to the structure of hexagonal diamond (Ergun & Alexander, 1962). However, so far we have not detected any example of such a graph. It is interesting to consider structures of the type $F_5^8(2,3,4)$; these contain a diamond-like system of H bonds, but some lines of the graph are doubled by additional H bonds, and the six-membered rings are divided into three- and four-membered ones. Such a structure occurs, for example, in L-tyrosine (Mostad, Nissen & Rømming, 1972).

The method of H-bonded structure representation described here does not take into account the fact that one of the two molecules connected by a H bond is a donor and that the other is an acceptor. This shortcoming can be eliminated by using so-called *digraphs* which consist of points and directed lines.

We plan to apply the digraph concept to the further systematization of H structures.

References

ANDERSEN, E. K. (1967). *Acta Cryst.* **22**, 188–191.

BIERLEIN, T. K. & LINGAFELTER, E. C. (1951). *Acta Cryst.* **4**, 450–453.

BOCK, C. M. (1968). *J. Am. Chem. Soc.* **90**, 2748–2754.

BROWN, C. J. (1966). *Acta Cryst.* **21**, 170–174.

BUTSMA, G. A. & SCHOONE, J. C. (1967). *Acta Cryst.* **22**, 522–526.

DE CAMP, W. H. & AHMED, F. R. (1972). *Acta Cryst.* B**28**, 3484–3489.

ERGUN, S. & ALEXANDER, L. E. (1962). *Nature (London)*, **195**, 765–767.

GIRLING, R. L. & JEFFREY, G. A. (1973). *Acta Cryst.* B**29**, 1102–1111.

HAMILTON, W. C. & IBERS, J. A. (1968). *Hydrogen Bonding in Solids*, pp. 18–22. New York: Benjamin.

HARARY, F. (1967). *Graph Theory and Theoretical Physics*. New York, London: Academic Press.

HARARY, F. & PALMER, E. M. (1973). *Graphical Enumeration*. New York, London: Academic Press.

JEFFREY, G. A. & PARK, Y. J. (1972). *Acta Cryst.* B**28**, 257–267.

KITAIGORODSKY, A. I., ZORKY, P. M. & BELSKY, V. K. (1980*a*). *Structure of Organic Substances*. Vol. 1. Moscow: Nauka.

KITAIGORODSKY, A. I., ZORKY, P. M. & BELSKY, V. K. (1980*b*). *Structure of Organic Substances*. Vol. 2. Moscow: Nauka (in the press).

MOSTAD, A., NISSEN, H. M. & RØMMING, C. (1972). *Acta Chem. Scand.* **26**, 3819–3824.

NEUMAN, A. & GILLIER-PANDRAUD, H. (1973). *Acta Cryst.* B**29**, 1017–1023.

ROHRER, D. C. & SUNDARALINGAM, M. (1970). *Acta Cryst.* B**26**, 546–553.

SINGH, P. & HODGSON, D. J. (1974). *Acta Cryst.* B**30**, 1430–1435.

STRIETER, F. J., TEMPLETON, D. U., SCHEUERMAN, R. F. & SASS, R. L. (1962). *Acta Cryst.* **15**, 1233–1239.

WELLS, A. J. (1962). *Structural Inorganic Chemistry*, pp. 307–315. Oxford: Clarendon Press.

WETHERINGTON, J. B. & MONCRIEF, J. W. (1973). *Acta Cryst.* B**29**, 1520–1526.

Acta Cryst. (1980). B**36**, 2115–2120

The Structure of 7-Chloro-1,3-dihydro-1-(*N*-methylacetamido)-5-phenyl-2*H*-1,4-benzodiazepin-2-one

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(*Received* 4 *March* 1980; *accepted* 24 *March* 1980)

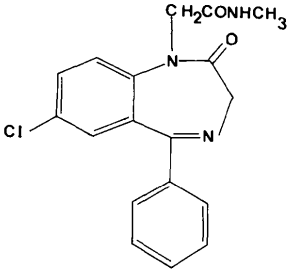
Abstract

$C_{18}H_{16}ClN_3O_2$ is monoclinic, space group $P2_1/c$, with $a = 4{\cdot}775\ (5)$, $b = 11{\cdot}74\ (1)$, $c = 30{\cdot}54\ (2)$ Å, $\beta = 91{\cdot}60\ (5)°$, $Z = 4$. Final $R = 6{\cdot}0\%$ for 1300 observed counter amplitudes $[I > 2{\cdot}5\sigma(I)]$. E.s.d.'s average 0·008 Å for bond lengths and 0·6° for bond angles not involving H atoms. The *N*-methylacetamido group is planar and oriented at an angle of 75·5° to the C(6)–(11) phenyl residue of the 1,4-benzodiazepine system. The angle between the two phenyl rings is 61·6°. Comparison of molecular parameters with those of diazepam indicates that the geometries of the 5-phenyl-1,4-benzodiazepine residues of the two molecules differ only slightly.

0567-7408/80/092115-06$01.00

Introduction

Many 1,4-benzodiazepines possess a broad spectrum of biological activity, exhibiting marked muscle relaxant, anticonvulsant, anti-anxiety and hypnotic effects (Randall & Kappell, 1973). The crystal structure of the title compound (I) is of interest since it differs from diazepam* (Camerman & Camerman, 1972) only in the nature of the substitution at the N(1) atom. Anticonvulsant and anxiolytic efficacies are similar (Popp, 1977; Zbinden & Randall, 1967). However, the affinity of the specific benzodiazepine receptor for (I) is approximately 130 times less than that for diazepam (Squires & Braestrup, 1977), and muscle relaxant activity is less by a factor of approximately 100 (Zbinden & Randall, 1967).



(I)

Experimental

White needles were obtained from Hoffmann–La Roche. A crystal 0·3 × 0·1 × 0·05 mm was mounted along the needle axis which coincided with **a**. After initial examination by photographic methods, final cell dimensions and intensities were measured on a Stoe STADI2 two-circle diffractometer with graphite-monochromated Mo $K\alpha$ radiation and a scintillation counter. The ω-scan technique was employed with a stepping interval of 0·01°, a step time of 1 s and background counts of 30 s at each end of the scan. For layers 0–1kl the scan range was 1·4° and for the higher layers (2kl–5kl), $\Delta\omega$ was calculated from $[A + (B \sin\mu/\tan\theta')]°$, where $2\theta'$ is the azimuth angle, μ the equi-inclination angle and A and B were assigned values of 1·0 and 0·5, respectively. Reflexions were scanned within the range $0{\cdot}1 < \sin\theta/\lambda < 0{\cdot}6$ Å^{-1} and of these 1300 were considered to be observed [$I > 2{\cdot}5\sigma(I)$]. The intensities of four 0kl reflexions were remeasured after each layer of data collection: there was no significant variation of their intensities.

Crystal data

$C_{18}H_{16}ClN_3O_2$, M_r = 341·8, monoclinic, $P2_1/c$, a = 4·775 (5), b = 11·74 (1), c = 30·54 (2) Å, β = 91·60 (5)°, U = 1711·4 Å^3, Z = 4, D_c = 1·327 Mg m^{-3}, $F(000)$ = 712, Mo $K\alpha$ radiation, λ = 0·71069 Å, μ(Mo $K\alpha$) = 0·20 mm^{-1}.

* 7-Chloro-1,3-dihydro-1-methyl-5-phenyl-2*H*-1,4-benzodiazepin-2-one, marketed under the trade name 'Valium' (Roche).

Determination of the structure

The structure was solved by direct methods with *SHELX* (Sheldrick, 1976) and refined by least squares, first with isotropic temperature factors to R = 18·3% and then anisotropically. H atoms, except for H[N(13)], the one linked to the N atom of the *N*-methylacetamido group, were included in the calculations in theoretical positions, but their coordinates were not refined. H[N(13)] was located from a difference synthesis and its coordinates refined in order to determine the disposition of bonds from N(13). One overall isotropic temperature factor for all

Table 1. *Fractional atomic coordinates* (×10^4) *with e.s.d.'s in parentheses and equivalent isotropic temperature factors* (Å^2 × 10^3)

	x	y	z	U_{eq}
Cl(7)	3932 (5)	−1656 (2)	850 (1)	114
C(2)	7364 (12)	2849 (5)	2160 (2)	44
C(3)	5094 (12)	3212 (5)	1837 (2)	50
C(5)	7040 (11)	2448 (5)	1198 (2)	42
C(6)	5673 (12)	429 (5)	1079 (2)	50
C(7)	5193 (14)	−653 (5)	1224 (2)	60
C(8)	5663 (14)	−961 (6)	1657 (2)	67
C(9)	6663 (13)	−144 (5)	1947 (2)	52
C(10)	7178 (10)	969 (4)	1811 (2)	36
C(11)	6683 (11)	1270 (5)	1370 (2)	41
C(12)	10288 (11)	1355 (5)	2461 (2)	45
C(13)	8838 (11)	1171 (4)	2897 (2)	38
C(14)	9616 (14)	732 (6)	3673 (2)	61
C(1′)	8152 (13)	2599 (6)	747 (2)	57
C(2′)	10066 (14)	1838 (7)	571 (2)	73
C(3′)	11118 (15)	2015 (8)	158 (2)	91
C(4′)	10225 (20)	2939 (10)	−83 (2)	96
C(5′)	8285 (21)	3678 (8)	77 (2)	90
C(6′)	7262 (15)	3518 (6)	495 (2)	72
N(1)	8316 (8)	1756 (4)	2119 (1)	39
N(4)	6353 (10)	3352 (4)	1404 (2)	52
N(13)	10588 (10)	976 (4)	3233 (2)	48
O(2)	8335 (9)	3491 (3)	2442 (1)	63
O(13)	6284 (7)	1189 (3)	2930 (1)	53
H[N(13)]	12251 (143)	961 (62)	3188 (20)	
H^1(3)	4200	4010	1940	
H^2(3)	3477	2570	1818	
H(6)	5273	639	739	
H(8)	5258	−1819	1766	
H(9)	7053	−371	2286	
H^1(12)	11192	559	2359	
H^2(12)	11927	1981	2508	
H^1(14)	7365	786	3693	
H^2(14)	10580	1346	3893	
H^3(14)	10298	−114	3764	
H(2′)	10736	1103	760	
H(3′)	12627	1430	27	
H(4′)	11061	3085	−404	
H(5′)	7549	4386	−121	
H(6′)	5769	4113	624	

Table 2. *Molecular dimensions*

Values in parentheses refer to diazepam (Camerman & Camerman, 1972). For diazepam, e.s.d.'s are 0·002 Å for lengths and 0·12–0·18° for bond angles.

(*a*) Bond lengths (Å)

N(1)–C(2)	1·368 (6) (1·365)	C(12)–N(1)	1·466 (6) (1·469)
C(2)–O(2)	1·225 (6) (1·218)	C(12)–C(13)	1·531 (7)
C(2)–C(3)	1·507 (7) (1·506)	C(13)–O(13)	1·227 (5)
C(3)–N(4)	1·477 (7) (1·460)	C(13)–N(13)	1·326 (6)
N(4)–C(5)	1·280 (6) (1·286)	N(13)–C(14)	1·460 (7)
C(5)–C(11)	1·490 (7) (1·482)	C(1′)–C(5)	1·502 (8) (1·492)
C(6)–C(11)	1·405 (7) (1·395)	C(1′)–C(2′)	1·395 (9) (1·393)
C(6)–C(7)	1·367 (7) (1·372)	C(2′)–C(3′)	1·387 (9) (1·390)
C(7)–Cl(7)	1·737 (6) (1·736)	C(3′)–C(4′)	1·374 (11) (1·385)
C(7)–C(8)	1·385 (8) (1·381)	C(4′)–C(5′)	1·370 (11) (1·384)
C(8)–C(9)	1·382 (8) (1·379)	C(5′)–C(6′)	1·392 (9) (1·382)
C(9)–C(10)	1·395 (7) (1·394)	C(6′)–C(1′)	1·385 (8) (1·393)
C(10)–C(11)	1·407 (6) (1·407)	N(13)–H[N(13)]	0·81 (7)
C(10)–N(1)	1·416 (6) (1·422)		

(*b*) Bond angles (°)

C(12)–N(1)–C(2)	116·4 (4) (116·6)	C(11)–C(10)–N(1)	121·5 (5) (122·0)
C(12)–N(1)–C(10)	119·4 (4) (119·0)	C(10)–C(11)–C(6)	118·3 (5) (118·2)
C(10)–N(1)–C(2)	123·5 (4) (123·1)	C(10)–C(11)–C(5)	123·5 (5) (122·2)
N(1)–C(2)–O(2)	121·4 (5) (121·8)	C(6)–C(11)–C(5)	118·1 (5) (119·5)
N(1)–C(2)–C(3)	116·1 (5) (115·3)	N(1)–C(12)–C(13)	111·6 (4)
O(2)–C(2)–C(3)	122·5 (5) (122·9)	C(12)–C(13)–O(13)	123·0 (4)
C(2)–C(3)–N(4)	108·4 (5) (110·5)	C(12)–C(13)–N(13)	114·0 (5)
C(3)–N(4)–C(5)	117·6 (5) (118·1)	O(13)–C(13)–N(13)	123·0 (5)
N(4)–C(5)–C(11)	124·3 (5) (123·6)	C(13)–N(13)–C(14)	122·4 (5)
N(4)–C(5)–C(1′)	117·0 (5) (116·8)	C(5)–C(1′)–C(2′)	121·9 (6) (122·6)
C(11)–C(5)–C(1′)	118·6 (5) (119·4)	C(5)–C(1′)–C(6′)	119·3 (7) (118·6)
C(11)–C(6)–C(7)	120·5 (5) (121·1)	C(6′)–C(1′)–C(2′)	118·7 (6) (118·8)
C(6)–C(7)–Cl(7)	118·4 (5) (119·3)	C(1′)–C(2′)–C(3′)	120·7 (8) (120·4)
C(6)–C(7)–C(8)	121·8 (6) (121·0)	C(2′)–C(3′)–C(4′)	119·5 (8) (120·3)
Cl(7)–C(7)–C(8)	119·7 (5) (119·7)	C(3′)–C(4′)–C(5′)	120·8 (8) (119·4)
C(7)–C(8)–C(9)	118·4 (6) (118·8)	C(4′)–C(5′)–C(6′)	120·0 (8) (120·6)
C(8)–C(9)–C(10)	121·3 (5) (121·5)	C(5′)–C(6′)–C(1′)	120·2 (8) (120·5)
C(9)–C(10)–C(11)	119·7 (5) (119·4)	C(13)–N(13)–H[N(13)]	118·2 (47)
C(9)–C(10)–N(1)	118·8 (5) (118·5)	C(14)–N(13)–H[N(13)]	119·3 (47)

(*c*) Selected torsion angles (°); e.s.d.'s are 0·6–0·9°, for diazepam e.s.d.'s are smaller by a factor of *ca* 3

C(10)–N(1)–C(2)–C(3)	−3·5 (−13·5)	C(6)–C(11)–C(5)–N(4)	137·7 (138·1)
N(1)–C(2)–C(3)–N(4)	−72·2 (−65·0)	N(4)–C(3)–C(2)–O(2)	107·1 (113·3)
C(2)–C(3)–N(4)–C(5)	72·8 (74·7)	C(12)–N(1)–C(2)–C(3)	−173·3 (179·6)
C(3)–N(4)–C(5)–C(11)	−0·7 (−2·9)	C(12)–N(1)–C(2)–O(2)	7·4 (1·3)
N(4)–C(5)–C(11)–C(10)	−39·2 (−40·2)	C(12)–N(1)–C(10)–C(11)	−143·3 (−141·5)
C(5)–C(11)–C(10)–N(1)	−6·0 (−3·3)	C(13)–C(12)–N(1)–C(10)	−99·2
C(11)–C(10)–N(1)–C(2)	47·2 (51·9)	C(13)–C(12)–N(1)–C(2)	71·1
N(4)–C(5)–C(1′)–C(2′)	150·5 (157·3)	N(13)–C(13)–C(12)–N(1)	−170·3
C(11)–C(5)–C(1′)–C(2′)	−32·3 (−25·5)	O(13)–C(13)–C(12)–N(1)	10·6
C(9)–C(10)–N(1)–C(2)	−135·7 (−130·2)	C(14)–N(13)–C(13)–C(12)	−177·4

(*d*) Selected non-bonded distances (Å); *A* is the centre of phenyl ring C(6)–(11); *B* is the centre of phenyl ring C(1′)–(6′); e.s.d.'s are *ca* 0·01 Å

Cl(7)···N(1)	5·92 (5·93)	N(4)···*A*	3·78 (3·76)
Cl(7)···N(4)	6·22 (6·23)	N(4)···*B*	3·65 (3·64)
Cl(7)···O(2)	8·00 (7·97)	O(2)···*A*	4·93 (4·91)
N(4)···O(2)	3·29 (3·35)	O(2)···*B*	6·53 (6·68)
Cl(7)···*B*	6·00 (6·08)	*A*···*B*	4·99 (5·00)
N(1)···*B*	5·62 (5·61)		

the H atoms refined to $U = 0.094$ Å^2. Least-squares calculations were terminated when all shifts were $<0.3\sigma$ and $R = 6.0\%$ for the 1300 observed amplitudes. A final difference synthesis showed no significant features. Final atomic coordinates are in Table 1.* The weighting scheme was $w = 1/[\sigma^2(F)]$, where $\sigma(F)$ is the standard deviation in the observed amplitudes based on counting statistics.

Computations were carried out on the Birmingham University ICL 1906A computer, mainly with the *SHELX* system of programs.

Results and discussion

Fig. 1 shows a stereoscopic view of the molecule and also indicates the atom numbering. Bond lengths, bond angles and selected torsion angles are listed in Table 2 and the results of mean-plane calculations in Table 3. It is of interest to compare molecular dimensions and conformation with those of diazepam (Camerman & Camerman, 1972), and to facilitate the comparison we have listed in Tables 2 and 3, beside our values, corresponding lengths and angles of diazepam.

(*a*) *Description of the structure*

The angle between the mean planes of phenyl rings C(6)–(11) and C(1′)–(6′) is 61·6° which is within the range of interplanar angles commonly found in 5-phenyl-1,4-benzodiazepines where the 5-phenyl ring is not substituted (Chananont, Hamor & Martin, 1980). The seven-membered ring adopts the expected boat conformation with C(3) forming the bow and C(10) and C(11) the stern (Table 3, planes III–V). The *N*-methylacetamido group is essentially planar, C(12), C(13), O(13), N(13), C(14) being coplanar to within ±0·02 Å. N(1) deviates by 0·21 Å from the mean plane through these atoms, which is oriented at an angle of 75·5° to the C(6)–(11) phenyl residue.

Bond lengths and angles generally agree well with standard values. As had been found previously in analogous structures the N(1)–C(2) single bond [length 1·368 (6) Å] is shortened and the C(2)–O(2) carbonyl bond [length 1·225 (6) Å] is slightly lengthened indicating some electron delocalization. The conformation about N(1)–C(2) resembles that of a double bond with near-planar disposition of bonds at N(1) and C(2) [the sum of bond angles being 359·3° at N(1) and 360·0° at C(2)] and torsion angles C(10),

* Lists of structure factors and anisotropic thermal parameters have been deposited with the British Library Lending Division as Supplementary Publication No. SUP 35294 (10 pp.). Copies may be obtained through The Executive Secretary, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England. Equivalent isotropic temperature factors U_{eq} calculated from the anisotropic values by the method of Willis & Pryor (1975) are given in Table 1.

Table 3. *Mean-plane calculations*

(*a*) Deviations of atoms from planes (Å); e.s.d.'s are *ca* 0·007 Å

Distances marked with an asterisk refer to atoms defining the plane. For plane I the corresponding atomic deviations in diazepam are listed in parentheses.

	I		II	III	IV	V
N(1)	−0·061	(−0·034)		0·002*		−0·012*
C(12)	−0·828	(−0·832)				
C(2)	0·722	(0·834)		−0·003*	0*	
O(2)	0·674	(0·924)				
C(3)	1·625	(1·630)		0·760	0*	
N(4)	0·791	(0·748)	0·612	0·003*	0*	
C(5)	0·067	(0·029)	0·036	−0·003*		0·012*
C(6)	0·000*	(−0·001*)				
C(7)	−0·002*	(0·003*)				
C(8)	0·002*	(−0·002*)				
C(9)	−0·001*	(−0·001*)				
C(10)	0·000*	(0·002*)		0·732		0·025*
C(11)	0·000*	(−0·002*)	−0·655	0·689		−0·025*
Cl(7)	0·005	(0·067)				
C(1′)	−0·710	(−0·758)	0·008*			
C(2′)	−1·924	(−1·891)	−0·010*			
C(3′)	−2·639	(−2·575)	0·002*			
C(4′)	−2·132	(−2·132)	0·009*			
C(5′)	−0·923	(−1·014)	−0·011*			
C(6′)	−0·213	(−0·332)	0·003*			

(*b*) Interplanar angles (°); e.s.d.'s are *ca* 0·7°

Values in parentheses refer to diazepam.

plane I–plane II	61·6 (54·7)	plane III–plane IV	60·5 (58·4)	plane III–plane V	35·5 (37·9)

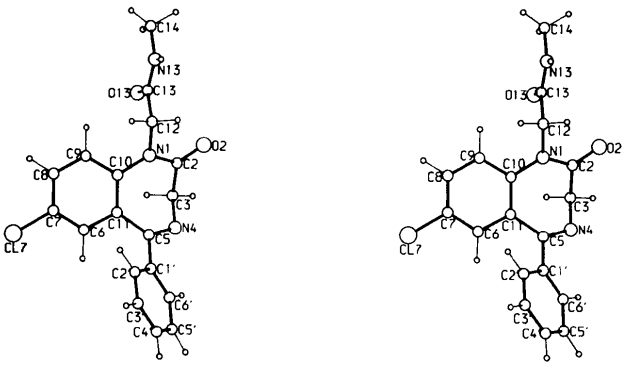


Fig. 1. Stereoscopic view of the molecule in a direction perpendicular to the mean plane of C(5)–(11), N(1).

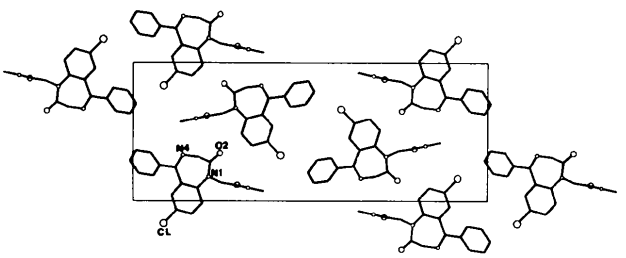


Fig. 2. The crystal structure projected along **x***. The *y* axis points up the page, the *z* axis to the right.

C(12)–N(1)–C(2)–O(2), C(3) all within $7\frac{1}{2}°$ of 0 or 180°. A similar geometry is found for the C(13)–N(13) bond of the *N*-methylacetamido group. N(4)–C(5), 1·280 (6) Å, is in good agreement with accepted values for the length of a C=N double bond, and C(5)–C(11) and C(1′)–C(5), 1·490 (7) and 1·502 (8) Å, are in good agreement with the accepted value for the length of a single bond between trigonally hybridized C atoms.

The packing of the molecules is illustrated in Fig. 2. Molecules stacked parallel to the short (4·775 Å) *a* axis are linked by hydrogen bonds N(13)–H[N(13)]···O(13^{I}) where the superscript I refers to equivalent position $x+1, y, z$. The distances N(13)···O(13^{I}) and H[N(13)]···O(13^{I}) are 2·91 and 2·12 Å and the angle H–N(13)···O(13^{I}) is 11°. All other intermolecular contact distances correspond to normal van der Waals interactions.

(*b*) *Comparison with diazepam*

Bond lengths agree very closely. The largest deviation occurs in C(3)–N(4) where our length of 1·477 (7) Å differs by 0·017 Å from the length in diazepam [1·460 (2) Å]. The difference is, however, not statistically significant. All other deviations are $<1\cdot5\sigma$. Bond angles also agree closely. One highly significant but nevertheless quite small deviation occurs: the angle at C(3) is 108·4 (5)° in our structure and 110·5° in diazepam. Two of the angles at C(11) show deviations of $2\cdot5\sigma$ and $2\cdot7\sigma$ but all other differences are $\leq 1\cdot5\sigma$.

Comparison of torsion angles [Table 2(*c*)] indicates larger differences. For the 15 selected angles listed in the table, the mean difference is 4·6° and the maximum difference, for torsion angle C(10)–N(1)–C(2)–C(3), 10·0°. All but one of the larger deviations (>2·2°) involve either N(1), the site of the substitution change, or the angles about the C(5)–C(1′) bond which define the orientation of the 5-phenyl ring. The overall conformations of the two molecules are, however, quite similar. The angle between the mean planes of the two phenyl rings is 54·7° in diazepam, compared with 61·6° in (I) (Table 3). In diazepam the seven-membered ring also adopts a boat conformation with C(3) as bow and C(10) and C(11) forming the stern. The bow and stern angles, *i.e.* the angles which the plane through N(1), C(2), N(4), C(5) makes with those of C(2), C(3), N(4) and N(1), C(5), C(10), C(11), respectively, are 58·4 and 37·9° in diazepam compared with 60·5 and 35·5° in (I). The similarity of the overall geometries of the two molecules is indicated also by the close agreement of the intramolecular non-bonded distances listed in Table 2(*d*), and the deviations of atoms from the mean plane of phenyl ring C(6)–(11) shown in Table 3. Only one non-bonded distance, O(2)···centre of phenyl ring C(1′)–(6′), and three out-of-plane deviations, those of C(2), O(2) and C(6′), differ by >0·1 Å, the largest difference, 0·25 Å, being for the out-of-plane deviation of O(2). It does not, however, seem possible to rationalize this movement of O(2) on the basis of non-bonded interactions with the neighbouring *N*-methylacetamido group.

The replacement of the 1-methyl substituent of diazepam by an *N*-methylacetamido group has resulted in what seem to be quite minor changes in bond lengths, bond angles and conformational parameters in the 5-phenyl-1,4-benzodiazepine system. The marked reduction in certain aspects of biological activity would therefore appear to be due to the difference in size or electronic properties of these substituents, the *N*-methylacetamido group presumably preventing strong interaction with the pertinent receptors. Further structural studies, covering a series of related compounds of widely differing biological activities are in progress.

We thank Professors J. C. Tatlow, Department of Chemistry, and P. B. Bradley, Director of the MRC Neuropharmacology Unit, for their encouragement, Hoffmann–La Roche for a gift of the title compound (Ro 5-5807) and the Medical Research Council for financial support.

References

CAMERMAN, A. & CAMERMAN, N. (1972). *J. Am. Chem. Soc.* **94**, 268–272.

CHANANONT, P., HAMOR, T. A. & MARTIN, I. L. (1980). *Acta Cryst.* B**36**, 1238–1241.

POPP, F. D. (1977). *Anticonvulsants*, edited by J. A. VIDA, pp. 329–575. New York: Academic Press.

RANDALL, L. O. & KAPPELL, B. (1973). *The Benzodiazepines*, edited by S. GARATTINI, E. MUSSINI & L. O. RANDALL, pp. 27–51. New York: Raven Press.

SHELDRICK, G. M. (1976). *SHELX*. Program for crystal structure determination. Univ. of Cambridge, England.

SQUIRES, R. F. & BRAESTRUP, C. (1977). *Nature (London)*, **266**, 732–734.

WILLIS, B. T. M. & PRYOR, A. W. (1975). *Thermal Vibrations in Crystallography*, pp. 101–102. Cambridge University Press.

ZBINDEN, G. & RANDALL, L. O. (1967). *Adv. Pharmacol.* **5**, 213–291.