Synthesis and Spectral Properties of 2,3-Dihydro-4-(*para*-methylphenyl)-7-[(*o*-, *m*-, and *p*-substituted)phenoxy]-1*H*-1,5-benzodiazepine-2-thiones

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A series of twelve new 2,3-dihydro-4-(*para*-methylphenyl)-7-[(*o*-, *m*-, and *p*-substituted)phenoxy]-1*H*-1,5-benzodiazepine-2-thiones, which have potentially useful pharmacological properties, has been synthesized by condensing the 3,3-dimercapto-1-(*p*-methylphenyl)-2-propen-1-one with 3,4-diaminophenyl-R-phenyl ethers. The structure of all products was corroborated by ir; ^{1}H-nmr; ^{13}C-nmr and ms.

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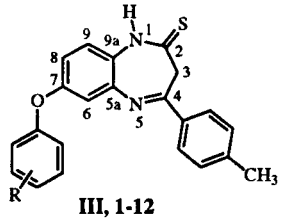
There have been several reports concerning pharmacological activity of benzodiazepines with chloro-substitutents in the position C-7 of the benzene ring of the benzodiazepine derivatives [3-6]. On the other hand, research has been carried out recently and anticonvulsant effects were evaluated in 1,5-benzodiazepin-2-ones derivatives. The study also demonstrated that these derivatives were more potent than clobazam and desmethyl clobazam [7].

As a part of a program directed towards the synthesis and spectral property determination of 1,5-benzodiazepine derivatives with possible pharmacological activity, we describe in this report the synthesis of the novel compounds 2,3-dihydro-4-(*para*-methylphenyl)-7-[(*o*-, *m*-, *p*-substituted)phenoxy]-1*H*-1,5-benzodiazepine-2-thiones **III, 1-12** (Scheme 1) as shown in Scheme 2.

Scheme 1

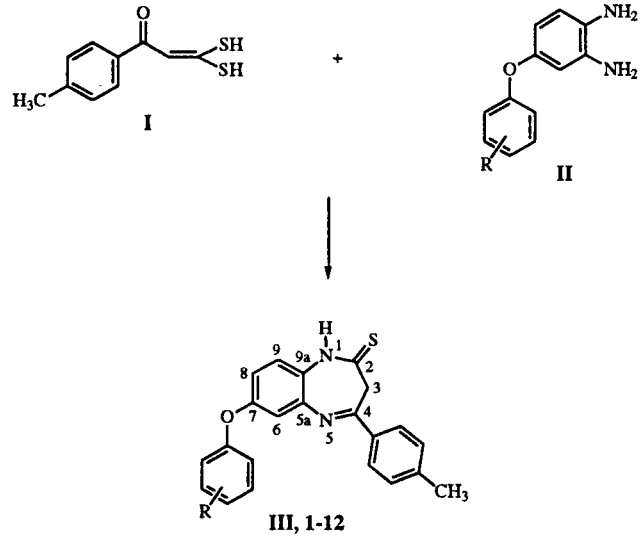


III, 1-12

1	H
2	*o*-CH_3
3	*m*-CH_3
4	*p*-CH_3
5	*o*-OCH_3
6	*m*-OCH_3
7	*p*-OCH_3
8	*o*-Cl
9	*m*-Cl
10	*p*-Cl
11	*m*-Br
12	*p*-Br

The reaction of Compound **I** with **II**, has been performed in anhydrous *ortho*-xylene at reflux for six hours. The 1*H*-1,5-benzodiazepine-2-thiones **III, 1-12** have been obtained in 25-56% yield.

Scheme 2



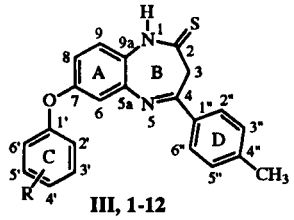
I **II** **III, 1-12**

The infrared spectrum of Compounds **1-12** displayed absorptions at 3175-3134 cm^{-1} for N-H stretching; at 1595-1584 cm^{-1} for C=N stretching; at 1239-1230 and 1187-1180 cm^{-1} for C-N stretching; at 1267-1258 and 1099-1019 cm^{-1} for C-O stretching and the corresponding absorptions for aromatic an R-substituents.

In the ^{1}H nmr spectra the presence of three proton signals at δ 2.32-2.37 singlet were assigned to the methyl protons joined at C-4" of the phenyl "D" ring; the presence of two proton signals at δ 3.85-3.92 broad was consistent with the methylene protons of the C-3. The presence of three proton signals at δ 6.67-7.39 multiplet was assigned to the aromatic protons of C-6, C-8 and C-9 of the benzodiazepine framework. The other aromatic protons appeared as a multiplet and AA'BB' system at δ 6.64-8.07 and the signal for the R-substituent, the presence of one proton signal at δ 12.38-12.53 broad was consistent with the proton of the N-H.

The ^{13}C nmr spectra of compounds **1-12** are given in Table 1, and the signals were confirmed by using HET-

Table 1
^{13}C NMR Spectral Data for Compounds **1-12**



III, 1-12

Compounds	1	2	3	4	5	6	7	8	9	10	11	12
R	H	*o*-CH_3	*m*-CH_3	*p*-CH_3	*o*-OCH_3	*m*-OCH_3	*p*-OCH_3	*o*-Cl	*m*-Cl	*p*-Cl	*m*-Br	*p*-Br
C-2	191.8	191.6	192.4	191.5	191.6	191.8	191.5	191.8	192.1	191.9	192.1	191.9
C-3	47.5	47.7	48.1	47.5	47.7	47.6	47.5	47.6	47.8	47.7	47.7	47.6
C-4	159.2	159.2	160.3	159.0	159.3	159.2	159.0	159.3	159.4	159.4	159.4	159.3
C-5a	141.8	141.9	142.5	141.5	141.9	141.8	141.5	141.8	142.0	142.0	142.0	141.9
C-6	115.6	113.8	116.9	115.0	113.0	115.8	114.0	114.4	116.6	116.1	116.6	116.1
C-7	156.0	154.8	155.1	154.5	155.5	153.9	156.0	150.9	153.1	153.7	153.1	153.4
C-8	116.3	115.4	117.2	116.0	114.8	116.5	115.5	115.3	117.3	116.8	117.7	116.6
C-9	123.5	123.8	124.3	123.5	123.6	123.6	123.0	123.6	123.7	123.9	123.8	123.7
C-9a	127.0	126.6	127.5	126.5	126.4	127.1	126.5	126.7	127.0	127.6	126.8	127.9
C-1'	154.0	153.3	156.4	153.5	143.2	157.2	149.0	153.7	157.4	155.1	157.4	155.6
C-2'	118.8	126.9	120.4	119.0	151.5	105.1	115.0	127.1	118.6	120.7	121.4	120.9
C-3'	129.8	131.6	140.7	129.0	113.8	160.7	120.5	130.6	129.5	129.2	126.3	132.7
C-4'	123.6	124.7	125.6	133.0	126.2	110.8	155.5	125.7	125.6	129.2	126.5	115.3
C-5'	129.8	127.6	130.6	129.0	121.3	130.4	120.5	128.7	131.4	129.2	131.6	132.7
C-6'	118.8	120.2	115.9	119.0	122.2	109.5	115.0	121.6	117.0	120.7	116.9	120.9
C-1"	133.5	133.6	133.9	133.5	133.7	133.5	133.5	133.5	133.5	133.6	133.5	133.5
C-2"; C-6"	127.6	127.9	128.6	128.0	128.0	127.8	127.5	127.7	128.0	127.9	127.8	127.8
C-3"; C-5"	128.8	129.2	129.9	130.0	129.2	129.0	129.0	128.9	129.2	130.0	129.1	129.0
C-4"	141.2	141.5	142.5	141.0	141.6	141.3	141.0	141.3	141.7	141.5	141.4	141.3
CH_3	20.6	20.9	21.4	20.5	21.0	20.8	20.5	20.7	20.9	20.9	20.8	20.7
R	...	15.7	21.2	20.0	55.8	55.1	55.0	...	...	...	...	...

Note: the numbering of the phenyl rings is only for the assignment of the chemical shifts of the carbons in ^{13}C nmr spectra.

COR, Long Range HETCOR, COSY and NOESY nmr experiments operating at 500 MHz.

The mass spectra of the compounds **1-12** include ions at m/z $[M-15]^+$, $[M-33]^+$, $[M-48]^+$, $[M-58]^+$, m/z 264, 256, 255, 232, 223, 208, 135, 119 and 91. The molecular ion is the base peak, and the main fragmentation was consistent with the assigned structures. The proposed fragmentation pathways leading to the formation of a number of important daughter ions have been confirmed of the corresponding parent ion spectra using the tandem ms/ms technique. The elemental composition of the principal fragment ions was determined by exact mass measurements.

EXPERIMENTAL

The ir spectra were recorded on Nicolet Magna TR-750 spectrophotometer. The ^1H-nmr spectra were recorded on a Varian Unity-300 Spectrometer operating at 300 MHz and the ^{13}C-nmr spectra were recorded on a Varian Unity Plus-500 Spectrometer operating at 500 MHz, in deuteriochloroform or deuteriodimethyl sulfoxide solution containing tetramethylsilane as the internal standard with chemical shifts δ (ppm) expressed downfield from TMS. The mass spectra were measured on a JEOL JMS-AX505 and JEOL MS-SX 102A High Resolution Mass Spectrometer with accurate mass determination of the molecular ion, using the direct inlet system. The spectra were recorded by electron impact at an ionization chamber temperature of 190° and ionizing electron energy of 70 eV.

General Procedure for the Synthesis of the 2,3-Dihydro-4-(*para*-methylphenyl)-7-[(*o*-, *m*-, and *p*-substituted)phenoxy]-1*H*-1,5-benzodiazepine-2-thiones, **III, 1-12**.

A mixture of 0.024 mole of 3,3-dimercapto-1-[(*p*-methyl)phenyl]-2-propen-1-one, **I**, 0.024 mole of 3,4-diaminophenyl-R-phenyl ether, **II**, in 150 ml of dry *ortho*-xylene was heated at reflux for three hours. After cooling, the crystals were collected, and washed with hexane to yield the compounds **III, 1-12** (25-56%).

2,3-Dihydro-4-[(*para*-methyl)phenyl]-7-phenoxy-1*H*-1,5-benzodiazepine-2-thione (**1**).

This compound was obtained as yellowish needles in 33% yield, mp 211°; ir (nujol mull): ν N-H 3151, C=N 1587, C-N 1236 and 1186, C-O 1259 and 1099 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.36 (s, 3H, CH_3-$C_{4''}$), 3.90 (bs, 2H, 3-H), 6.89 (d, 1H, J = 3.0 Hz, 6-H), 7.00 (d, d, 1H, J = 2.7, 9.0 Hz, 8-H), 7.10 and 7.45 (AA'BB', 4H, J = 8.0 Hz, phenyl protons of "C" ring, 2'-H, 3'-H, 5'-H, 6'-H), 7.19 (d, d, t, 1H, J = 0.9,

3.2, 7.4 Hz, 4'-H), 7.32 and 8.06 (AA'BB', 4H, J = 8.0 Hz, phenyl protons of "D" ring), 7.37 (d, 1H, J = 8.7 Hz, 9-H), 12.50 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 358 (M^+), m/z 360 $[M+2]^+$.

Anal. Calcd. for $C_{22}H_{18}N_2OS$: C, 73.71; H, 5.06; N, 7.82. Found: C, 73.61; H, 5.11; N, 7.76.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*o*-methylphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**2**).

This compound was obtained as yellowish needles in 45% yield, mp 223°; ir (nujol mull); ν N-H 3151, C=N 1593, C-N 1234 and 1183, C-O 1258 and 1022 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.18 (s, 3H, CH_3-$C_{4'}$), 2.36 (s, 3H, CH_3-$C_{4''}$), 3.88 (bs, 2H, 3-H), 6.70 (d, 1H, J = 3.0 Hz, 6-H), 6.93 (d, d, 1H, J = 2.7, 9.0 Hz, 8-H), 7.01 (d, d, 1H, J = 0.9, 7.9 Hz, 6'-H), 7.07 (d, t, 1H, J = 1.2, 7.5 Hz, 4'-H), 7.26 (d, t, 1H, J = 1.2, 7.8 Hz, 5'-H), 7.27 (d, d, 1H, J = 1.2, 9.1 Hz, 3'-H), 7.32 and 8.05 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.34 (d, 1H, J = 9.0 Hz, 9-H), 12.45 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 372 (M^+), m/z 374 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2OS$: C, 74.16; H, 5.41; N, 7.52. Found: C, 74.22; H, 5.37; N, 7.45.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*m*-methylphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**3**).

This compound was obtained as yellowish needles in 30% yield, mp 206°; ir (nujol mull): ν N-H 3135, C=N 1590, C-N 1237 and 1187, C-O 1262 and 1020 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.25 (s, 3H, CH_3-$C_{4'}$), 2.32 (s, 3H, CH_3-$C_{4''}$), 3.89 (bs, 2H, 3-H), 6.80 (d, d, d, 1H, J = 0.8, 2.4, 7.4 Hz, 6'-H), 6.82 (d, 1H, J = 3.0 Hz, 6-H), 6.86 (d, d, 1H, J = 0.8, 5.7 Hz, 2'-H), 6.94 (d, d, 1H, J = 3.0, 9.3 Hz, 8-H), 6.98 (d, d, d, 1H, J = 0.8, 2.3, 7.8 Hz, 4'-H), 7.24 (t, 1H, J = 7.8 Hz, 5'-H), 7.28 and 7.99 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.31 (d, 1H, J = 8.4 Hz, 9-H), 12.41 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 372 (M^+), m/z 374 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2OS$: C, 74.16; H, 5.41; N, 7.52. Found: C, 74.11; H, 5.48; N, 7.49.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*p*-methylphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**4**).

This compund was obtained as yellowish needles in 44% yield, mp 216°; ir (nujol mull): ν N-H 3163, C=N 1592, C-N 1237 and 1184, C-O 1260 and 1021 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.34 (s, 3H, CH_3-$C_{4'}$), 2.38 (s, 3H, CH_3-$C_{4''}$), 3.90 (bs, 2H, 3-H), 6.85 (d, 1H, J = 3.0 Hz, 6-H), 6.97 (d, d, 1H, J = 3.0, 9.0 Hz, 8-H), 7.01 and 7.23 (AA'BB', 4H, J = 8.5 Hz, phenyl protons of "C" ring), 7.33 an 8.07 (AA'BB', 4H, J = 8.0 Hz, phenyl protons of "D" ring), 7.36 (d, 1H, J = 8.0 Hz, phenyl protons of "D" ring), 7.36 (d, 1H, J = 9.0 Hz, 9-H), 12.40 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 372 (M^+), m/z 374 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2OS$: C, 74.16; H, 5.41; N, 7.52. Found: C, 74.20; H, 5.34; N, 7.59.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*o*-methoxyphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**5**).

This compound was obtained as yellowish needles in 56% yield, mp 205°; ir (nujol mull); ν N-H 3138, C=N 1593, C-N 1230 and 1180, C-O 1267 and 1043 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.35 (s, 3H, CH_3-$C_{4''}$), 3.75 (s, 3H, CH_3-O), 3.85 (bs, 2H, 3-H), 6.67 (d, 1H, J = 3.0 Hz, 6-H), 6.89 (d, d, 1H, J = 3., 9.0 Hz, 8-H), 7.00 (d, t, 1H, J = 1.8, 7.8 Hz, 5'-H), 7.12 (d, d, 1H, J = 1.8, 7.7 Hz, 6'-H), 7.19 (d, d, 1H, J = 1.8, 8.1 Hz, 3'-H), 7.31 and 8.04 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.33 (d, 1H, J = 9.0 Hz, 9-H); 12.41 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 388 (M^+), 390 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2O_2S$: C; 71.11; H, 5.19; N, 7.21. Found: C, 71.04; H, 5.25; N, 7.15.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*m*-methoxyphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**6**).

This compound was obtained as yellowish needles in 30% yield, mp 201°; ir (nujol mull): ν N-H 3168, C=N 1595, C-N 1232 and 1180, C-O 1259 and 1037 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.37 (s, 3H, CH_3-$C_{4''}$), 3.75 (s, 3H, CH_3-O), 3.91 (bs, 2H, 3-H), 6.64 (d, d, d, 1H, J = 0.9, 2.4, 7.8 Hz, 4'-H), 6.66 (d, d, 1H, J = 0.9, 2.4 Hz, 2'-H), 6.76 (d, d, d, 1H, J = 0.6, 2.5, 8.5 Hz, 6'-H), 6.92 (d, 1H, J = 2.7 Hz, 6-H), 7.07 (d, d, 1H, J = 2.7, 9.0 Hz, 8-H), 7.31 (t, 1H, J = 8.4 Hz, 5'-H), 7.33 and 8.07 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.37 (d, 1H, J = 8.7 Hz, 9-H), 12.41 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 388 (M^+), 390 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2O_2S$: C, 71.11; H, 5.19; N, 7.21. Found: C, 71.20; H, 5.12; N, 7.28.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*p*-methoxyphenoxy)-1*H*-1,5-benzodiazepine-2-thione (**7**).

This compound was obtained as yellowish needles in 45% yield, mp 219°; ir (nujol mull); ν N-H 3134, C=N 1593, C-N 1231 and 1183, C-O 1259 and 1033 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.39 (s, 3H, CH_3-$C_{4''}$), 3.77 (S, 3H, CH_3-O); 3.90 (bs, 2H, 3-H), 6.79 (d, 1H, J = 3.0 Hz, 6-H), 6.94 (d, d, 1H, J = 3.0, 9.2 Hz, 8-H), 6.99 and 7.08 (AA'BB', 4H, J = 9.0 Hz, phenyl protons of "C" ring), 7.32 and 8.06 (AA'BB', 4H, J = 8.5 Hz, phenyl protons of "D" ring), 7.35 (d, 1H, J = 8.5 Hz, 9-H), 12.38 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 388 (M^+), 390 $[M+2]^+$.

Anal. Calcd. for $C_{23}H_{20}N_2O_2S$: C, 71.11; H, 5.19; N; 7.21. Found: C; 71.23; H, 5.15; N, 7.27.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*o*-chlorophenoxy)-1*H*-1,5-benzodiazepine-2-thione (**8**).

This compound was obtained as yellowish needles in 42% yield, mp 211°; ir (nujol mull): ν N-H 3135, C=N 1595, C-N 1236 and 1186, C-O 1261 and 1032 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.37 (s, 3H, CH_3-$C_{4''}$), 3.90 (bs, 2H, 3-H), 6.82 (d, 1H, J = 3.0 Hz, 6-H), 6.97 (d, d, 1H, J = 3.0, 8.7 Hz, 8-H), 7.22 (d, d, 1H, J = 1.8, 7.8 Hz, 6'-H), 7.23 (d, t, 1H, J = 1.2, 7.5 Hz, 4'-H), 7.31 (d, t, 1H, J = 1.2, 7.8 Hz, 5'-H), 7.32 and 8.06 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.39 (d, 1H, J = 8.7 Hz, 9-H), 7.61 (d, d, 1H, J = 1.2, 7.9 Hz, 3'-H), 12.38 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 392 (M^+), 394 $[M+2]^+$, 396 $[M+4]^+$.

Anal. Calcd. for $C_{22}H_{17}ClN_2OS$: C, 67.25; H, 4.36; N, 7.13. Found: C, 67.18; H, 4.43; N, 7.21.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*m*-chlorophenoxy)-1*H*-1,5-benzodiazepine-2-thione (**9**).

This compound was obtained as yellowish needles in 30% yield, mp 220°; ir (nujol mull): ν N-H 3170, C=N 1584, C-N 1235 and 1184, C-O 1259 and 1019 cm^{-1}; ^1H nmr (deuterio-

dimethyl sulfoxide): δ 2.38 (s, 3H, CH_3-$C_{4''}$), 3.92 (bs, 2H, 3-H), 6.99 (d, 1H, J = 2.7 Hz, 6-H), 7.04 (d, d, 1H, J = 3.0, 9.0 Hz, 8-H), 7.07 (d, d, d, 1H, J = 0.6, 2.4, 8.5 Hz, 6'-H), 7.16 (d, d, 1H, J = 0.8, 2.5 Hz, 2'-H), 7.23 (d, d, d, 1H, J = 0.9, 2.3, 8.3 Hz, 4'-H), 7.24 (t, 1H, J = 8.0 Hz, 5'-H), 7.39 and 8.07 (AA'BB', 4H, J = 8.7 Hz, phenyl protons of "D" ring), 7.45 (d, 1H, J = 8.1 Hz, 9-H), 12.53 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 392 (M^+), 394 $[M+2]^+$, 396 $[M+4]^+$.

Anal. Calcd. for $C_{22}H_{17}ClN_2OS$: C, 67.25; H, 4.36; N, 7.13. Found: C, 67.33; H, 4.31; N, 7.09.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*p*-chlorophenoxy)-1*H*-1,5-benzodiazepine-2-thione (**10**).

This compound was obtained as yellowish needles in 31% yield, mp 206°; ir (nujol mull): ν N-H 3140, C=N 1593, C-N 1238 and 1186, C-O 1258 and 1065 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.37 (s, 3H, CH_3-$C_{4''}$), 3.91 (bs, 2H, 3-H), 6.94 (d, 1H, J = 2.4 Hz, 6-H), 7.02 (d, d, 1H, J = 3.0, 9.0 Hz, 8-H), 7.12 and 7.33 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "C" ring), 7.38 (d, 1H, J = 9.3 Hz, 9-H), 7.46 and 8.07 (AA'BB', 4H, J = 9.3 Hz, phenyl protons of "D" ring), 12.53 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 392 (M^+), 394 $[M+2]^+$, 396 $[M+4]^+$.

Anal. Calcd. for $C_{22}H_{17}ClN_2OS$: C, 67.25; H, 4.36; N; 7.13. Found: C, 67.31; H, 4.41; N, 7.19.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*m*-bromophenoxy)-1*H*-1,5-benzodiazepine-2-thione (**11**).

This compound was obtained as yellowish needles in 25% yield, mp 200°; ir (nujol mull): ν N-H 3173, C=N 1592, C-N 1239 and 1187, C-O 1247 and 1063 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.38 (s, 3H, CH_3-$C_{4''}$), 3.92 (bs, 2H, 3-H), 6.98 (d, 1H, J = 2.7 Hz, 6-H), 7.03 (d, d, 1H, J = 2.4, 9.3 Hz, 8-H), 7.10 (d, d, d, 1H, J = 0.7, 2.4, 8.4 Hz, 6'-H), 7.25 (d, d, 1H, J = 1.2, 6.7 Hz, 2'-H), 7.32 (t, 1H, J = 7.4 Hz, 5'-H), 7.33 and 8.07 (AA'BB', 4H, J = 8.7 Hz, phenyl protons of "D" Ring), 7.36 (d, d, d, 1H, J = 0.6, 2.3, 8.3 Hz, 4'-H), 7.40 (d, 1H, J = 9.3 Hz, 9-H), 12.41 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 436 (M^+), 438 $[M+2]^+$, 440 $[M+4]^+$.

Anal. Calcd. for $C_{22}H_{17}BrN_2OS$: C, 60.42; H, 3.92; N, 6.41. Found: C, 60.50; H, 3.97; N, 6.35.

2,3-Dihydro-4-(*para*-methylphenyl)-7-(*p*-bromophenoxy)-1*H*-1,5-benzodiazepine-2-thione (**12**).

This compound was obtained as yellowish needles in 31% yield, mp 210°; ir (nujol mull): ν N-H 3144, C=N 1598, C-N 1236 and 1185, C-O 1260 and 1067 cm^{-1}; ^1H nmr (deuteriodimethyl sulfoxide): δ 2.38 (s, 3H, CH_3-$C_{4''}$), 3.92 (bs, 2H, 3-H), 6.95 (d, 1H, J = 2.7 Hz, 6-H), 7.02 (d, d, 1H, J = 2.3, 9.0 Hz, 8-H), 7.06 and 7.57 (AA'BB', 4H, J = 9.3 Hz, phenyl protons of "C" ring), 7.33 and 8.05 (AA'BB', 4H, J = 8.4 Hz, phenyl protons of "D" ring), 7.39 (d, 1H, J = 8.7 Hz, 9-H), 12.41 (bs, 1H, N-H, deuterium oxide exchangeable); ms: m/z 436 (M^+), 438 $[M+2]^+$, 440 $[M+4]^+$.

Anal. Calcd. for $C_{22}H_{17}BrN_2OS$: C, 60.42; H, 3.92; N, 6.41. Found: C, 60.37; H, 3.88; N, 6.47.

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