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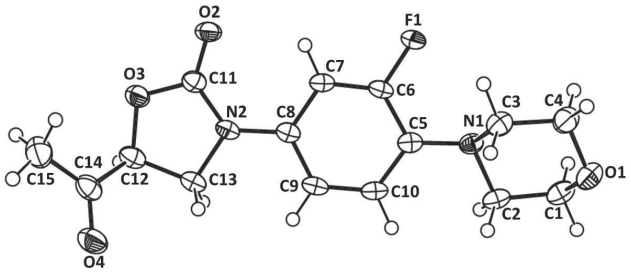
Marivel Samipillai, Thavendran Govender, Hendrik G. Kruger and Naicker Tricia*

Crystal structure of 5-acetyl-3-(3-fluoro-4-morpholinophenyl)oxazolidin-2-one, $C_{15}H_{17}FN_2O_4$



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Abstract

$C_{15}H_{17}FN_2O_4$, monoclinic, $P2_1/c$ (no. 14), $a = 12.4266(11)$ Å, $b = 6.6865(5)$ Å, $c = 17.1510(15)$ Å, $\beta = 99.288(2)°$, $V = 1406.4(2)$ Å^3, $Z = 4$, $R_{gt}(F) = 0.0422$, wR_{ref} $(F^2) = 0.1139$, $T = 173$ K.

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The crystal structure is shown in the figure. Tables 1 and 2 contain details on crystal structure and measurement conditions and a list of the atoms including atomic coordinates and displacement parameters.

Table 1: Data collection and handling.

Crystal:	Colourless plate
Size:	0.39 × 0.25 × 0.05 mm
Wavelength:	Mo $K\alpha$ radiation (0.71073 Å)
μ:	1.2 cm^{-1}
Diffractometer, scan mode:	Bruker APEX-II, 0.5° φ and ω
$2\theta_{max}$, completeness:	56.6°, >99%
$N(hkl)_{measured}$, $N(hkl)_{unique}$, R_{int}:	16828, 3509, 0.035
Criterion for I_{obs}, $N(hkl)_{gt}$:	$I_{obs} > 2\,\sigma(I_{obs})$, 2556
$N(param)_{refined}$:	200
Programs:	Bruker programs [1], SHELX [2], X-SEED [3], ORTEP [5]

Source of material

A solution of 3-fluoro-4-(4-morpholinyl)-aniline (1.0 eq.) and carbonyldiimidazole (CDI) (1.2 eq.) in dichloromethane (DCM) (10 mL) was stirred at room temperature for 24 h. The solvent was evaporated under reduced pressure and the resulting residue was purified *via* column chromatography to afford pure product. Yield 65%; ^{1}H-NMR (400 MHz, $CDCl_3$) δ/p.p.m. = 7.43–7.41 (dd, $J = 14.33$, 2.20 Hz, 1H), 7.11–7.09 (d, $J = 9.21$ Hz, 1H), 6.94–6.91 (t, $J = 9.08$ Hz, 1H), 4.85–4.83 (t, $J = 7.75$ Hz, 1H), 4.13–4.11 (d, $J = 7.16$ Hz, 2H), 3.86–3.85 (t, $J = 4.71$ Hz, 4H), 3.06–3.04 (t, $J = 4.69$ Hz, 4H), 2.41 (s, 3H); ^{13}C-NMR ($CDCl_3$) δ = 204.6 (CO), 156.6 (CF), 155.0 (CO), 153.3 (CN), 133.0 (CN), 132.5 (CH), 119.0 (CH), 113.8 (CH), 108.3 (CH), 75.1 (CH), 68.0 (CH_2), 51.3 (CH_2), 47.4 (CH_2), 27.4 (CH_3). The title compound (3.0 mg) was dissolved in DCM in a NMR tube and the tube was covered loosely with cap to enable the solvent to slowly evaporate at ambient conditions. Crystals suitable for X-ray diffraction formed over a period of 7 days.

Experimental details

All hydrogen atoms were placed in idealised positions and refined using a riding model with U_{iso} assigned 1.2 or 1.5 times U_{eq} of their parent atoms and the C—H bond distances constrained between 0.95 and 1.00 Å. The final conventional R factor is 0.0422.

Discussion

In the past decade oxazolidonone compounds have attracted much attention because of their biologically properties [6–9]. They are totally synthetic antibacterial agents with a novel mechanism of action involving the inhibition of bacterial protein synthesis at a very early stage, thus disrupting chain initiation [9, 10]. Linezolid and tedizolid are the only members of oxazolidonone compounds that are in clinical use for treatment of bacterial infection in humans [11].

Herein, we report the single crystal structure and packing analysis of a linezolid analogue, $C_{15}H_{17}FN_2O_4$. The title compound can be considered to be flexible as the conformation of the five membered oxazoline and six membered morpholine

***Corresponding author: Naicker Tricia** Catalysis and Peptide Research Unit, University of KwaZulu Natal, Durban 4000, South Africa, e-mail: naickert1@ukzn.ac.za
Marivel Samipillai, Thavendran Govender and Hendrik G. Kruger: Catalysis and Peptide Research Unit, University of KwaZulu Natal, Durban 4000, South Africa

Table 2: Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å^2).

Atom	*x*	*y*	*z*	U_{iso}*/U_{eq}
F1	0.80765(8)	0.71695(13)	0.12697(6)	0.0375(3)
O1	0.64862(10)	1.22240(17)	0.29976(7)	0.0376(3)
O2	1.13563(9)	0.53271(16)	0.03838(7)	0.0333(3)
O3	1.28472(9)	0.69336(16)	0.01482(7)	0.0335(3)
O4	1.47301(10)	1.05972(19)	0.09716(8)	0.0452(3)
N1	0.78112(11)	1.08789(18)	0.18873(7)	0.0258(3)
N2	1.15623(10)	0.87577(18)	0.05818(7)	0.0261(3)
C1	0.65539(15)	1.3314(2)	0.22906(10)	0.0354(4)
H1A	0.6444	1.4755	0.2384	0.042*
H1B	0.5966	1.2866	0.1867	0.042*
C2	0.76414(14)	1.3015(2)	0.20264(9)	0.0306(4)
H2A	0.7663	1.3777	0.1534	0.037*
H2B	0.8231	1.3520	0.2437	0.037*
C3	0.77146(14)	0.9740(2)	0.26085(9)	0.0307(4)
H3A	0.8308	1.0134	0.3038	0.037*
H3B	0.7789	0.8293	0.2507	0.037*
C4	0.66271(15)	1.0139(2)	0.28580(10)	0.0363(4)
H4A	0.6037	0.9672	0.2440	0.044*
H4B	0.6576	0.9379	0.3346	0.044*
C5	0.87668(13)	1.0419(2)	0.15739(8)	0.0252(3)
C6	0.89033(12)	0.8508(2)	0.12708(9)	0.0260(3)
C7	0.97882(13)	0.7887(2)	0.09502(9)	0.0263(3)
H7	0.9833	0.6557	0.0763	0.032*
C8	1.06227(12)	0.9263(2)	0.09064(8)	0.0239(3)
C9	1.05072(13)	1.1206(2)	0.11698(9)	0.0284(3)
H9	1.1054	1.2171	0.1121	0.034*
C10	0.96062(13)	1.1758(2)	0.15027(9)	0.0293(3)
H10	0.9559	1.3088	0.1688	0.035*
C11	1.18499(13)	0.6879(2)	0.03774(8)	0.0269(3)
C12	1.32711(14)	0.8939(2)	0.02139(10)	0.0316(4)
H12	1.3299	0.9459	−0.0329	0.038*
C13	1.24476(13)	1.0178(2)	0.05775(9)	0.0293(3)
H13A	1.2752	1.0619	0.1119	0.035*
H13B	1.2206	1.1363	0.0250	0.035*
C14	1.44106(14)	0.9009(3)	0.06863(10)	0.0343(4)
C15	1.51184(16)	0.7190(3)	0.07280(12)	0.0455(5)
H15A	1.5824	0.7476	0.1055	0.068*
H15B	1.5232	0.6819	0.0195	0.068*

rings with respect to the aromatic ring (flurophenyl) can be varied. The conformational flexibility can be described in terms of two important torsion angles t1 [C13—N2—C8—C7, −176.85(13)°] and t2 [C2—N1—C5—C6, −167.18(13)°]. The value of t1 shows that the oxazolidine and fluorophenyl rings are essentially coplanar. The morpholine ring is in a chair conformation. The "downward" orientation of the morpholine ring with respect to the fluorophenyl ring can be understood in terms of minimisation of unfavourable van der Waals contacts between H (van der Waals radius 1.2 Å) and F (1.47 Å) atoms. Crystal packing analysis reveals that molecules are interconnected through C—H···O and C—H···F interactions. Pairs of molecules related by translation along the y axis are connected together through C—H···O [D···A, 3.3141(18) Å and D—H···A, 141°] and C—H···F [D···A, 3.1496(17) Å and D—H···A, 133°] interactions to form infinite columns. These columns are connected by a number of C—H···O interactions giving rise to an overall 3D network.

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