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Crystal structure of 4-(((2-(3-(1-(3-(3-cyanophenyl)-6-oxopyridazin-1(6*H*)-yl)ethyl)phenyl) pyrimidin-5-yl)oxy)methyl)-1-methylpiperidin-1-ium chloride monohydrate, $C_{30}H_{33}N_6O_2Cl$

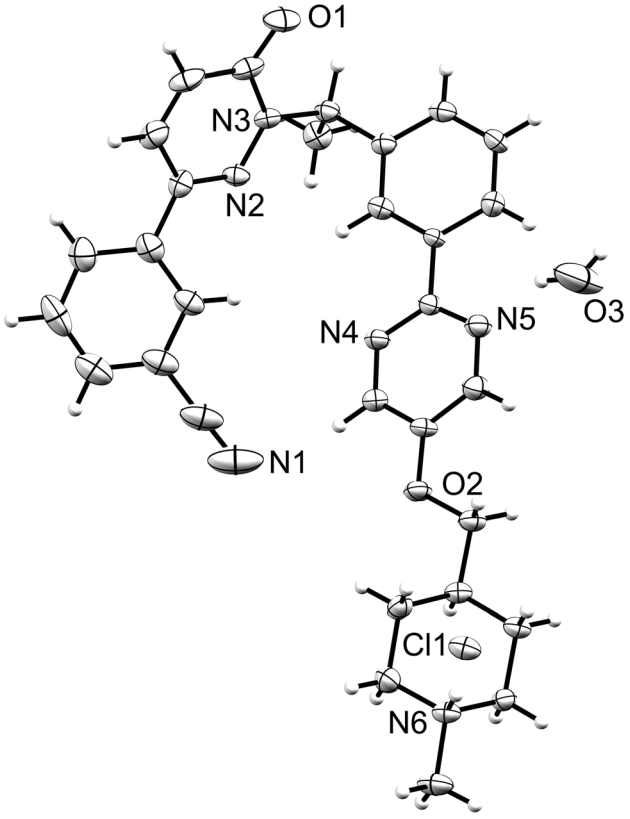

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Table 1: Data collection and handling.

Crystal:	Colorless needle
Size:	0.15 × 0.11 × 0.09 mm
Wavelength:	Cu *K*α radiation (1.54184 Å)
μ:	1.53 mm^{-1}
Diffractometer, scan mode:	SuperNova, ω
θ_{max}, completeness:	65.0°, >99%
$N(hkl)_{measured}$, $N(hkl)_{unique}$, R_{int}:	4900, 3637, 0.050
Criterion for I_{obs}, $N(hkl)_{gt}$:	$I_{obs} > 2\ \sigma(I_{obs})$, 3225
$N(param)_{refined}$:	367
Programs:	Bruker [1], Olex2 [2], SHELX [3]

Abstract
$C_{30}H_{33}N_6O_2Cl$ monoclinic, $P2_1$ (no. 4), a = 13.7983(8) Å, b = 7.3771(3) Å, c = 14.3578(7) Å, β = 101.730(5)°, V = 1430.97(12) $Å^3$, Z = 2, $R_{gt}(F)$ = 0.0525, $wR_{ref}(F^2)$ = 0.1285, T = 170 K.

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The molecular structure is shown in the figure. Table 1 contains crystallographic data and Table 2 contains the list of the atoms including atomic coordinates and displacement parameters.

Source of material

The compound was synthesized according to the procedure in our previous work [4]. A mixture of 3-(6-oxo-1,6-dihydropyridazin-3-yl)benzonitrile (197.2 mg, 1 mmol), (*S*)-1-(3-(5-((1-methylpiperidin-4-yl)methoxy)pyrimidin-2-yl) phenyl) ethan-1-ol (327.4 mg, 1 mmol), and PPh_3 (393.4 mg, 1.5 mmol) in anhydrous tetrahydrofuran (THF) (8.0 mL) were added diisopropyl azodicarboxylate (DIAD) (303.3 mg, 1.5 mmol) slowly at 0 °C. The reaction mixture was allowed to warm to room temperature. After 1 h, the reaction was quenched with ice water (20.0 mL) and the mixture was extracted with CH_2Cl_2 (20.0 × 3). The organic layers were separated, dried and concentrated under reduced pressure.

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

Atom	x	y	z	U_{iso}*/U_{eq}
Cl01	0.91107 (9)	−0.02945 (17)	0.10094 (8)	0.0332 (3)
O002	0.7509 (2)	0.5505 (5)	0.3237 (2)	0.0299 (8)
O003	0.5322 (3)	0.5637 (6)	0.9674 (3)	0.0442 (10)
N004	0.6661 (3)	0.6883 (6)	0.5332 (3)	0.0259 (9)
N005	0.4388 (3)	0.7122 (5)	0.7319 (3)	0.0256 (9)
N006	0.8370 (3)	0.6137 (6)	0.5797 (3)	0.0291 (10)
N007	0.8296 (3)	0.3283 (6)	0.0080 (3)	0.0272 (9)
H007	0.860862	0.215316	0.034714	0.033*
N008	0.4900 (3)	0.7014 (5)	0.8226 (3)	0.0240 (9)
C009	0.7486 (4)	0.8309 (7)	0.8836 (3)	0.0277 (11)
H009	0.748720	0.865240	0.945896	0.033*
C00A	0.5637 (3)	0.8460 (7)	0.8516 (3)	0.0257 (10)
H00A	0.578913	0.849418	0.921327	0.031*
C00B	0.6590 (3)	0.8074 (7)	0.8194 (3)	0.0248 (10)
C00C	0.7501 (3)	0.7285 (7)	0.6969 (3)	0.0226 (10)
C00D	0.7521 (4)	0.6720 (7)	0.5983 (3)	0.0264 (10)
C00E	0.6613 (4)	0.7589 (7)	0.7256 (3)	0.0274 (11)
H00E	0.602093	0.746814	0.681648	0.033*
C00F	0.8368 (4)	0.8035 (7)	0.8551 (3)	0.0308 (12)
H00F	0.895897	0.819445	0.898833	0.037*
C00G	0.6694 (4)	0.6435 (7)	0.4444 (3)	0.0280 (11)
H00G	0.611648	0.651261	0.398139	0.034*
C00H	0.8430 (3)	0.5124 (7)	0.2954 (3)	0.0289 (12)
H00B	0.869101	0.396408	0.320795	0.035*
H00C	0.891376	0.605629	0.318926	0.035*
C00I	0.7551 (4)	0.5856 (7)	0.4176 (3)	0.0249 (10)
C00J	0.3689 (4)	0.5913 (7)	0.7021 (4)	0.0279 (11)
C00K	0.8216 (3)	0.5083 (7)	0.1873 (3)	0.0258 (11)
H00K	0.791678	0.624088	0.163453	0.031*
C00L	0.9183 (3)	0.4852 (7)	0.1532 (3)	0.0259 (10)
H00D	0.950111	0.373138	0.178150	0.031*
H00H	0.962575	0.584758	0.176369	0.031*
C00M	0.3174 (4)	0.6102 (7)	0.6014 (4)	0.0332 (12)
C00N	0.8396 (4)	0.5694 (7)	0.4893 (3)	0.0303 (12)
H00N	0.898253	0.527613	0.474484	0.036*
C00O	0.8979 (3)	0.4814 (7)	0.0447 (3)	0.0265 (10)
H00I	0.868233	0.595216	0.019895	0.032*
H00J	0.959692	0.466833	0.023215	0.032*
C00P	0.4783 (4)	0.5657 (7)	0.8874 (3)	0.0328 (12)
C00Q	0.7512 (4)	0.3563 (8)	0.1476 (3)	0.0311 (12)
H00L	0.688455	0.374880	0.166858	0.037*
H00M	0.778335	0.241761	0.174151	0.037*
C00R	0.3692 (4)	0.6787 (7)	0.5348 (4)	0.0336 (12)
H00R	0.435854	0.708270	0.553209	0.040*
C00S	0.8396 (4)	0.7527 (7)	0.7625 (4)	0.0307 (11)
H00S	0.899832	0.734831	0.744324	0.037*
C00T	0.5211 (4)	1.0288 (7)	0.8172 (4)	0.0325 (12)
H00O	0.510106	1.033108	0.748993	0.049*
H00P	0.566696	1.122623	0.843541	0.049*
H00Q	0.459441	1.046593	0.837078	0.049*
O00U	1.0231 (4)	0.4242 (9)	0.6737 (3)	0.086 (2)
H00V	0.961615	0.448626	0.660622	0.129*
H00W	1.047185	0.498214	0.717746	0.129*
C00V	0.3203 (5)	0.7022 (8)	0.4409 (4)	0.0418 (14)
C00W	0.7335 (4)	0.3469 (8)	0.0390 (4)	0.0347 (12)
H00T	0.691427	0.243970	0.016494	0.042*
H00U	0.699960	0.456021	0.011880	0.042*
N00X	0.4191 (6)	0.8427 (8)	0.3222 (4)	0.0723 (19)
C00Y	0.3472 (4)	0.4531 (8)	0.7635 (4)	0.0368 (12)
H00Y	0.296008	0.371762	0.742116	0.044*
C00Z	0.4006 (4)	0.4399 (7)	0.8528 (4)	0.0392 (13)
H00Z	0.386721	0.347873	0.892421	0.047*
C010	0.8139 (4)	0.3160 (8)	−0.0990 (3)	0.0403 (14)
H01A	0.777212	0.419771	−0.127039	0.060*
H01B	0.777690	0.207649	−0.120411	0.060*
H01C	0.876946	0.312914	−0.117562	0.060*
C011	0.3745 (5)	0.7802 (9)	0.3738 (4)	0.0511 (17)
C012	0.2180 (4)	0.5650 (8)	0.5724 (4)	0.0423 (14)
H012	0.182465	0.520608	0.615972	0.051*
C013	0.2218 (5)	0.6568 (9)	0.4113 (4)	0.0501 (16)
H013	0.189744	0.673327	0.348364	0.060*
C014	0.1722 (5)	0.5871 (9)	0.4767 (5)	0.0530 (18)
H014	0.106258	0.553391	0.456972	0.064*

The crude products were purified by flash column chromatography using CH_2Cl_2/CH_3OH (20/1, *v*/*v*) as eluents to give (*R*)-3-(1-(1-(3-(5-((1-methylpiperidin-4-yl)methoxy) pyrimidin-2-yl) phenyl)ethyl)-6-oxo-1,6-dihydropyridazin-3-yl)benzonitrile. The hydrochloride salt of the title compound (506.6 mg, 1 mmol) was obtained by adding hydrogen chloride solution in ethyl acetate (1.0 M, 1 mL) to ethanol. After drying at the rotavapor, the solid product was recrystallized from a mixture of CH_2Cl_2 and ethyl acetate (*v*/*v*, 1/3, 20 mL). Pale yellow block crystals were obtained after three days.

Experimental details

Hydrogen atoms were placed in their geometrically idealized positions and constrained to ride on their parent atoms.

Comment

Chirality is the basic feature of nature, and the main substances that makeup life, such as amino acids, carbohydrates, nucleic acids, proteins, enzymes, and receptors are chiral [5]. Enantiomers do not differ in their physical and chemical properties but could differ in their pharmacological activity, metabolic process, metabolic rate, and toxicity

[6, 7]. Pyridazine and its derivatives have attracted wide increasing attention due to its biological activities, such as anticancer and antibacterial [8, 9]. As a part of our current research interest in the exploration of the chiral compounds with anticancer activities [10], we herein report the molecular structure of a new chiral pyridazine derivative.

The asymmetric unit of the title compound contains the hydrochloride of (*R*)-3-(1-(1-(3-(5-((1-methylpiperidin-4-yl) methoxy)pyrimidin-2-yl) phenyl)ethyl)-6-oxo-1,6-dihydro pyridazin-3-yl)benzonitrile and an additional water molecule. The single-crystal structure of this salt monhydrate with (*R*)-configuration is shown in the figure. A classical hydrogen bond of the N–H···Cl type is observed in the structure. All bond lengths and angles of this molecule are in the expected ranges.

Author contributions: All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission.

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Conflict of interest statement: The authors declare no conflicts of interest regarding this article.

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