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# Crystal structure of (*E*)-4-(4-(1H-1,2,4-triazol-1-yl) benzylidene)-6,8-dimethoxy-3,4-dihydrobenzo[*b*] oxepin-5(*2H*)-one, $C_{21}H_{19}N_3O_4$

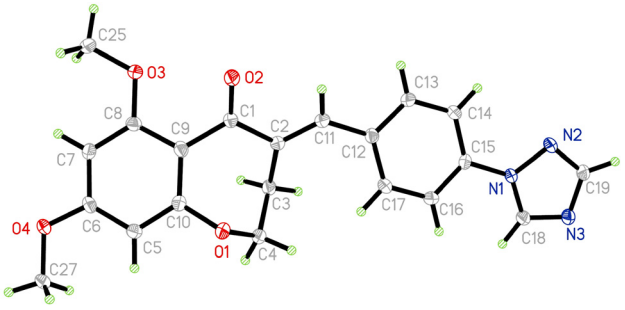


**Table 1:** Data collection and handling.

| | |
|---|---|
| Crystal: | Clear light colourless block |
| Size: | 0.14 × 0.13 × 0.10 mm |
| Wavelength: | Cu*K*α radiation (1.54184 Å) |
| $\mu$: | 0.85 mm$^{-1}$ |
| Diffractometer, scan mode: | XtaLAB Synergy R, $\omega$ scan |
| $\theta_{max}$, completeness: | 73.3°, 100 % |
| $N(hkl)_{measured}$, $N(hkl)_{unique}$, $R_{int}$: | 9353, 3319, 0.027 |
| Criterion for $I_{obs}$, $N(hkl)_{gt}$: | $I_{obs} > 2\ \sigma(I_{obs})$, 3,143 |
| $N(param)_{refined}$: | 256 |
| Programs: | Rigaku,[1] SHELX[2,3] |

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**Abstract**

$C_{21}H_{19}N_3O_4$, triclinic, $P\bar{1}$ (no. 2), $a$ = 7.1708(3) Å, $b$ = 9.1832(4) Å, $c$ = 14.0711(6) Å, $\alpha$ = 80.297(4)°, $\beta$ = 88.910(3)°, $\gamma$ = 69.639(4)°, $V$ = 855.49(7) Å$^3$, $Z$ = 2, $R_{gt}(F)$ = 0.0372, $wR_{ref}(F^2)$ = 0.0975, T = 100 K.

**CCDC no.:** 2418113

The molecular structure is shown in the figure. Displacement ellipsoids are drawn at the 50 % probability level.

Table 1 contains the crystallographic data and the list of the atoms including atomic coordinates and displacement parameters can be found in the cif-file attached to this article.

## 1 Source of material

The parent nucleus, 6,8-dimethoxy-3,4-dihydrobenzo[*b*]-oxepin-5(*2H*)-one was obtained by the synthesis method in ref. 4. Next, 1,2,4-triazole (10.89 g, 0.16 mol), and potassium carbonate (27.64 g, 0.20 mol) were mixed in *N*,*N*-dimethylformamide (10 mL) solvent. The mixture was heated and refluxed at 353 K for 4 h. Then, *p*-fluorobenzaldehyde (2.48 g, 0.02 mol) was added to the reaction and reacted at 373 K for another 5 h. When the reaction was completed, the mixture was cooled to room temperature. After filtration and vacuum distillation, the residue was purified on a silicagel column with dichloromethane/methanol (30:1, *v*:*v*) to obtain the intermediate.[5,6] Using a 25 % aqueous sodium hydroxide solution as a catalyst, the parent nucleus (2.22 g, 0.01 mol) and the intermediate (1.73 g, 0.01 mol) were dissolved in methanol. The system was stirred at room temperature for 5 h. The title compound, was obtained from a mixture of dichloromethane and methanol (1:1, *v*:*v*) at room temperature.

## 2 Experimental details

The H atoms were placed in idealized positions and treated as riding on their parent atoms, with $d$(C–H) = 0.98 Å (methyl), $U_{iso}$(H) = 1.5$U_{eq}$ (C), and $d$(C–H) = 0.99 Å (methylene), $U_{iso}$(H) = 1.2$U_{eq}$ (C), and $d$(C–H) = 0.95 Å (aromatic), $U_{iso}$(H) = 1.2$U_{eq}$ (C).

## 3 Comment

Previous research revealed that some benzoxazepine derivatives exhibit significant anti-inflammatory effects.[7] Under base catalysis, the 3,4-dihydrobenzo[*b*]oxepin-5(*2H*)-one and 4-(*1H*-1,2,4-triazol-1-yl)benzaldehyde formed an

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*α*,*β*-unsaturated ketone through the Claisen–Schmidt reaction. This structural characteristic endow the compound has high reactivity.[8] To further enhance the activity of the compound, we introduced a nitrogen-containing heterocycle at the C(15) position.[9] The 1,2,4-triazole moiety, a common five-membered aromatic heterocycle, plays a crucial role in molecular interactions. And the N–H group can act as a hydrogen bond donor to interact with biological targets. In addition, the difference in electronegativity between the C and N atoms allows the triazole to have a low logP value, thus exhibiting the potential to improve the aqueous solubility of the compound.[10,11] Based on the skeletal combination strategy,[12] the benzoxepine derivative with the nitrogen-containing heterocyclic ring was designed to be combined to obtain target compound.

The molecular structure of the title compound is shown in the figure. The structure of the drug molecule contains an *α*,*β*-unsaturated ketone.[13] Precisely because of the structural characteristics, the substituted benzene ring forms a large dihedral angle between the central parent nucleus and the substituted benzene ring. The dihedral angle is about 23.67(2)° between their planes. The torsion angle of O(2) = C(1)–C(2) = C(11) is about 7.51(18)° and the torsion angle of C(1)–C(2) = C(11)–C(12) is about 176.29(12)°. Structurally, the compound central parent nucleus is 6,8-dimethoxy-3,4-dihydrobenzo[*b*]oxepin-5(*2H*)-one.[14] Therein, the bond lengths of C(1)–O(2), C(4)–O(1) and C(10)–O(1) are 1.2219(16) Å, 1.4429(16) Å and 1.3844(15) Å, respectively. The oxygen atom of the parent nucleus has an obvious torsion. The torsion angles of C(2)–C(3)–C(4)–O(1) and C(9)–C(10)–O(1)–C(4) are 43.95(14)° and −80.68(14)°. The 1,2,4-triazole substituted at the C(15) position. In the nitrogen-containing heterocycle, the bond lengths of N(1)–N(2), C(18)–N(1), C(18)–N(3), C(19)–N(2) and C(19)–N(3) are 1.3660(14) Å, 1.3192(17) Å, 1.3192(17) Å, 1.3548(17) Å and 1.3548(17) Å, respectively. Overall, the incorporation of these nitrogen-containing heterocycles facilitates the biological activity of the compounds.[15,16]

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