Crystal structure of ({(*E*)-[3-(1*H*-imidazol-1-yl)-1-phenylpropylidene]amino}-oxy)(4-methylphenyl)methanone, $C_{20}H_{19}N_3O_2$

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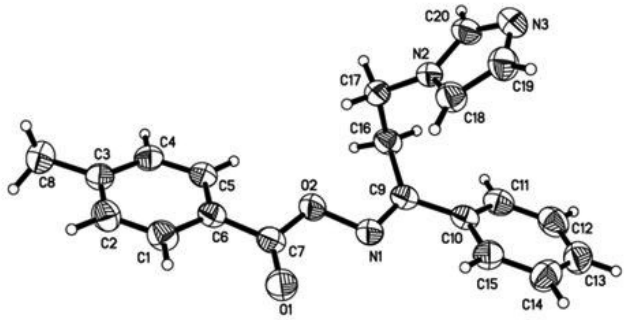

Abstract

$C_{20}H_{19}N_3O_2$, monoclinic, $P2_1/c$ (no. 14), a = 16.3620(2) Å, b = 8.1179(2) Å, c = 14.4252(2) Å, β = 113.861(1)°, V = 1752.3 Å^3, Z = 4, $R_{gt}(F)$ = 0.0385, $wR_{ref}(F^2)$ = 0.1200, T = 293 K.

Table 1. Data collection and handling.

Crystal:	colourless blocks, size 0.34×0.58×0.68 mm
Wavelength:	Cu K_α radiation (1.54178 Å)
μ:	6.71 cm^{-1}
Diffractometer, scan mode:	Bruker APEX-II CCD, φ and ω
$2\theta_{max}$:	140.62°
$N(hkl)_{measured}$, $N(hkl)_{unique}$:	11718, 3290
Criterion for I_{obs}, $N(hkl)_{gt}$:	$I_{obs} > 2\ \sigma(I_{obs})$, 2903
$N(param)_{refined}$:	228
Programs:	SHELX [1]

Source of material

A solution of 4-methylbenzoic acid (7 mmol), *N*-(3-dimethylaminopropyl)-*N'*-ethyl-carbodiimide hydrochloride (7.3 mmol), and 4-dimethylaminopyridine (400 mg) in dichloromethane (75 mL) was stirred at ambient temperature. (1*E*)-*N*-Hydroxy-3-(1*H*-imidazol-1-yl)-1-phenylpropan-1-imine (6.9 mmol) [2] was added to the stirred reaction mixture and stirring was continued for a further 18 h at room temperature. The reaction mixture was washed successively with water (2 × 20 mL), 10% $NaHCO_3$ solution (2 × 15 mL), and water (2 × 15 mL). The organic layer was separated, dried (Na_2SO_4) and evaporated under reduced pressure and the residue was crystallized from isopropanol to give pale yellow crystals of the title compound (**m.p.** 125-127 °C [2]) which were suitable for X-ray crystallography.

Discussion

Fungi are eukaryotic organisms and some of them are important human pathogens causing diseases such as Aspergillosis, Candidosis and Cryptococcosis [3–5]. Actually, the incidence of severe fungal infections has increased in an alarming way over the last two decades. Azoles are the largest family of antifungal drugs and they have been and are still widely used to treat superficial mucosal as well as deep and disseminated fungal infections. Nevertheless, their extensive use gives rise to the development of resistance and resulted in therapeutic failure. The title compound is an imidazole-containing antifungal agent having MIC value of 0.3752 µmol/mL towards clinical isolates of *Candida albicans* and *Asperagillus niger*. Whereas, it showed MIC value of 0.1876 and 1.5008 µmol/mL towards clinical isolates of *Candida tropicalis* and *Penicillium chrysogenum*, respectively [2]. The *E* isomer of the title compound as a kinetically favored candidate was detected over the *Z* isomer due to the steric factor. The single bond N1–O2 is clearly characterized by the distance of 1.4382(18) Å. The double bond of C9=N1 is characterized by the distance of 1.2833(18) Å.

Table 2. Atomic coordinates and displacement parameters (in Å^2).

Atom	Site	x	y	z	U_{iso}
H(1)	4*e*	–0.0440	0.4911	0.2674	0.070
H(2)	4*e*	0.0392	0.4503	0.1738	0.074
H(3)	4*e*	–0.1245	0.0862	0.0223	0.064
H(4)	4*e*	–0.2044	0.1170	0.1207	0.060
H(8C)	4*e*	0.0353	0.3489	0.0062	0.109
H(8B)	4*e*	–0.0180	0.1870	–0.0393	0.109
H(8A)	4*e*	0.0707	0.1791	0.0590	0.109
H(11)	4*e*	–0.5085	–0.0140	0.2636	0.072
H(12)	4*e*	–0.6057	0.0253	0.3411	0.084
H(13)	4*e*	–0.5714	0.2074	0.4734	0.085
H(14)	4*e*	–0.4401	0.3557	0.5270	0.082
H(15)	4*e*	–0.3418	0.3183	0.4514	0.068
H(16A)	4*e*	–0.3430	–0.0111	0.1856	0.065
H(16B)	4*e*	–0.3967	–0.0987	0.2401	0.065
H(17A)	4*e*	–0.2582	–0.2282	0.2766	0.067
H(17B)	4*e*	–0.2088	–0.0653	0.3267	0.067
H(18)	4*e*	–0.2029	0.0059	0.5114	0.070
H(19)	4*e*	–0.2197	–0.1727	0.6383	0.077
H(20)	4*e*	–0.3118	–0.4139	0.3842	0.070

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Table 3. Atomic coordinates and displacement parameters (in Å^2).

Atom	Site	x	y	z	U_{11}	U_{22}	U_{33}	U_{12}	U_{13}	U_{23}
O(1)	4*e*	–0.18331(8)	0.4699(1)	0.30933(8)	0.0934(7)	0.0575(6)	0.0813(7)	–0.0190(5)	0.0504(6)	–0.0231(5)
O(2)	4*e*	–0.24544(7)	0.2211(1)	0.25361(7)	0.0793(6)	0.0442(5)	0.0724(6)	–0.0082(4)	0.0461(5)	–0.0067(4)
N(1)	4*e*	–0.30477(8)	0.2567(1)	0.30222(9)	0.0690(7)	0.0440(6)	0.0642(7)	–0.0017(5)	0.0355(5)	–0.0025(5)
N(2)	4*e*	–0.25918(7)	–0.1853(1)	0.41216(7)	0.0571(5)	0.0382(5)	0.0527(5)	0.0034(4)	0.0273(4)	0.0014(4)
N(3)	4*e*	–0.27554(9)	–0.3451(2)	0.5273(1)	0.0831(8)	0.0551(7)	0.0699(7)	0.0040(6)	0.0395(6)	0.0132(6)
C(1)	4*e*	–0.06014(9)	0.4087(2)	0.2185(1)	0.0645(7)	0.0537(8)	0.0548(7)	–0.0120(6)	0.0210(6)	–0.0103(6)
C(2)	4*e*	–0.01087(9)	0.3851(2)	0.1616(1)	0.0573(7)	0.0606(8)	0.0655(8)	–0.0112(6)	0.0238(6)	–0.0033(6)
C(3)	4*e*	–0.03442(8)	0.2658(2)	0.0863(1)	0.0543(6)	0.0509(7)	0.0559(7)	0.0059(5)	0.0212(5)	0.0065(6)
C(4)	4*e*	–0.10780(8)	0.1672(2)	0.0721(1)	0.0598(7)	0.0460(7)	0.0541(7)	0.0009(5)	0.0217(5)	–0.0058(5)
C(5)	4*e*	–0.15652(8)	0.1865(2)	0.13026(9)	0.0539(6)	0.0425(7)	0.0514(6)	–0.0028(5)	0.0185(5)	–0.0011(5)
C(6)	4*e*	–0.13381(8)	0.3101(2)	0.20317(8)	0.0564(6)	0.0417(6)	0.0435(6)	–0.0006(5)	0.0174(5)	0.0020(5)
C(7)	4*e*	–0.18816(9)	0.3471(2)	0.26151(9)	0.0642(7)	0.0420(7)	0.0472(6)	–0.0028(5)	0.0217(5)	0.0003(5)
C(8)	4*e*	0.0182(1)	0.2431(2)	0.0222(1)	0.0717(9)	0.076(1)	0.082(1)	0.0009(8)	0.0422(8)	–0.0010(8)
C(9)	4*e*	–0.35123(8)	0.1278(2)	0.29902(8)	0.0552(6)	0.0409(6)	0.0442(6)	–0.0001(5)	0.0152(5)	0.0017(5)
C(10)	4*e*	–0.41440(8)	0.1481(2)	0.34875(9)	0.0528(6)	0.0407(6)	0.0480(6)	0.0016(5)	0.0155(5)	0.0054(5)
C(11)	4*e*	–0.49420(9)	0.0607(2)	0.3168(1)	0.0588(7)	0.0501(8)	0.0639(7)	–0.0043(6)	0.0170(6)	0.0011(6)
C(12)	4*e*	–0.5524(1)	0.0841(2)	0.3634(1)	0.0554(7)	0.0669(9)	0.083(1)	–0.0019(7)	0.0247(7)	0.0156(8)
C(13)	4*e*	–0.5323(1)	0.1929(2)	0.4419(1)	0.0640(8)	0.082(1)	0.0746(9)	0.0158(7)	0.0346(7)	0.0198(8)
C(14)	4*e*	–0.4537(1)	0.2808(2)	0.4741(1)	0.0734(9)	0.073(1)	0.0597(8)	0.0110(7)	0.0278(7)	–0.0018(7)
C(15)	4*e*	–0.39490(9)	0.2588(2)	0.4286(1)	0.0577(7)	0.0547(8)	0.0555(7)	–0.0018(6)	0.0195(5)	–0.0038(6)
C(16)	4*e*	–0.34400(9)	–0.0330(2)	0.25123(9)	0.0708(7)	0.0440(7)	0.0453(6)	–0.0038(6)	0.0220(5)	–0.0038(5)
C(17)	4*e*	–0.2613(1)	–0.1318(2)	0.3148(1)	0.0752(8)	0.0455(7)	0.0593(7)	0.0052(6)	0.0400(6)	0.0013(5)
C(18)	4*e*	–0.22689(9)	–0.0998(2)	0.5008(1)	0.0710(8)	0.0496(8)	0.0574(7)	–0.0074(6)	0.0282(6)	–0.0067(6)
C(19)	4*e*	–0.2368(1)	–0.1995(2)	0.5703(1)	0.0768(9)	0.0682(9)	0.0526(7)	0.0010(7)	0.0303(6)	0.0015(6)
C(20)	4*e*	–0.2871(1)	–0.3316(2)	0.4323(1)	0.0732(8)	0.0407(7)	0.0642(8)	–0.0006(6)	0.0310(6)	0.0021(6)

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