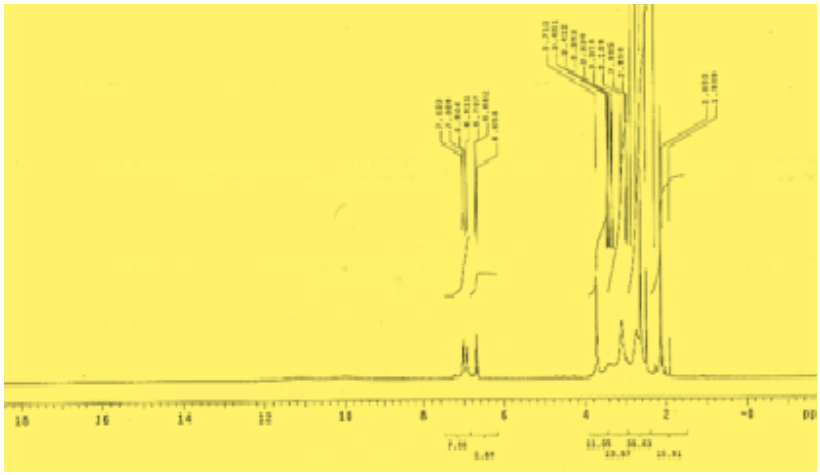


Fig.51: ^{1}HNMR spectrum of compound 13

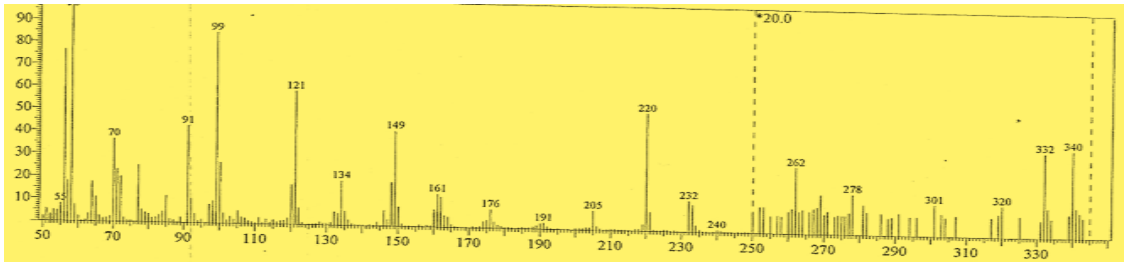
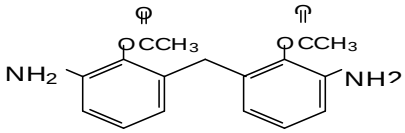


Fig.52: The Mass spectrum of compound 13

On the basis of the above spectral data structure 13 above was assigned for this Mannich base.

3.14 Synthesis of the base 14



(14)

The base 14 was synthesized by adding formalin to a mixture of2-aminophenol and dimethylamine in absolute ethanol.Then the base was acetylated. The UV spectrum of base 14 (Fig.53) showed λ_{max} (MeOH) 233,278,334 nm.

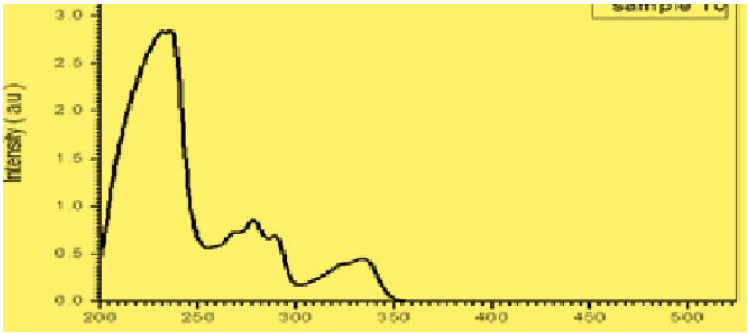


Fig.53: The UV spectrum of compound 14

The ^{1}HNMR spectrum (Fig.54) showed: δ1.79-2.27 (m,8H) assigned for two methyls and a methylene moiety.The resonance at δ5.14(4H) accounts for two amino functions. The signal at δ 5.14(4H) was assigned for two amino groups,The aromatic protons appeared at : δ6.80 and δ8.46 ppm.The Mass spectrum (Fig.55) gave m/z 314 for M^{+}.

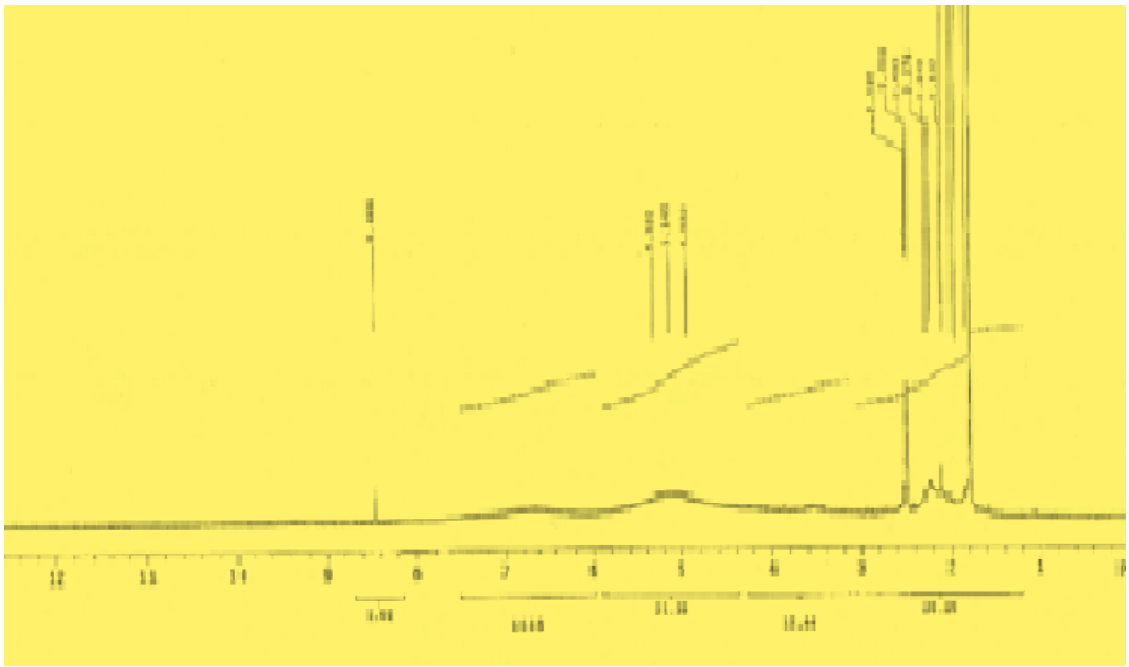


Fig.54: ^{1}HNMR spectrum of compound 14

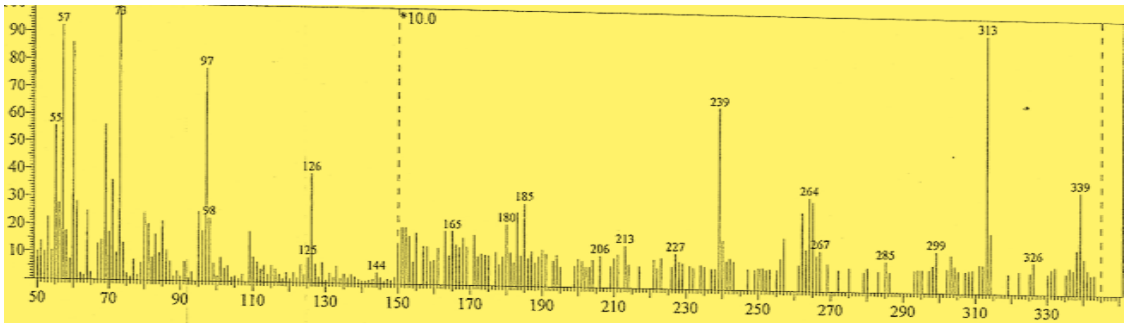
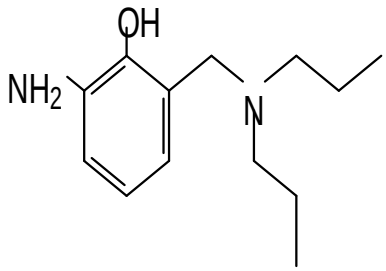


Fig.55: The Mass spectrum of compound 14

On the basis of the above spectral data structure 14 above was assigned for this Mannich base.

3.15Synthesis of the Mannich base 15



(15)

The base 15 was synthesized by adding formalin to a mixture of 2-aminophenol and diproypylamine in absolute ethanol. The UV spectrum of base 15 (Fig.56) showed λ_{max} (MeOH) 218,288 nm.

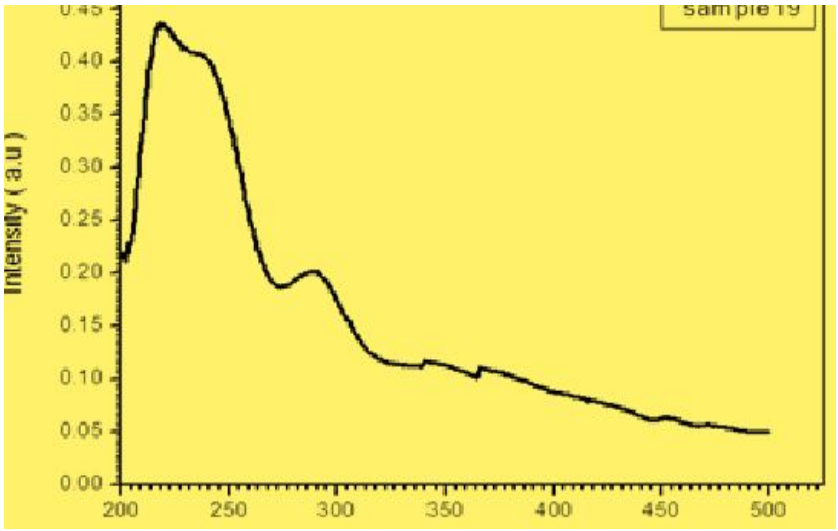


Fig.56: The UV spectrum of compound 15

The IR spectrum (Fig.57) showed ν (KBr): 698, 734 (C-H, Ar., bending), 1218(C-N), 1510, 1591 (C=C, Ar.), 2823, 2871, 2931, 2958 (C-H, aliphatic), 3411) cm^{-1}(OH).

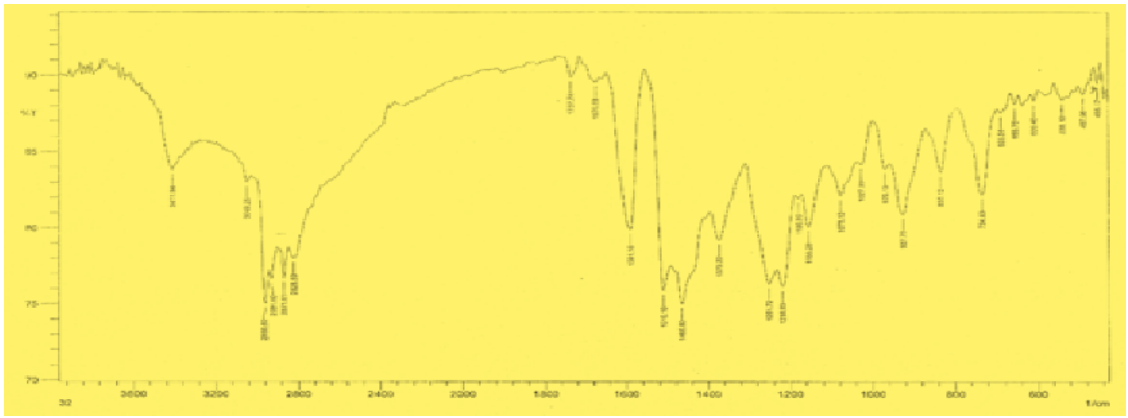


Fig.57: The IR spectrum of compound 15

The ^{1}HNMR spectrum (Fig.58) showed: δ0.82-1.44 (m,6H) assigned for two methyl groups.The multiplet at δ 3.45-4.39(6H)ppm account for five methylene functions,The aromatic protons appeared at : δ6.26-6.85(m) ppm.The Mass spectrum (Fig.59) gave m/z 222 for M^{+}.

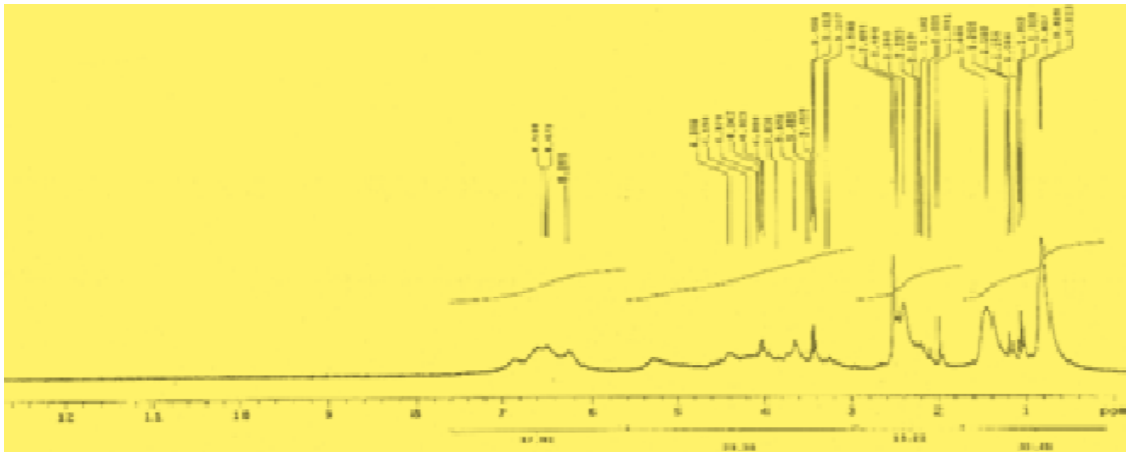


Fig.58: ^{1}HNMR spectrum of compound 15

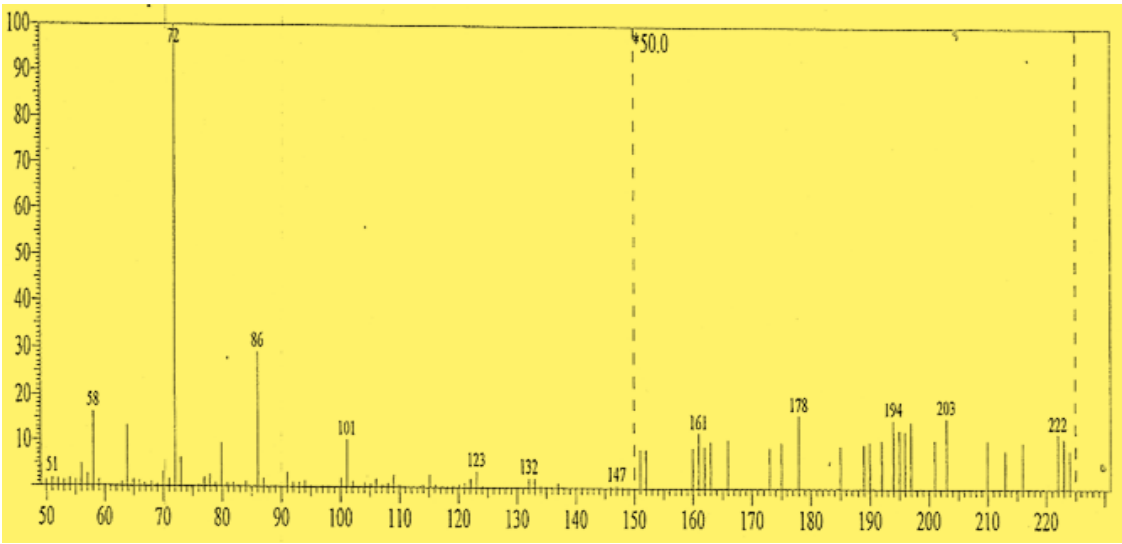
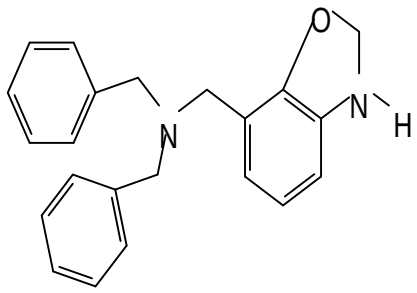


Fig.59: The Mass spectrum of compound 15

On the basis of theabove spectral data structure 15 above was assigned for this Mannich base.

3.16Synthesis of the Mannich base 16



(16)

The Mannich base 16 was synthesized by adding formalin to a mixture of 2-aminophenol and dibenzylamine in absolute ethanol. The UV spectrum of base 16 (Fig.60) showed λ_{max} (MeOH) 200,234,282 nm.

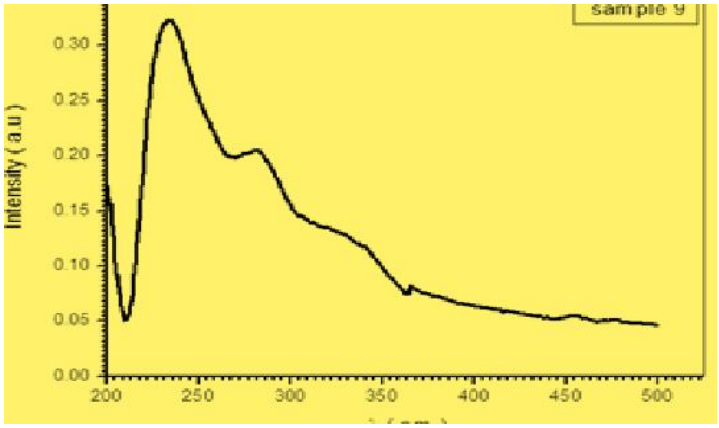


Fig.60: The UV spectrum of compound 16

The IR spectrum (Fig.61) showed ν (KBr). 698, 736,746,838 (C-H, Ar., bending), 1242(C-N), 1589, 1598 (C=C, Ar.), 1735(C=O),2827, 2883, 2923 (C-H, aliphatic), 3413cm^{-1}(OH),

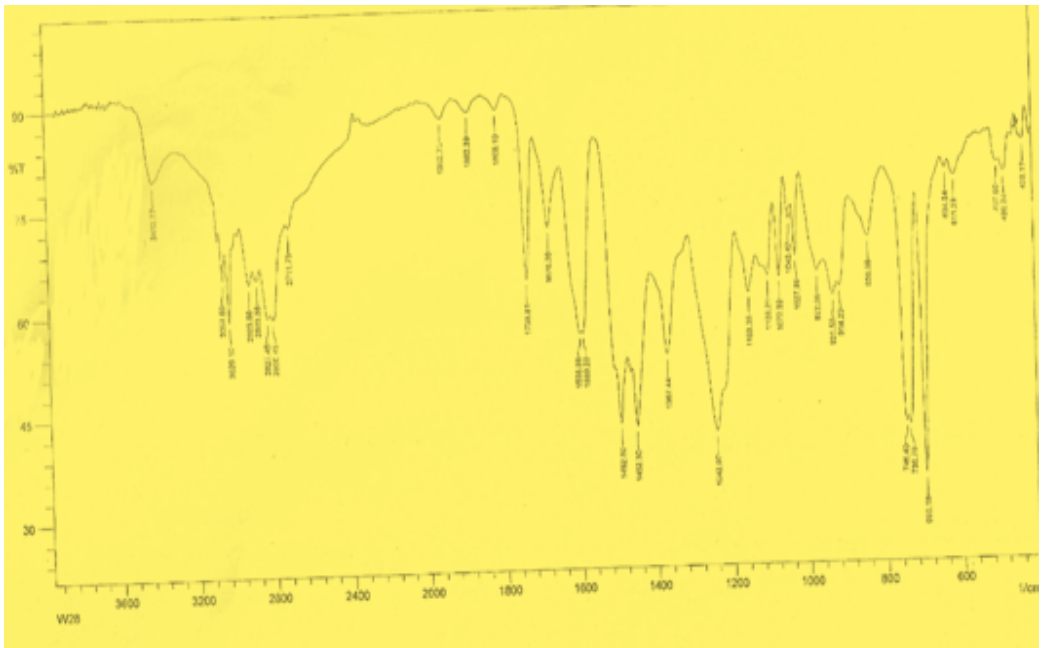


Fig.61: The IR spectrum of compound 16

The ^{1}HNMR spectrum (Fig.62) showed: δ1.90 (2H) assigned for a methylene group.The multiplet at δ 3.99-4.41(4H) accounts for two methylene functions,The resonance at δ 5.29ppm accounts for NH moiety.The aromatic protons appeared as multiplet at : δ6.38-7.32(m) ppm.The Mass spectrum (Fig.63) gave m/z 328 for M^{+}.

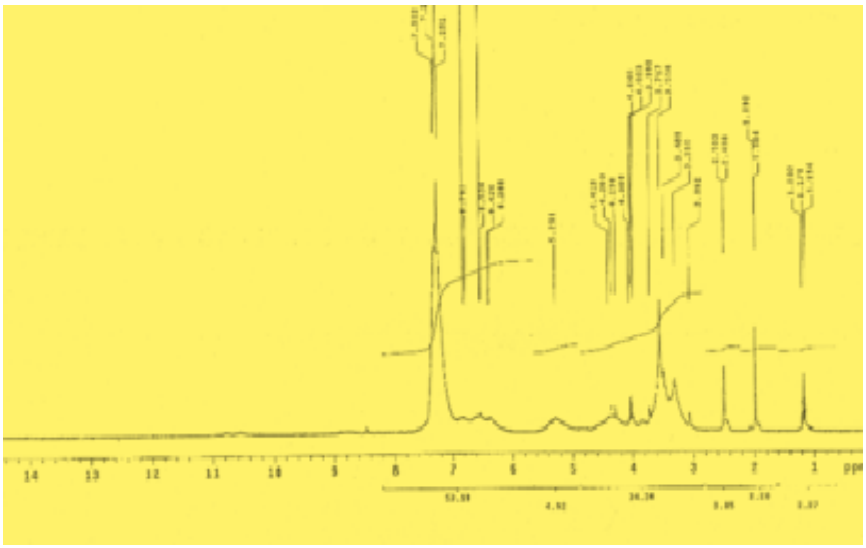


Fig.62: ^{1}HNMR spectrum of compound 16

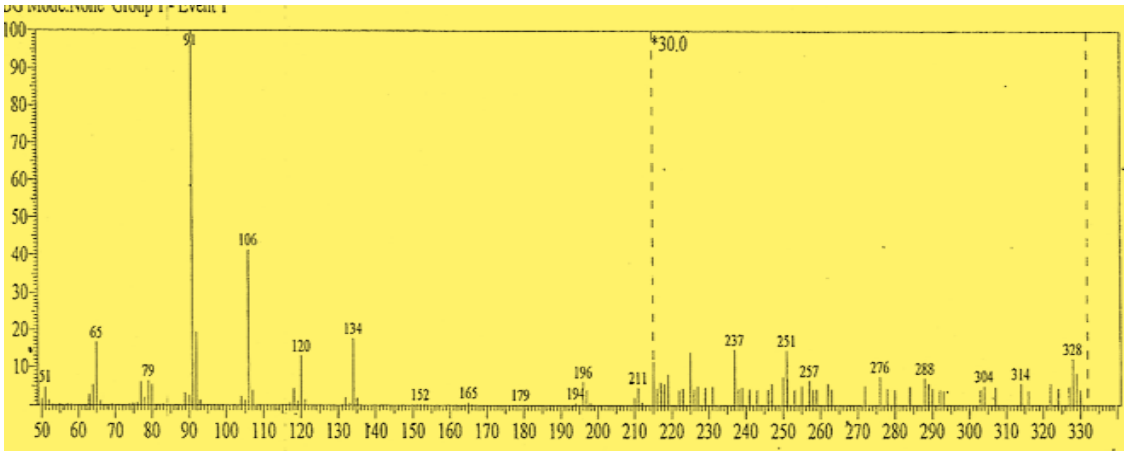
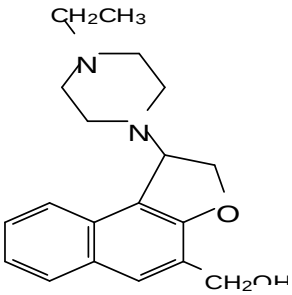


Fig.63: The Mass spectrum of compound 16

On the basis of the above spectral data structure 16 above was assigned for this Mannich base.

3.17-Synthesis of the Mannich base 17



(17)

The Mannich base 17 was synthesized by adding formalin to a mixture of β-naphthol and N-ethylpiperazine in absolute ethanol.The IR spectrum (Fig.64) showed ν (KBr): 607, 740,810 (C-H, Ar., bending), 1269(C-N), 1440, 1512 (C=C, Ar.), 1735(C=O),2823, 2953cm^{-1}(C-H, aliphatic).

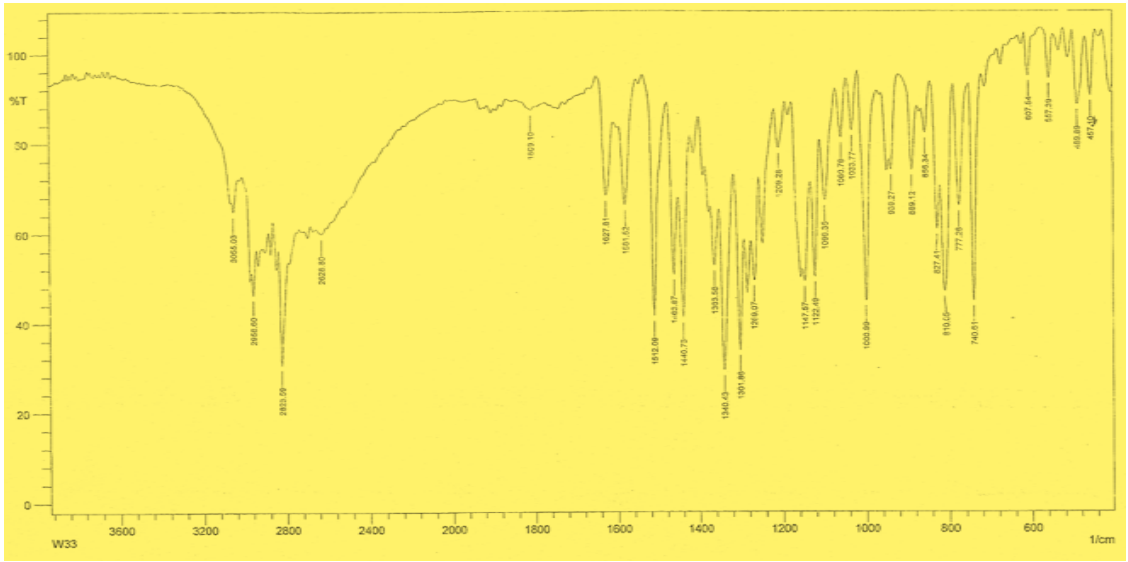


Fig.64 : IR spectrum of Mannich base 17

The ^{1}HNMR spectrum (Fig.65) showed: δ0.98 (3H) assigned for a methyl group. The multiplet at δ2.27-2.49(4H) accounts for seven methylene functions, The resonance at δ4.05ppm accounts for CH moiety.The aromatic protons appeared at : δ7.07,7.42,7.70 and 7.92ppm.The Mass spectrum (Fig.66) gave m/z 312 for M^{+}.

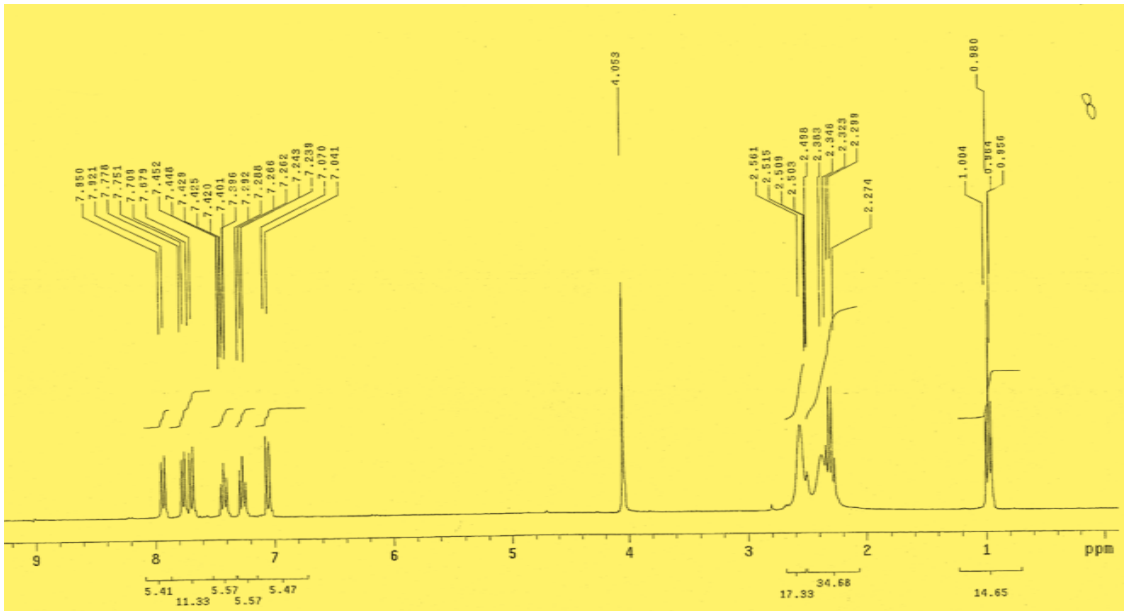


Fig.65: ^{1}HNMR spectrum of compound 17

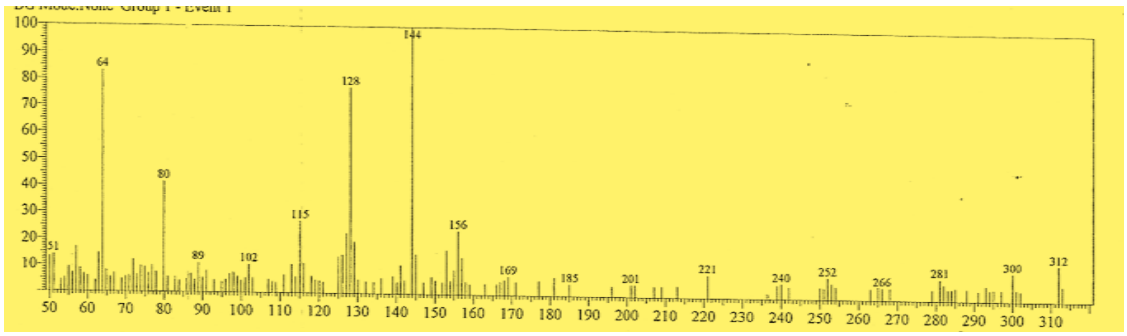


Fig.66: Mass spectrum of compound 17

On the basis of the above spectral data structure 17 above was assigned for this Mannich base.

3.18-Antibacterial and antifungal activity

The targeted molecules were evaluated for their antimicrobial activity using the cup plate agar diffusion method.The average of the diameters of the growth inhibition zones are shown in Table (3.1) .The results were interpreted in terms of the commonly used terms (sensitive, intermediate and resistant). 13-18mm growth inhibition zones is considered to be active; more than 18mm: very active. Values less than 9 mm indicate inactivity.Values ranging from 9-12 indicate partial activity. Tables (3.2) and (3.3) represent the antimicrobial activity of standard antibacterial and antifungal chemotherapeutic agents against standard bacteria and fungi respectively.

Compound 1: active against all test organisms. It showed significant activity against *Bacillus subtilis*.

Compound 2: revealed significant antibacterial activity , but partial antifungal potential.

Compound 3:showed significant antibacterial activity , but partial antifungal potential. It was active against *Candida albicans*, but inactive against the fungus *Aspergillus niger*.

Compound 4: showed antimicrobial activity, but it was inactive against *Escherichia coli*.

Compound 5:showed activity against all test organisms.It showed significant activity against*Staphylococcus aureus.*

Compound 6:active only against: *Escherichia coli*,*Staphylococcus aureus* and *Bacillus subtilis*.

Compound 7:showed activity against all test organisms.It showed significant activity against*Staphylococcus aureus*, *Escherichia coli* and *Bacillus subtilis*.

Compound 8:revealed activity against all test organisms.

Compound 9: active against *Bacillus subtilis*,*Candida albicans*,partially active against *Pseudomonas aeruginosa*. It was inactive against other test organisms.

Compound 10:Totally inactive against all test bacterial strains.

Compound 11:active against *Pseudomonas aeruginosa*,*Candida albicans*,but partially active against *Bacillus subtilis* and *Aspergillus niger*.

Compound 12:active against *Pseudomonas aeruginosa*,*Staphylococcus aureus*,*Candida albicans*,but inactive against other test organisms.

Compound 13:only active against *Bacillus subtilis*and *Staphylococcus aureus*.

Compound 14:revealed significant activity against *Pseudomonas aeruginosa*,*Candida albicans*.It was partially active against *Bacillus subtilis*,but inactive against *Escherichia coli*.

Compound 15:It did not reveal activity against any of the test organisms.

Compound 16:revealed significant activity against *Escherichia coli*and*Candida albicans*.It was also active against *Staphylococcus aureus*,but inactive against the other test organisms.

Compound 17: It revealed significant activity against all test organisms and moderate activity against *Escherichia coli*. (see Table 3.1).

Table (3.1) : Antibacterial activity of synthesized compounds :M.D.I.Z (mm)

Compd.	Conc.(mg/ml)	Ec	Pa	Sa	Bs	Ca	An
1	20	15	15	17	18	14	10
2	20	25	-	22	25	10	9
3	20	24	26	26	26	-	15
4	20	-	16	21	12	12	15
5	20	18	10	20	14	13	14
6	20	22	-	21	16	-	-
7	20	20	17	18	21	16	15
8	20	15	12	16	15	12	13
9	20	-	9	7	13	12	-
10	20	-	-	-	-	-	-
11	20	-	13	-	12	14	11
12	20	-	10	14	-	14	-
13	20	-	-	15	14	-	-
14	20	-	18	-	12	18	14
15	20	-	-	-	-	-	-
16	20	21	-	17	-	17	-
17	20	15	17	21	23	18	20

Table (3.2) : Antibacterial activity of standard chemotherapeutic agents :M.D.I.Z (mm)

Drug	Conc. mg/ml	Bs.	Sa.	Ec.	Pa
Ampicillin	40	15	30	-	-
	20	14	25	-	-
	10	11	15	-	-
Gentamycin	40	25	19	22	21
	20	22	18	18	15
	10	17	14	15	12

Table (3.3) : Antifungal activity of standard chemotherapeutic agents against standard fungi

Drug	Conc. mg/ml	An.	Ca.
Clotrimazole	30	22	38
	15	17	31
	7.5	16	29

- S.a*: Staphylococcus aureus*
- E.c*: Escherichia coli*
- P.a: *Pseudomonas aeruginosa*
- A.n: *Aspergillus niger*
- C.a: *Candida albicans*
- S.t: *Salmonella typhi*
- *B.a: Bacillus subtilis*
- M.D.I.Z: Mean diameter or growth inhibition zone (mm). Average or two replicates, inhibition zone >=15: sensitive, <15: resistant.

Conclusion

Seventeen phenolic Mannich bases were synthesized by a general synthesis protocol witch involve addition of an active hydrogen compound to a mixture of formalin and a secondary amine in absolute ethanol.

The constitution of the target molecules have been characterized by using a combination of spectral techniques (UV, IR, ^{1}HNMR and MS).

The targeted molecules were evaluated for their antimicrobial potential against six standard human pathogens and significant results were obtained.

Recommendations

i) The active hydrogen component may be reacted with other secondary amines and their derivatives to afford other new Mannich bases which could be evaluated for their biological activity.

ii) The synthesized bases may be evaluated for other biological potential like anti-inflammatory,anti-malarial,anti-viral,anti-cancer……etc.

iii) 2D NMR spectroscopy may be attempted for the synthesized compounds.

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