Crystal structure of 4-[3-(4-fluorophenyl)-2-hydroxy-1-(1,2,4-triazol-1-yl)-propyl]benzonitrile, $C_{18}H_{17}FN_4O$

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Received September 6, 2001, accepted December 19, 2001; CCDC-No. 1267724

corded on a Bruker DPX 400 instrument in DMSO- d_6 using tetramethylsilane as an internal reference. NMR data are included in the deposited CIF-file.

Experimental details

The intensity data were corrected for Lorentz and polarization effects and for absorption and extinction. All non H atoms were refined anisotropically. H atoms were localized from difference Fourier maps and refined isotropically.

Discussion

Aromatase is a cytochrome P450 enzyme which catalyses the conversion of androgens to estrogens. Aromatase inhibitors are potentially useful in the endocrine therapy of estrogen dependent diseases, such as breast cancer. The title compound, Finrozole, is a new competitive, highly potent and selective nonsteroidal aromatase inhibitor [2]. The compound was found to crystallize as *RS* and *SR* racemate.

Table 1. Data collection and handling.

Crystal:	colorless plate, size 0.06 × 0.16 × 0.23 mm
Wavelength:	Cu K_{α} radiation (1.54178 Å)
μ :	7.93 cm ⁻¹
Diffraction, scan mode:	Enraf-Nonius CAD4, $\omega/2\theta$
$2\theta_{\max}$:	135.48°
$N(hkl)_{\text{measured}}$, $N(hkl)_{\text{unique}}$:	3009, 3002
Criterion for I_{obs} , $N(hkl)_{\text{gt}}$:	$I_{\text{obs}} > 2\sigma(I_{\text{obs}})$, 2231
$N(\text{param})_{\text{refined}}$:	434
Programs:	SHELXTL-PC [3], SHELXL-97 [4]

Abstract

$C_{18}H_{17}FN_4O$, orthorhombic, $Pna2_1$ (No. 33), $a = 15.613(3)$ Å, $b = 5.872(1)$ Å, $c = 34.350(7)$ Å, $V = 3149.2$ Å³, $Z = 8$, $R_{\text{gt}}(F) = 0.062$, $wR_{\text{ref}}(F^2) = 0.184$, $T = 193$ K.

Source of material

Title compound was synthesized by condensation of 4-(1,2,4-triazol-1-yl-methyl) benzonitrile with ethyl 4-fluorophenylacetate in DMF using potassium *t*-butoxide as a base. The intermediate ketone was reduced by sodium borohydride to give 4-[3-(4-fluorophenyl)-2-hydroxy-1-(1,2,4-triazol-1-yl)-propyl]-benzonitrile. The two diastereomeric racemates were separated by crystallization. Title compound is the less soluble enantiomer pair. Crystal suitable for X-ray work were obtained from water-ethanol mixture and mounted on the glass fiber using the oil drop method [1].

The mass spectrum was recorded on Micromass LCT instrument by time of flight (TOF) analyser using electrospray ionisation technique. The main peak of the spectrum appears at 323 (MH⁺), which corresponds to the molecular mass of the title compound. Accurate mass 323.1301 (lock mass correction, raffinose 527.1588, MNa⁺), calculated 323.1308. The NMR spectra were re-

Table 2. Atomic coordinates and displacement parameters (in Å²).

Atom	Site	<i>x</i>	<i>y</i>	<i>z</i>	<i>U</i> _{iso}
H(1AA)	4a	0.5005	0.5237	0.9032	0.029
H(2AA)	4a	0.6142	0.2628	0.8539	0.030
H(11A)	4a	0.7053	0.4777	0.8772	0.02(2)
H(3AA)	4a	0.5191	0.4794	0.8148	0.032
H(3AB)	4a	0.5401	0.7042	0.8394	0.032
H(5AA)	4a	0.6668	0.9225	0.8252	0.037
H(6AA)	4a	0.7805	1.0077	0.7832	0.037
H(8AA)	4a	0.7464	0.4040	0.7292	0.036
H(9AA)	4a	0.6344	0.3172	0.7716	0.033
H(13A)	4a	0.4970	0.4475	0.9682	0.033
H(14A)	4a	0.5292	0.2251	1.0232	0.039
H(16A)	4a	0.6326	-0.2572	0.9516	0.037
H(17A)	4a	0.5992	-0.0284	0.8976	0.036
H(21A)	4a	0.4972	-0.0019	0.8472	0.037
H(22A)	4a	0.3547	-0.0946	0.8296	0.046
H(23A)	4a	0.2582	0.1809	0.8547	0.050

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Table 2. Continued.

Atom	Site	x	y	z	U _{iso}
H(24A)	4a	0.3394	0.4571	0.8907	0.041
H(1BA)	4a	1.2367	0.4976	0.5861	0.027
H(2BA)	4a	1.1223	0.7582	0.6339	0.030
H(11B)	4a	1.0652	0.5752	0.5834	0.047
H(3BA)	4a	1.1995	0.3214	0.6498	0.037
H(3BB)	4a	1.2155	0.5472	0.6747	0.037
H(5BA)	4a	1.1031	0.6908	0.7176	0.031
H(6BA)	4a	0.9897	0.5991	0.7601	0.040
H(8BA)	4a	0.9614	-0.0066	0.7053	0.038

Table 2. Continued.

Atom	Site	x	y	z	U _{iso}
H(9BA)	4a	1.0736	0.0900	0.6625	0.037
H(13B)	4a	1.1326	1.0476	0.5904	0.032
H(14B)	4a	1.1064	1.2808	0.5368	0.040
H(16B)	4a	1.2236	0.8153	0.4668	0.040
H(17B)	4a	1.2502	0.5905	0.5203	0.040
H(21B)	4a	1.2336	1.0253	0.6424	0.039
H(22B)	4a	1.3745	1.1334	0.6605	0.041
H(23B)	4a	1.4751	0.8714	0.6330	0.050
H(24B)	4a	1.3967	0.5816	0.5985	0.038

Table 3. Atomic coordinates and displacement parameters (in Å²).

Atom	Site	x	y	z	U ₁₁	U ₂₂	U ₃₃	U ₁₂	U ₁₃	U ₂₃
C(1A)	4a	0.5183(4)	0.371(1)	0.8930(2)	0.034(4)	0.025(4)	0.014(3)	0.001(3)	-0.003(3)	-0.004(3)
C(2A)	4a	0.5929(4)	0.413(1)	0.8638(2)	0.026(3)	0.030(4)	0.019(3)	0.000(3)	-0.003(2)	-0.005(3)
O(11A)	4a	0.6571(3)	0.5169(9)	0.8858(1)	0.023(2)	0.040(3)	0.028(2)	-0.002(2)	0.004(2)	-0.006(2)
C(3A)	4a	0.5646(4)	0.560(1)	0.8295(2)	0.023(3)	0.035(4)	0.023(3)	0.006(3)	0.006(3)	0.004(3)
C(4A)	4a	0.6383(4)	0.613(1)	0.8022(2)	0.023(3)	0.030(4)	0.024(3)	-0.001(3)	-0.003(3)	0.005(3)
C(5A)	4a	0.6827(5)	0.817(1)	0.8055(2)	0.049(4)	0.015(4)	0.027(4)	-0.002(3)	0.003(3)	-0.002(3)
C(6A)	4a	0.7499(5)	0.869(1)	0.7807(2)	0.037(4)	0.023(4)	0.033(4)	-0.004(3)	0.003(3)	0.007(3)
C(7A)	4a	0.7711(4)	0.713(1)	0.7523(2)	0.028(3)	0.035(4)	0.027(4)	0.001(3)	-0.002(3)	0.004(3)
F(10A)	4a	0.8351(3)	0.7657(9)	0.7269(2)	0.040(2)	0.053(3)	0.034(3)	-0.006(2)	0.013(2)	0.005(2)
C(8A)	4a	0.7297(4)	0.510(1)	0.7487(2)	0.039(4)	0.028(4)	0.023(3)	0.007(3)	0.003(3)	-0.001(3)
C(9A)	4a	0.6633(5)	0.459(1)	0.7738(2)	0.036(4)	0.023(4)	0.023(4)	0.002(3)	-0.005(3)	0.000(3)
C(12A)	4a	0.5444(4)	0.230(1)	0.9276(2)	0.020(3)	0.028(4)	0.022(4)	0.000(3)	0.001(3)	-0.001(3)
C(13A)	4a	0.5243(4)	0.304(1)	0.9649(2)	0.031(3)	0.029(4)	0.023(4)	0.006(3)	0.005(3)	0.008(3)
C(14A)	4a	0.5433(5)	0.173(1)	0.9978(2)	0.047(4)	0.034(5)	0.019(3)	-0.001(4)	-0.001(3)	-0.001(3)
C(15A)	4a	0.5828(5)	-0.034(1)	0.9924(2)	0.037(4)	0.029(4)	0.023(3)	-0.001(3)	0.002(3)	0.003(3)
C(18A)	4a	0.6040(5)	-0.172(2)	1.0257(2)	0.053(5)	0.041(5)	0.022(4)	0.012(4)	-0.006(3)	0.001(4)
N(19A)	4a	0.6218(6)	-0.279(1)	1.0521(2)	0.091(6)	0.042(5)	0.039(4)	0.012(4)	-0.006(4)	0.015(4)
C(16A)	4a	0.6049(5)	-0.115(1)	0.9549(2)	0.044(4)	0.019(4)	0.029(4)	0.004(3)	-0.004(3)	-0.004(3)
C(17A)	4a	0.5848(4)	0.022(1)	0.9231(2)	0.035(4)	0.031(4)	0.023(3)	-0.003(3)	0.004(3)	-0.009(3)
N(20A)	4a	0.4441(4)	0.273(1)	0.8735(2)	0.030(3)	0.030(3)	0.021(3)	0.003(3)	0.000(2)	0.005(2)
N(21A)	4a	0.4510(4)	0.077(1)	0.8531(2)	0.033(3)	0.032(3)	0.028(3)	0.005(3)	-0.003(3)	-0.006(3)
C(22A)	4a	0.3710(5)	0.034(2)	0.8445(2)	0.048(5)	0.049(5)	0.018(3)	-0.010(4)	0.000(3)	0.004(3)
N(23A)	4a	0.3141(4)	0.182(1)	0.8578(2)	0.021(3)	0.073(5)	0.031(3)	-0.009(3)	-0.004(3)	0.003(4)
C(24A)	4a	0.3608(5)	0.330(2)	0.8768(2)	0.034(4)	0.042(5)	0.026(4)	-0.001(4)	-0.001(3)	0.007(4)
C(1B)	4a	1.2175(4)	0.650(1)	0.5960(2)	0.025(3)	0.019(3)	0.024(3)	0.001(3)	-0.002(3)	-0.001(3)
C(2B)	4a	1.1449(4)	0.609(1)	0.6244(2)	0.031(3)	0.022(4)	0.022(3)	0.001(3)	0.000(3)	-0.007(3)
O(11B)	4a	1.0796(3)	0.4940(9)	0.6025(1)	0.038(3)	0.034(3)	0.023(2)	-0.002(2)	-0.004(2)	-0.005(2)
C(3B)	4a	1.1721(5)	0.462(1)	0.6595(2)	0.039(4)	0.025(4)	0.029(4)	0.004(3)	0.002(3)	-0.002(3)
C(4B)	4a	1.1004(5)	0.398(1)	0.6859(2)	0.038(4)	0.022(4)	0.017(3)	0.007(3)	-0.003(3)	0.004(3)
C(5B)	4a	1.0745(4)	0.549(1)	0.7150(2)	0.030(4)	0.024(4)	0.024(4)	0.000(3)	-0.005(3)	-0.003(3)
C(6B)	4a	1.0078(5)	0.496(1)	0.7404(2)	0.035(4)	0.036(4)	0.028(3)	0.003(3)	-0.001(3)	-0.003(3)
C(7B)	4a	0.9689(5)	0.284(1)	0.7355(2)	0.033(4)	0.036(5)	0.022(4)	0.001(3)	0.005(3)	0.006(3)
F(10B)	4a	0.9047(3)	0.2297(9)	0.7610(2)	0.045(2)	0.059(4)	0.044(3)	-0.012(2)	0.018(2)	0.003(3)
C(8B)	4a	0.9905(5)	0.135(1)	0.7077(2)	0.045(4)	0.024(4)	0.026(3)	-0.005(4)	-0.006(3)	0.002(3)
C(9B)	4a	1.0574(5)	0.193(1)	0.6825(2)	0.049(4)	0.020(4)	0.024(4)	0.004(4)	-0.001(3)	-0.005(3)
C(12B)	4a	1.1933(4)	0.793(1)	0.5608(2)	0.033(4)	0.020(4)	0.013(3)	-0.007(3)	0.000(3)	-0.004(3)
C(13B)	4a	1.1512(4)	1.001(1)	0.5653(2)	0.034(4)	0.025(4)	0.022(3)	-0.001(3)	0.000(3)	-0.002(3)
C(14B)	4a	1.1361(4)	1.141(2)	0.5337(2)	0.031(4)	0.040(5)	0.028(4)	0.002(3)	0.001(3)	-0.001(3)
C(15B)	4a	1.1652(5)	1.073(1)	0.4968(2)	0.038(4)	0.022(4)	0.023(3)	-0.011(3)	-0.003(3)	-0.001(3)
C(18B)	4a	1.1521(5)	1.221(2)	0.4635(2)	0.048(4)	0.040(5)	0.028(4)	-0.008(4)	0.000(3)	0.001(4)
N(19B)	4a	1.1420(5)	1.340(2)	0.4377(2)	0.089(5)	0.040(5)	0.034(4)	0.006(4)	-0.005(4)	0.014(4)
C(16B)	4a	1.2061(5)	0.864(1)	0.4920(2)	0.043(4)	0.039(5)	0.017(3)	-0.007(4)	0.005(3)	-0.007(3)
C(17B)	4a	1.2206(5)	0.731(1)	0.5236(2)	0.041(4)	0.028(4)	0.030(4)	0.001(4)	0.009(3)	-0.006(3)
N(20B)	4a	1.2908(3)	0.756(1)	0.6156(2)	0.027(3)	0.027(3)	0.012(3)	-0.003(2)	0.000(2)	-0.002(2)
N(21B)	4a	1.2811(4)	0.953(1)	0.6364(2)	0.038(3)	0.031(4)	0.028(3)	0.001(3)	0.003(2)	-0.011(3)
C(22B)	4a	1.3601(5)	1.005(2)	0.6451(2)	0.035(4)	0.041(5)	0.027(3)	-0.003(4)	0.001(3)	-0.008(3)
N(23B)	4a	1.4191(4)	0.863(1)	0.6307(2)	0.029(3)	0.063(5)	0.032(3)	-0.007(3)	0.003(3)	-0.004(4)
C(24B)	4a	1.3737(4)	0.708(2)	0.6122(2)	0.025(3)	0.044(5)	0.027(4)	-0.001(3)	0.001(3)	-0.008(3)

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