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2-Methyl-3-(3-methylisoxazol-5-yl)-4-oxo-4*H*-pyrido[1,2-*a*]pyrimidin-1-ium chloride

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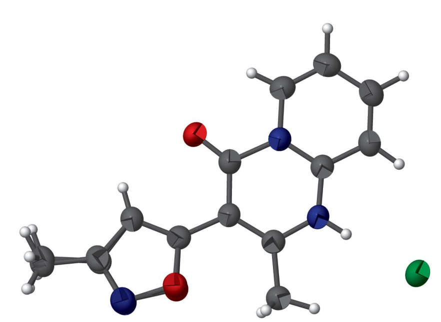
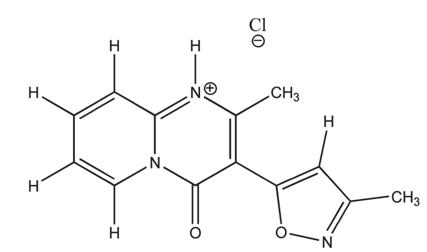
In the title molecular salt, $C_{13}H_{12}N_3O_2^+ \cdot Cl^-$, the oxazolyl ring is disordered over two orientations in a 0.536 (15):0.464 (15) ratio, both of which approximate to envelopes with the N atom as the flap in each case. The cation and anion are linked by a charge-assisted N—H···Cl hydrogen bond. In the extended structure, C—H···N, C—H···O and C—H···Cl interactions link the components into a three-dimensional network.

3D view



Chemical scheme



Structure description

Pyridopyrimidine compounds have found use as antimalarial agents (Mane *et al.*, 2014), anti-allergic agents (Awouters *et al.*, 1986) and urease inhibitors (Rauf *et al.*, 2012). The isoxazole nucleus is known to exhibit anticancer (Han *et al.*, 2002), anti-HIV (Deng *et al.*, 2006) and fungicide (Raffa *et al.*, 1999) activities. The present work reporting the synthesis and structure of the title molecular salt (Fig. 1) is a continuation of our work on pyridopyrimidine derivatives (Djerrari *et al.*, 2002).

The bicyclic core of the cation is slightly folded along the C5—N1 axis by 1.07 (14)°. In the oxazolyl substituent, the oxygen and nitrogen atoms and the C—CH_3 grouping are disordered over two sets of sites, which represent the two possible envelope conformations of the five-membered ring (flap atom = N). The cation and anion are strongly associated through the N2—H2*A*···Cl1 hydrogen bond (Table 1 and Fig. 1). In the extended structure, the ion pairs are arranged in rows running along the *a*-axis direction with weak, bifurcated C13*A*—H13*A*···O2*A*^{i} and C13*A*—H13*A*···N3*A*^{i} [symmetry code: (i) $\frac{1}{2} - x, \frac{1}{2} + y, \frac{1}{2} - z$] hydrogen bonds (Table 1 and Fig. 2) as well as weak C—H···Cl interactions.

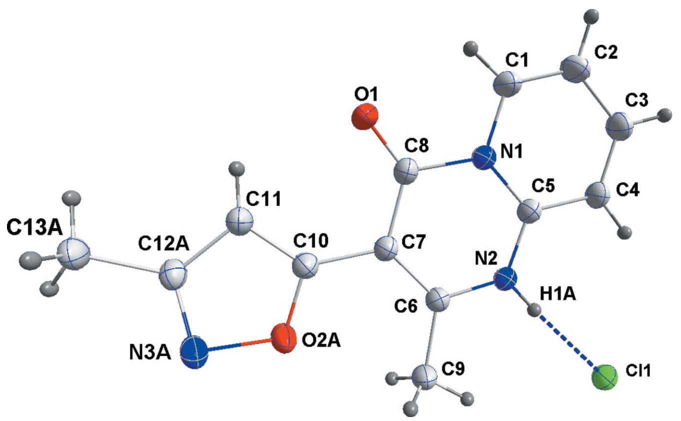


Figure 1
The title molecule with the atom-labelling scheme and 25% probability ellipsoids. The N—H···Cl hydrogen bond is shown as a dotted line. Only the major component of the disorder in the oxazolyl substituent is shown.

Synthesis and crystallization

A mixture of 1-(2-methyl-4-oxo-4*H*-pyrido[1,2-*a*]pyrimidin-3-yl)butane-1,3-dione (0.7 g, 2.86 mmol) and of hydroxylamine hydrochloride (0.4 g, 5.75 mmol) in methanol (30 ml) was heated at reflux for 4 h. The completion of the reaction was confirmed by TLC. The solid obtained upon cooling the mixture was recrystallized from ethanol solution to afford orange blocks (yield: 76%. m.p.: 465–467 K).

Refinement

Crystal data, data collection and structure refinement details are summarized in Table 2. In the pendant oxazolyl substituent, all atoms except C10 and C11 are disordered over two sets of sites in a 0.536 (15):0.464 (15) ratio. The two components of the disorder were refined with restraints that their geometries be comparable.

Acknowledgements

JTM thanks Tulane University for support of the Tulane Crystallography Laboratory.

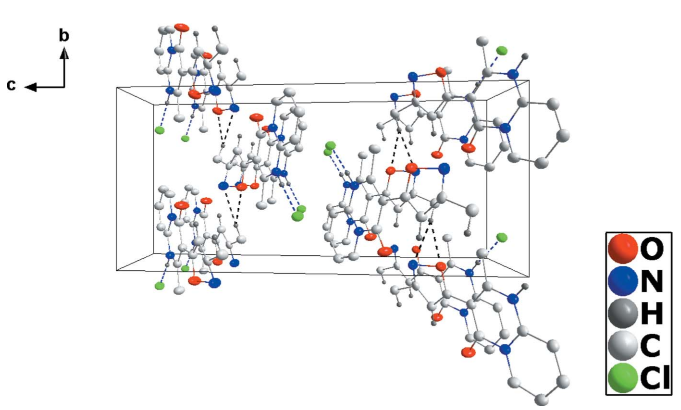


Figure 2
Packing viewed along the *a* axis. N—H···Cl and C–H···O hydrogen bonds are shown, respectively, as blue and black dotted lines.

Table 1
Hydrogen-bond geometry (Å, °).

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
N2—H1*A*···Cl1	0.88 (4)	2.15 (4)	3.024 (3)	177 (3)
C2—H2···Cl1^{i}	0.98 (4)	2.78 (4)	3.745 (4)	173 (2)
C3—H3···Cl1^{ii}	0.98 (4)	2.71 (4)	3.445 (3)	132 (3)
C11—H11···N3*A*^{iii}	0.90 (4)	2.67 (4)	3.390 (16)	138 (3)
C13*A*—H13*A*···O2*A*^{iii}	0.96	2.34	3.21 (4)	151
C13*A*—H13*A*···N3*A*^{iii}	0.96	2.50	3.37 (4)	150

Symmetry codes: (i) $x, y+1, z$; (ii) $-x+3, -y+1, -z+1$; (iii) $-x+\frac{1}{2}, y+\frac{1}{2}, -z+\frac{3}{2}$.

Table 2
Experimental details.

Crystal data	
Chemical formula	$C_{13}H_{12}N_3O_2^+\cdot Cl^-$
M_r	277.70
Crystal system, space group	Monoclinic, $P2_1/n$
Temperature (K)	298
a, *b*, *c* (Å)	6.2796 (12), 9.6912 (18), 21.152 (4)
β (°)	95.294 (3)
V (Å^3)	1281.8 (4)
Z	4
Radiation type	Mo *K*α
μ (mm^{-1})	0.30
Crystal size (mm)	0.32 × 0.20 × 0.19
Data collection	
Diffractometer	Bruker SMART APEX CCD
Absorption correction	Multi-scan (*TWINABS*; Sheldrick, 2009)
T_{min}, T_{max}	0.75, 0.94
No. of measured, independent and observed [$I > 2\sigma(I)$] reflections	28190, 6596, 4582
R_{int}	0.068
$(\sin \theta/\lambda)_{max}$ (Å^{-1})	0.678
Refinement	
$R[F^2 > 2\sigma(F^2)]$, $wR(F^2)$, S	0.064, 0.192, 1.04
No. of reflections	6596
No. of parameters	222
No. of restraints	53
H-atom treatment	H atoms treated by a mixture of independent and constrained refinement
$\Delta\rho_{max}$, $\Delta\rho_{min}$ (e Å^{-3})	0.36, −0.33

Computer programs: *APEX3* and *SAINT* (Bruker, 2016), *CELL_NOW* (Sheldrick, 2008*a*) and *SHELXT* (Sheldrick, 2015*a*), *SHELXL2014* (Sheldrick, 2015*b*), *DIAMOND* (Brandenburg & Putz, 2012) and *SHELXTL* (Sheldrick, 2008*b*).

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full crystallographic data

IUCrData (2016). **1**, x161978 [https://doi.org/10.1107/S2414314616019787]

2-Methyl-3-(3-methylisoxazol-5-yl)-4-oxo-4*H*-pyrido[1,2-*a*]pyrimidin-1-ium chloride

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Crystal data

$C_{13}H_{12}N_3O_2^+\cdot Cl^-$
M_r = 277.70
Monoclinic, $P2_1/n$
a = 6.2796 (12) Å
b = 9.6912 (18) Å
c = 21.152 (4) Å
β = 95.294 (3)°
V = 1281.8 (4) Å^3
Z = 4
F(000) = 576
D_x = 1.439 Mg m^{-3}
Mo $K\alpha$ radiation, λ = 0.71073 Å
Cell parameters from 5128 reflections
θ = 2.3–25.9°
μ = 0.30 mm^{-1}
T = 298 K
Block, orange
0.32 × 0.20 × 0.19 mm

Data collection

Bruker SMART APEX CCD diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
Detector resolution: 8.3333 pixels mm^{-1}
φ and ω scans
Absorption correction: multi-scan (*TWINABS*; Sheldrick, 2009)
T_{min} = 0.75, T_{max} = 0.94
28190 measured reflections
6596 independent reflections
4582 reflections with $I > 2\sigma(I)$
R_{int} = 0.068
θ_{max} = 28.8°, θ_{min} = 1.9°
h = −8→8
k = −13→13
l = −28→28

Refinement

Refinement on F^2
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)]$ = 0.064
$wR(F^2)$ = 0.192
S = 1.04
6596 reflections
222 parameters
53 restraints
Primary atom site location: structure-invariant direct methods
Secondary atom site location: difference Fourier map
Hydrogen site location: mixed
H atoms treated by a mixture of independent and constrained refinement
$w = 1/[\sigma^2(F_o^2) + (0.0802P)^2 + 0.5444P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max}$ = 0.001
$\Delta\rho_{max}$ = 0.36 e Å^{-3}
$\Delta\rho_{min}$ = −0.33 e Å^{-3}

Special details

Experimental. The diffraction data were obtained from 3 sets of 400 frames, each of width 0.5° in ω, colllected at φ = 0.00, 90.00 and 180.00° and 2 sets of 800 frames, each of width 0.45° in φ, collected at ω = –30.00 and 210.00°. The scan time was 20 sec/frame. Analysis of 1600 reflections having $I/\sigma(I) > 12$ and chosen from the full data set with *CELL_NOW* (Sheldrick, 2008*a*) showed the crystal to belong to the monoclinic system and to be twinned by a 180° rotation about the *c** axis. The raw data were processed using the multi- component version of *SAINT* under control of the two-component orientation file generated by *CELL_NOW*.

Geometry. All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds involving l.s. planes.

Refinement. Refinement of F^2 against ALL reflections. The weighted R-factor wR and goodness of fit S are based on F^2, conventional R-factors R are based on F, with F set to zero for negative F^2. The threshold expression of $F^2 > 2\text{sigma}(F^2)$ is used only for calculating R-factors(gt) etc. and is not relevant to the choice of reflections for refinement. R-factors based on F^2 are statistically about twice as large as those based on F, and R- factors based on ALL data will be even larger. The methyl oxazole moiety is disordered over two partially resolved sites with the disorder mainly involving alternate conformations of the heteroatom prtion of the ring.

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²)

	x	*y*	*z*	U_{iso}*/U_{eq}	Occ. (<1)
O1	0.6819 (4)	0.8510 (2)	0.65445 (14)	0.0747 (8)	
N1	0.9648 (4)	0.7726 (2)	0.60427 (12)	0.0472 (6)	
H1A	1.092 (5)	0.470 (4)	0.5794 (15)	0.048 (8)*	
N2	1.0175 (4)	0.5368 (3)	0.59451 (11)	0.0460 (6)	
O2A	0.497 (2)	0.4524 (5)	0.7017 (5)	0.067 (2)	0.536 (15)
N3A	0.374 (2)	0.4582 (16)	0.7600 (5)	0.068 (3)	0.536 (15)
O2B	0.549 (2)	0.4604 (7)	0.7216 (6)	0.067 (2)	0.464 (15)
N3B	0.320 (2)	0.4573 (19)	0.7389 (7)	0.068 (3)	0.464 (15)
C1	1.0220 (6)	0.9076 (3)	0.59290 (16)	0.0571 (8)	
H1	0.933 (6)	0.971 (4)	0.6091 (17)	0.063 (10)*	
C2	1.1882 (6)	0.9357 (4)	0.55943 (17)	0.0614 (8)	
H2	1.227 (5)	1.032 (4)	0.5534 (15)	0.058 (9)*	
C3	1.3048 (5)	0.8268 (4)	0.53573 (16)	0.0578 (8)	
H3	1.424 (6)	0.848 (4)	0.5106 (16)	0.060 (9)*	
C4	1.2516 (5)	0.6939 (3)	0.54654 (14)	0.0505 (7)	
H4	1.327 (5)	0.616 (3)	0.5311 (14)	0.046 (8)*	
C5	1.0770 (5)	0.6671 (3)	0.58186 (13)	0.0448 (6)	
C7	0.7321 (5)	0.6085 (3)	0.65240 (13)	0.0450 (6)	
C6	0.8520 (5)	0.5045 (3)	0.62902 (13)	0.0445 (6)	
C9	0.8178 (6)	0.3526 (3)	0.6367 (2)	0.0566 (8)	
H9A	0.841 (7)	0.328 (4)	0.678 (2)	0.090 (14)*	
H9B	0.685 (7)	0.327 (4)	0.6228 (19)	0.075 (12)*	
H9C	0.921 (7)	0.298 (5)	0.614 (2)	0.089 (13)*	
C8	0.7780 (5)	0.7504 (3)	0.63969 (15)	0.0510 (7)	
C10	0.5567 (5)	0.5859 (3)	0.69230 (13)	0.0476 (7)	
C11	0.4164 (5)	0.6703 (3)	0.71767 (15)	0.0510 (7)	
H11	0.400 (6)	0.762 (4)	0.7120 (16)	0.065 (11)*	
C12A	0.279 (3)	0.5827 (14)	0.7485 (9)	0.046 (3)	0.536 (15)

C13A	0.117 (4)	0.630 (4)	0.7921 (13)	0.059 (2)	0.536 (15)
H13A	0.0628	0.7190	0.7787	0.089*	0.536 (15)
H13B	0.0014	0.5650	0.7908	0.089*	0.536 (15)
H13C	0.1839	0.6364	0.8347	0.089*	0.536 (15)
C12B	0.306 (4)	0.5894 (16)	0.7596 (11)	0.046 (3)	0.464 (15)
C13B	0.110 (5)	0.617 (5)	0.7933 (15)	0.059 (2)	0.464 (15)
H13D	0.1091	0.7114	0.8067	0.089*	0.464 (15)
H13E	−0.0157	0.5989	0.7649	0.089*	0.464 (15)
H13F	0.1097	0.5576	0.8297	0.089*	0.464 (15)
Cl1	1.28278 (13)	0.31411 (8)	0.53955 (4)	0.0574 (3)	

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
O1	0.0733 (16)	0.0429 (12)	0.115 (2)	0.0045 (11)	0.0483 (15)	−0.0048 (13)
N1	0.0485 (13)	0.0420 (12)	0.0527 (13)	−0.0001 (10)	0.0139 (11)	−0.0023 (10)
N2	0.0463 (13)	0.0418 (12)	0.0514 (13)	0.0045 (10)	0.0130 (11)	−0.0006 (10)
O2A	0.088 (5)	0.0476 (14)	0.073 (5)	−0.0073 (16)	0.045 (4)	−0.008 (2)
N3A	0.090 (6)	0.0550 (18)	0.065 (6)	−0.004 (4)	0.042 (5)	−0.002 (5)
O2B	0.088 (5)	0.0476 (14)	0.073 (5)	−0.0073 (16)	0.045 (4)	−0.008 (2)
N3B	0.090 (6)	0.0550 (18)	0.065 (6)	−0.004 (4)	0.042 (5)	−0.002 (5)
C1	0.063 (2)	0.0418 (16)	0.069 (2)	−0.0008 (14)	0.0182 (16)	−0.0025 (14)
C2	0.067 (2)	0.0487 (18)	0.071 (2)	−0.0085 (15)	0.0187 (17)	0.0023 (15)
C3	0.0541 (18)	0.0594 (19)	0.0626 (19)	−0.0049 (15)	0.0190 (15)	0.0000 (15)
C4	0.0468 (16)	0.0529 (17)	0.0538 (16)	0.0014 (13)	0.0149 (13)	−0.0018 (13)
C5	0.0451 (14)	0.0425 (14)	0.0475 (15)	0.0017 (11)	0.0076 (12)	−0.0004 (11)
C7	0.0470 (15)	0.0427 (14)	0.0465 (14)	0.0010 (12)	0.0111 (12)	−0.0025 (11)
C6	0.0449 (14)	0.0424 (14)	0.0466 (14)	0.0020 (11)	0.0065 (12)	0.0016 (11)
C9	0.058 (2)	0.0432 (16)	0.071 (2)	0.0025 (15)	0.0213 (18)	0.0033 (15)
C8	0.0477 (16)	0.0471 (16)	0.0603 (17)	0.0009 (13)	0.0168 (14)	−0.0031 (13)
C10	0.0522 (16)	0.0436 (15)	0.0480 (15)	−0.0021 (12)	0.0106 (12)	−0.0031 (12)
C11	0.0510 (17)	0.0476 (17)	0.0565 (17)	0.0006 (13)	0.0172 (13)	−0.0001 (13)
C12A	0.049 (4)	0.0526 (19)	0.037 (6)	−0.008 (2)	0.006 (5)	−0.010 (3)
C13A	0.064 (2)	0.055 (6)	0.063 (2)	−0.007 (3)	0.0261 (17)	−0.004 (2)
C12B	0.049 (4)	0.0526 (19)	0.037 (6)	−0.008 (2)	0.006 (5)	−0.010 (3)
C13B	0.064 (2)	0.055 (6)	0.063 (2)	−0.007 (3)	0.0261 (17)	−0.004 (2)
Cl1	0.0549 (4)	0.0508 (4)	0.0684 (5)	0.0076 (3)	0.0152 (4)	−0.0032 (3)

Geometric parameters (Å, º)

O1—C8	1.203 (4)	C4—H4	0.96 (3)
N1—C5	1.352 (4)	C7—C6	1.377 (4)
N1—C1	1.383 (4)	C7—C8	1.436 (4)
N1—C8	1.465 (4)	C7—C10	1.465 (4)
N2—C5	1.351 (4)	C6—C9	1.498 (4)
N2—C6	1.360 (4)	C9—H9C	0.99 (4)
N2—H1A	0.88 (4)	C9—H9B	0.89 (4)
O2A—C10	1.368 (5)	C9—H9A	0.90 (5)

O2A—N3A	1.513 (6)	C10—C11	1.349 (4)
N3A—C12A	1.359 (10)	C11—C12B	1.412 (5)
O2B—C10	1.368 (5)	C11—C12A	1.412 (5)
O2B—N3B	1.515 (7)	C11—H11	0.90 (4)
N3B—C12B	1.358 (10)	C12A—C13A	1.506 (7)
C1—C2	1.342 (5)	C13A—H13A	0.9600
C1—H1	0.92 (4)	C13A—H13B	0.9600
C2—C3	1.403 (5)	C13A—H13C	0.9600
C2—H2	0.97 (4)	C12B—C13B	1.506 (7)
C3—C4	1.355 (5)	C13B—H13D	0.9600
C3—H3	0.98 (4)	C13B—H13E	0.9600
C4—C5	1.407 (4)	C13B—H13F	0.9600

C5—N1—C1	120.1 (3)	C6—C9—H9A	112 (3)
C5—N1—C8	122.4 (2)	H9C—C9—H9A	105 (4)
C1—N1—C8	117.5 (2)	H9B—C9—H9A	109 (3)
C5—N2—C6	124.1 (3)	O1—C8—C7	127.9 (3)
C5—N2—H1A	117 (2)	O1—C8—N1	117.3 (3)
C6—N2—H1A	119 (2)	C7—C8—N1	114.9 (2)
C10—O2A—N3A	104.6 (9)	C11—C10—O2A	108.5 (6)
C12A—N3A—O2A	97.7 (12)	C11—C10—O2B	107.8 (6)
C10—O2B—N3B	101.7 (10)	C11—C10—C7	133.8 (3)
C12B—N3B—O2B	98.5 (15)	O2A—C10—C7	117.2 (5)
C2—C1—N1	120.8 (3)	O2B—C10—C7	117.1 (6)
C2—C1—H1	126 (2)	C10—C11—C12B	106.8 (9)
N1—C1—H1	113 (2)	C10—C11—C12A	105.6 (7)
C1—C2—C3	119.5 (3)	C10—C11—H11	128 (2)
C1—C2—H2	119 (2)	C12B—C11—H11	125 (2)
C3—C2—H2	122 (2)	C12A—C11—H11	126 (2)
C4—C3—C2	120.7 (3)	N3A—C12A—C11	109.9 (13)
C4—C3—H3	120 (2)	N3A—C12A—C13A	118.1 (16)
C2—C3—H3	119 (2)	C11—C12A—C13A	125.1 (19)
C3—C4—C5	118.8 (3)	C12A—C13A—H13A	109.5
C3—C4—H4	123.6 (19)	C12A—C13A—H13B	109.5
C5—C4—H4	117.6 (19)	H13A—C13A—H13B	109.5
N2—C5—N1	118.3 (3)	C12A—C13A—H13C	109.5
N2—C5—C4	121.4 (3)	H13A—C13A—H13C	109.5
N1—C5—C4	120.2 (3)	H13B—C13A—H13C	109.5
C6—C7—C8	120.5 (3)	N3B—C12B—C11	105.8 (13)
C6—C7—C10	124.3 (3)	N3B—C12B—C13B	113 (2)
C8—C7—C10	115.2 (2)	C11—C12B—C13B	132 (2)
N2—C6—C7	119.6 (3)	C12B—C13B—H13D	109.5
N2—C6—C9	114.1 (3)	C12B—C13B—H13E	109.5
C7—C6—C9	126.3 (3)	H13D—C13B—H13E	109.5
C6—C9—H9C	111 (3)	C12B—C13B—H13F	109.5
C6—C9—H9B	112 (3)	H13D—C13B—H13F	109.5
H9C—C9—H9B	108 (4)	H13E—C13B—H13F	109.5

C10—O2A—N3A—C12A	35.8 (19)	C1—N1—C8—O1	2.8 (5)
C10—O2B—N3B—C12B	−42.4 (18)	C5—N1—C8—C7	4.0 (4)
C5—N1—C1—C2	0.3 (5)	C1—N1—C8—C7	−177.4 (3)
C8—N1—C1—C2	−178.4 (3)	N3A—O2A—C10—C11	−25.9 (13)
N1—C1—C2—C3	0.0 (6)	N3A—O2A—C10—C7	161.2 (9)
C1—C2—C3—C4	−0.2 (6)	N3B—O2B—C10—C11	29.1 (12)
C2—C3—C4—C5	0.1 (5)	N3B—O2B—C10—C7	−162.2 (8)
C6—N2—C5—N1	−0.6 (4)	C6—C7—C10—C11	−177.0 (3)
C6—N2—C5—C4	179.2 (3)	C8—C7—C10—C11	4.6 (5)
C1—N1—C5—N2	179.3 (3)	C6—C7—C10—O2A	−6.3 (8)
C8—N1—C5—N2	−2.1 (4)	C8—C7—C10—O2A	175.2 (7)
C1—N1—C5—C4	−0.4 (4)	C6—C7—C10—O2B	18.1 (8)
C8—N1—C5—C4	178.2 (3)	C8—C7—C10—O2B	−160.4 (7)
C3—C4—C5—N2	−179.5 (3)	O2B—C10—C11—C12B	−5.3 (14)
C3—C4—C5—N1	0.2 (5)	C7—C10—C11—C12B	−171.3 (13)
C5—N2—C6—C7	1.1 (4)	O2A—C10—C11—C12A	5.4 (12)
C5—N2—C6—C9	−179.8 (3)	C7—C10—C11—C12A	176.6 (11)
C8—C7—C6—N2	1.1 (4)	O2A—N3A—C12A—C11	−33 (2)
C10—C7—C6—N2	−177.3 (3)	O2A—N3A—C12A—C13A	174 (2)
C8—C7—C6—C9	−177.9 (3)	C10—C11—C12A—N3A	20.2 (19)
C10—C7—C6—C9	3.8 (5)	C10—C11—C12A—C13A	170 (2)
C6—C7—C8—O1	176.4 (4)	O2B—N3B—C12B—C11	40 (2)
C10—C7—C8—O1	−5.1 (5)	O2B—N3B—C12B—C13B	−169 (2)
C6—C7—C8—N1	−3.4 (4)	C10—C11—C12B—N3B	−24 (2)
C10—C7—C8—N1	175.1 (3)	C10—C11—C12B—C13B	−168 (3)
C5—N1—C8—O1	−175.9 (3)		

Hydrogen-bond geometry (Å, º)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
N2—H1*A*···Cl1	0.88 (4)	2.15 (4)	3.024 (3)	177 (3)
C2—H2···Cl1^{i}	0.98 (4)	2.78 (4)	3.745 (4)	173 (2)
C3—H3···Cl1^{ii}	0.98 (4)	2.71 (4)	3.445 (3)	132 (3)
C11—H11···N3*A*^{iii}	0.90 (4)	2.67 (4)	3.390 (16)	138 (3)
C13*A*—H13*A*···O2*A*^{iii}	0.96	2.34	3.21 (4)	151
C13*A*—H13*A*···N3*A*^{iii}	0.96	2.50	3.37 (4)	150

Symmetry codes: (i) *x*, *y*+1, *z*; (ii) −*x*+3, −*y*+1, −*z*+1; (iii) −*x*+1/2, *y*+1/2, −*z*+3/2.