



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 10:04 AM UTC

PDB ID : 4BET / pdb_00004bet
Title : Crystal structure of the Legionella pneumophila FIC domain-containing effector AnkX protein (inactive H229A mutant) in complex with cytidine-diphosphate-choline
Authors : Campanacci, V.; Mukherjee, S.; Roy, C.R.; Cherfils, J.
Deposited on : 2013-03-12
Resolution : 2.55 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

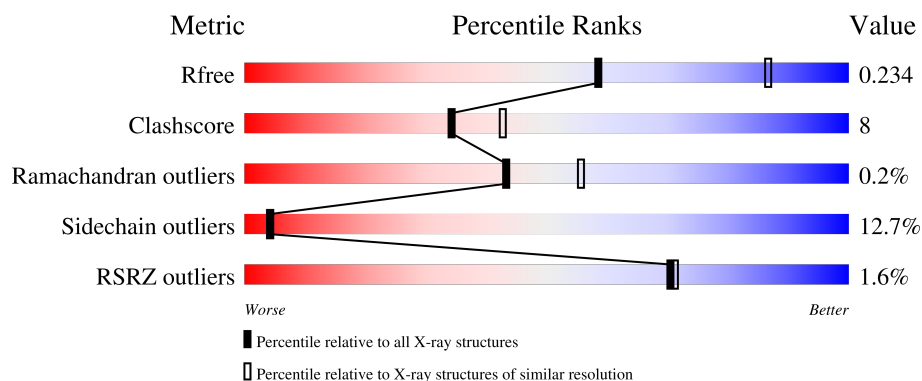
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1091 (2.54-2.54)
Clashscore	190562	1120 (2.54-2.54)
Ramachandran outliers	187476	1106 (2.54-2.54)
Sidechain outliers	187428	1106 (2.54-2.54)
RSRZ outliers	180081	1091 (2.54-2.54)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	512	2% 69% 21% 6%
1	B	512	% 67% 22% 6%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 7929 atoms, of which 76 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called PHOSPHOCHOLINE TRANSFERASE ANKX.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	480	Total	C	N	O	S	0	0	0
			3822	2449	636	721	16			
1	B	479	Total	C	N	O	S	0	0	0
			3817	2446	635	720	16			

There are 62 discrepancies between the modelled and reference sequences:

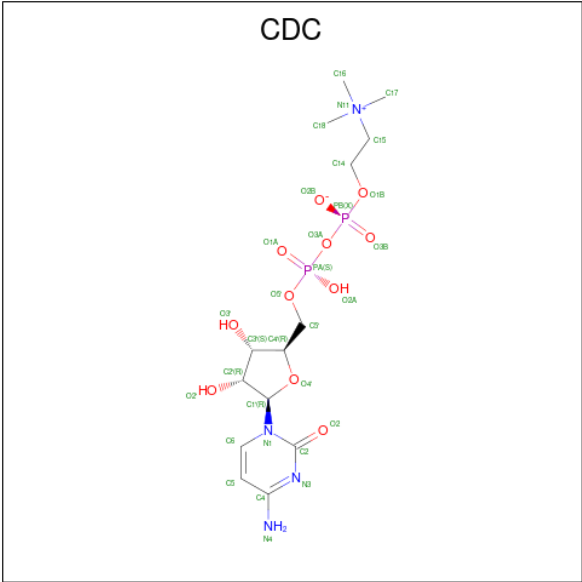
Chain	Residue	Modelled	Actual	Comment	Reference
A	-27	MET	-	expression tag	UNP Q5ZXN6
A	-26	SER	-	expression tag	UNP Q5ZXN6
A	-25	TYR	-	expression tag	UNP Q5ZXN6
A	-24	TYR	-	expression tag	UNP Q5ZXN6
A	-23	HIS	-	expression tag	UNP Q5ZXN6
A	-22	HIS	-	expression tag	UNP Q5ZXN6
A	-21	HIS	-	expression tag	UNP Q5ZXN6
A	-20	HIS	-	expression tag	UNP Q5ZXN6
A	-19	HIS	-	expression tag	UNP Q5ZXN6
A	-18	HIS	-	expression tag	UNP Q5ZXN6
A	-17	LEU	-	expression tag	UNP Q5ZXN6
A	-16	GLU	-	expression tag	UNP Q5ZXN6
A	-15	SER	-	expression tag	UNP Q5ZXN6
A	-14	THR	-	expression tag	UNP Q5ZXN6
A	-13	SER	-	expression tag	UNP Q5ZXN6
A	-12	LEU	-	expression tag	UNP Q5ZXN6
A	-11	TYR	-	expression tag	UNP Q5ZXN6
A	-10	LYS	-	expression tag	UNP Q5ZXN6
A	-9	LYS	-	expression tag	UNP Q5ZXN6
A	-8	ALA	-	expression tag	UNP Q5ZXN6
A	-7	GLY	-	expression tag	UNP Q5ZXN6
A	-6	LEU	-	expression tag	UNP Q5ZXN6
A	-5	GLU	-	expression tag	UNP Q5ZXN6
A	-4	ASN	-	expression tag	UNP Q5ZXN6
A	-3	LEU	-	expression tag	UNP Q5ZXN6

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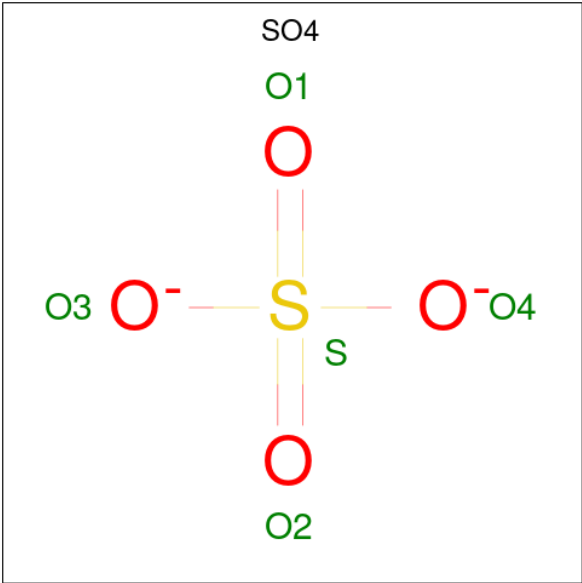
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	TYR	-	expression tag	UNP Q5ZXN6
A	-1	PHE	-	expression tag	UNP Q5ZXN6
A	0	GLN	-	expression tag	UNP Q5ZXN6
A	1	GLY	-	expression tag	UNP Q5ZXN6
A	229	ALA	HIS	engineered mutation	UNP Q5ZXN6
A	247	PRO	LEU	engineered mutation	UNP Q5ZXN6
B	-27	MET	-	expression tag	UNP Q5ZXN6
B	-26	SER	-	expression tag	UNP Q5ZXN6
B	-25	TYR	-	expression tag	UNP Q5ZXN6
B	-24	TYR	-	expression tag	UNP Q5ZXN6
B	-23	HIS	-	expression tag	UNP Q5ZXN6
B	-22	HIS	-	expression tag	UNP Q5ZXN6
B	-21	HIS	-	expression tag	UNP Q5ZXN6
B	-20	HIS	-	expression tag	UNP Q5ZXN6
B	-19	HIS	-	expression tag	UNP Q5ZXN6
B	-18	HIS	-	expression tag	UNP Q5ZXN6
B	-17	LEU	-	expression tag	UNP Q5ZXN6
B	-16	GLU	-	expression tag	UNP Q5ZXN6
B	-15	SER	-	expression tag	UNP Q5ZXN6
B	-14	THR	-	expression tag	UNP Q5ZXN6
B	-13	SER	-	expression tag	UNP Q5ZXN6
B	-12	LEU	-	expression tag	UNP Q5ZXN6
B	-11	TYR	-	expression tag	UNP Q5ZXN6
B	-10	LYS	-	expression tag	UNP Q5ZXN6
B	-9	LYS	-	expression tag	UNP Q5ZXN6
B	-8	ALA	-	expression tag	UNP Q5ZXN6
B	-7	GLY	-	expression tag	UNP Q5ZXN6
B	-6	LEU	-	expression tag	UNP Q5ZXN6
B	-5	GLU	-	expression tag	UNP Q5ZXN6
B	-4	ASN	-	expression tag	UNP Q5ZXN6
B	-3	LEU	-	expression tag	UNP Q5ZXN6
B	-2	TYR	-	expression tag	UNP Q5ZXN6
B	-1	PHE	-	expression tag	UNP Q5ZXN6
B	0	GLN	-	expression tag	UNP Q5ZXN6
B	1	GLY	-	expression tag	UNP Q5ZXN6
B	229	ALA	HIS	engineered mutation	UNP Q5ZXN6
B	247	PRO	LEU	engineered mutation	UNP Q5ZXN6

- Molecule 2 is [2-CYTIDYLATE-O'-PHOSPHONYLOXYL]-ETHYL-TRIMETHYL-AMMONIUM (CCD ID: CDC) (formula: C₁₄H₂₆N₄O₁₁P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
2	A	1	Total	C	H	N	O	P	0	0
			57	14	26	4	11	2		
2	B	1	Total	C	H	N	O	P	0	0
			57	14	26	4	11	2		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



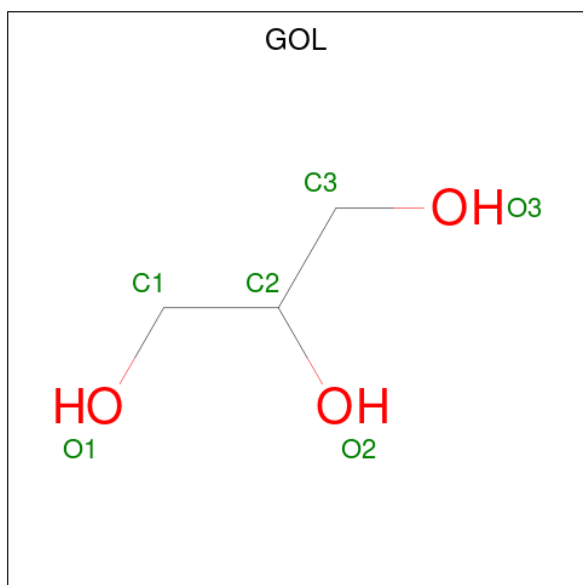
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	O S	0	0
			5	4 1		
3	A	1	Total	O S	0	0
			5	4 1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			14	3	8	3		
4	B	1	Total	C	H	O	0	0
			14	3	8	3		
4	B	1	Total	C	H	O	0	0
			14	3	8	3		

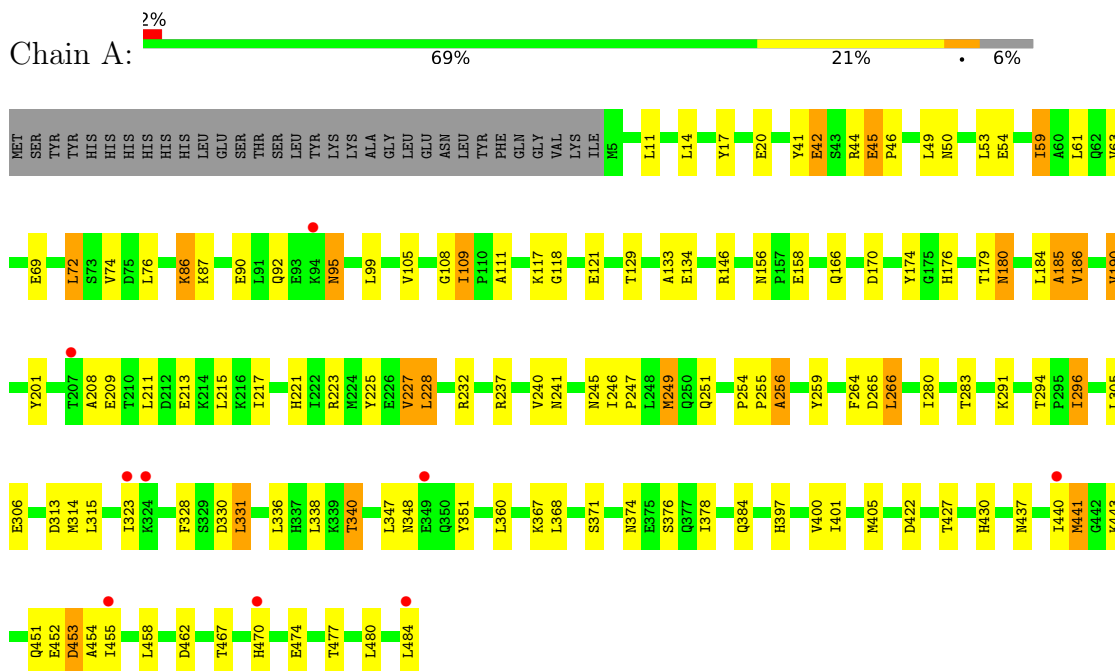
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	53	Total	O	0	0
			53	53		
5	B	61	Total	O	0	0
			61	61		

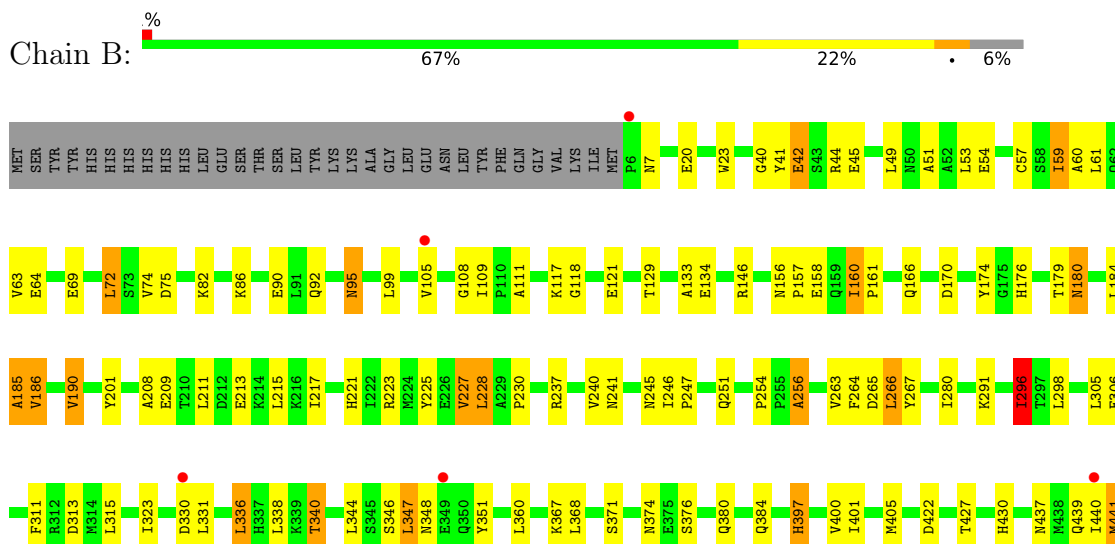
3 Residue-property plots

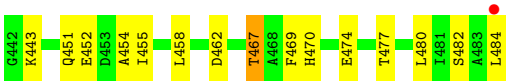
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: PHOSPHOCHOLINE TRANSFERASE ANKX



• Molecule 1: PHOSPHOCHOLINE TRANSFERASE ANKX





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	66.10Å 122.15Å 75.70Å 90.00° 107.32° 90.00°	Depositor
Resolution (Å)	43.89 – 2.55 43.89 – 2.55	Depositor EDS
% Data completeness (in resolution range)	98.7 (43.89-2.55) 98.7 (43.89-2.55)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.04 (at 2.54Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.203 , 0.247 (Not available) , 0.234	Depositor DCC
R_{free} test set	1851 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	49.5	Xtriage
Anisotropy	0.551	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 64.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7929	wwPDB-VP
Average B, all atoms (Å ²)	69.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.97% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, SO4, CDC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.88	4/3908 (0.1%)	1.45	27/5282 (0.5%)
1	B	0.86	0/3903	1.43	26/5274 (0.5%)
All	All	0.87	4/7811 (0.1%)	1.44	53/10556 (0.5%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	249	MET	SD-CE	-7.51	1.60	1.79
1	A	45	GLU	C-N	5.62	1.40	1.33
1	A	46	PRO	N-CD	5.36	1.55	1.47
1	A	109	ILE	CA-CB	5.21	1.58	1.54

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	348	ASN	N-CA-C	8.11	119.75	111.07
1	A	228	LEU	N-CA-C	-6.68	99.03	109.25
1	B	228	LEU	N-CA-C	-6.61	99.14	109.25
1	A	256	ALA	N-CA-C	6.26	118.94	108.73
1	A	397	HIS	CA-C-N	6.26	128.66	120.28
1	A	397	HIS	C-N-CA	6.26	128.66	120.28
1	A	313	ASP	CA-CB-CG	6.12	118.72	112.60
1	B	422	ASP	CA-CB-CG	6.08	118.68	112.60
1	B	296	ILE	N-CA-CB	6.01	117.49	110.82
1	B	256	ALA	N-CA-C	5.90	118.35	108.73
1	A	348	ASN	N-CA-C	5.87	117.36	110.97
1	A	422	ASP	CA-CB-CG	5.84	118.44	112.60
1	A	470	HIS	N-CA-C	-5.82	104.85	111.14
1	A	296	ILE	N-CA-CB	5.68	117.12	110.82
1	A	453	ASP	CA-CB-CG	5.66	118.26	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	45	GLU	CA-C-N	-5.64	113.89	119.93
1	A	45	GLU	C-N-CA	-5.64	113.89	119.93
1	B	180	ASN	CA-CB-CG	5.60	118.20	112.60
1	B	185	ALA	CA-C-N	5.51	127.96	120.63
1	B	185	ALA	C-N-CA	5.51	127.96	120.63
1	A	129	THR	CA-C-N	5.51	127.66	120.28
1	A	129	THR	C-N-CA	5.51	127.66	120.28
1	B	129	THR	CA-C-N	5.49	127.64	120.28
1	B	129	THR	C-N-CA	5.49	127.64	120.28
1	A	190	VAL	N-CA-CB	5.48	118.00	110.54
1	B	313	ASP	CA-CB-CG	5.47	118.07	112.60
1	B	462	ASP	CA-CB-CG	5.46	118.06	112.60
1	A	180	ASN	CA-CB-CG	5.46	118.06	112.60
1	A	462	ASP	CA-CB-CG	5.45	118.05	112.60
1	A	185	ALA	CA-C-N	5.42	127.84	120.63
1	A	185	ALA	C-N-CA	5.42	127.84	120.63
1	B	346	SER	CA-C-N	5.42	129.27	120.60
1	B	346	SER	C-N-CA	5.42	129.27	120.60
1	A	92	GLN	CA-C-N	5.39	127.77	120.38
1	A	92	GLN	C-N-CA	5.39	127.77	120.38
1	B	121	GLU	CA-C-N	5.38	127.44	120.44
1	B	121	GLU	C-N-CA	5.38	127.44	120.44
1	A	121	GLU	CA-C-N	5.36	127.41	120.44
1	A	121	GLU	C-N-CA	5.36	127.41	120.44
1	B	20	GLU	CB-CG-CD	5.31	121.63	112.60
1	B	397	HIS	CA-C-N	5.25	127.31	120.28
1	B	397	HIS	C-N-CA	5.25	127.31	120.28
1	A	20	GLU	CB-CG-CD	5.23	121.50	112.60
1	B	470	HIS	N-CA-C	-5.22	105.59	111.28
1	B	190	VAL	N-CA-CB	5.20	117.62	110.54
1	B	170	ASP	CA-CB-CG	5.18	117.78	112.60
1	B	60	ALA	CA-C-N	5.16	127.71	120.28
1	B	60	ALA	C-N-CA	5.16	127.71	120.28
1	A	259	TYR	CA-C-N	5.05	128.63	122.42
1	A	259	TYR	C-N-CA	5.05	128.63	122.42
1	B	92	GLN	CA-C-N	5.04	127.29	120.38
1	B	92	GLN	C-N-CA	5.04	127.29	120.38
1	A	170	ASP	CA-CB-CG	5.00	117.60	112.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3822	0	3802	52	0
1	B	3817	0	3801	65	0
2	A	31	26	25	1	0
2	B	31	26	25	1	0
3	A	10	0	0	0	0
3	B	10	0	0	0	0
4	A	6	8	8	0	0
4	B	12	16	16	0	0
5	A	53	0	0	0	0
5	B	61	0	0	0	0
All	All	7853	76	7677	117	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (117) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:397:HIS:O	1:B:401:ILE:HD12	1.36	1.22
1:A:437:ASN:HB3	1:A:440:ILE:CD1	1.90	1.02
1:B:437:ASN:HB3	1:B:440:ILE:CD1	1.92	0.99
1:A:437:ASN:HB3	1:A:440:ILE:HD11	1.51	0.93
1:A:14:LEU:HB2	1:A:249:MET:HE1	1.52	0.92
1:A:437:ASN:HB3	1:A:440:ILE:CG1	2.03	0.87
1:B:437:ASN:HB3	1:B:440:ILE:HD11	1.54	0.87
1:B:437:ASN:HB3	1:B:440:ILE:CG1	2.04	0.87
1:B:437:ASN:HB3	1:B:440:ILE:HG12	1.60	0.84
1:B:41:TYR:HA	1:B:44:ARG:NH1	1.93	0.83
1:A:437:ASN:HB3	1:A:440:ILE:HG12	1.59	0.82
1:B:397:HIS:C	1:B:401:ILE:HD12	2.07	0.80
1:A:405:MET:HE2	1:A:443:LYS:HZ2	1.48	0.79
1:B:42:GLU:HG2	1:B:49:LEU:HD12	1.66	0.78
1:B:41:TYR:HA	1:B:44:ARG:HH12	1.53	0.73
1:A:14:LEU:HB2	1:A:249:MET:CE	2.20	0.71
1:B:437:ASN:CB	1:B:440:ILE:HG12	2.21	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437:ASN:CB	1:A:440:ILE:HG12	2.20	0.70
1:B:160:ILE:HG13	1:B:161:PRO:HD3	1.74	0.69
1:A:223:ARG:HG2	1:A:264:PHE:O	1.95	0.66
1:B:237:ARG:HA	1:B:241:ASN:HD22	1.61	0.66
1:A:237:ARG:HA	1:A:241:ASN:HD22	1.60	0.65
1:B:223:ARG:HG2	1:B:264:PHE:O	1.99	0.63
1:A:437:ASN:CG	1:A:440:ILE:HG12	2.27	0.60
1:A:217:ILE:O	1:A:221:HIS:HD2	1.85	0.60
1:B:40:GLY:O	1:B:44:ARG:HG3	2.02	0.60
1:B:208:ALA:HB1	1:B:213:GLU:HB3	1.84	0.60
1:A:245:ASN:ND2	1:A:256:ALA:H	2.00	0.59
1:A:208:ALA:HB1	1:A:213:GLU:HB3	1.84	0.59
1:A:41:TYR:HA	1:A:44:ARG:HH12	1.66	0.59
1:B:437:ASN:CG	1:B:440:ILE:HG12	2.28	0.59
1:B:217:ILE:O	1:B:221:HIS:HD2	1.85	0.59
1:B:245:ASN:ND2	1:B:256:ALA:H	2.01	0.59
1:A:245:ASN:HD21	1:A:256:ALA:H	1.52	0.57
1:B:245:ASN:HD21	1:B:256:ALA:H	1.53	0.57
1:B:405:MET:HE2	1:B:443:LYS:HZ2	1.70	0.57
1:B:228:LEU:O	1:B:230:PRO:HD3	2.06	0.55
1:A:41:TYR:HA	1:A:44:ARG:NH1	2.21	0.55
1:B:397:HIS:O	1:B:401:ILE:CD1	2.31	0.54
1:B:254:PRO:HD2	1:B:280:ILE:HG23	1.90	0.53
1:A:45:GLU:HG2	1:A:90:GLU:HG3	1.90	0.53
1:B:45:GLU:HG2	1:B:90:GLU:HG3	1.89	0.53
1:A:225:TYR:O	1:A:228:LEU:O	2.28	0.52
1:B:157:PRO:HA	1:B:160:ILE:HG23	1.92	0.51
1:A:374:ASN:HD22	1:A:376:SER:H	1.58	0.51
1:B:374:ASN:HD22	1:B:376:SER:H	1.58	0.51
1:B:225:TYR:O	1:B:228:LEU:O	2.28	0.50
1:B:44:ARG:NH1	2:B:1000:CDC:N3	2.59	0.50
1:B:344:LEU:O	1:B:347:LEU:HB2	2.11	0.49
1:A:11:LEU:HA	1:A:249:MET:HE2	1.93	0.49
1:B:437:ASN:CB	1:B:440:ILE:CD1	2.80	0.49
1:A:254:PRO:HD2	1:A:280:ILE:HG23	1.94	0.49
1:A:133:ALA:HB2	1:A:186:VAL:HG23	1.95	0.48
1:B:397:HIS:C	1:B:401:ILE:CD1	2.82	0.48
1:B:105:VAL:HG13	1:B:185:ALA:HB3	1.95	0.48
1:B:133:ALA:HB2	1:B:186:VAL:HG23	1.96	0.48
1:A:437:ASN:CB	1:A:440:ILE:CD1	2.78	0.48
1:A:111:ALA:HB3	1:A:176:HIS:HA	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:249:MET:HE3	1:A:255:PRO:HD3	1.95	0.48
1:B:174:TYR:CD2	1:B:180:ASN:HB2	2.49	0.48
1:B:427:THR:H	1:B:430:HIS:CD2	2.32	0.48
1:A:105:VAL:HG13	1:A:185:ALA:HB3	1.96	0.47
1:B:72:LEU:HD22	1:B:201:TYR:CD2	2.49	0.47
1:A:454:ALA:O	1:A:458:LEU:HG	2.13	0.47
1:A:174:TYR:CD2	1:A:180:ASN:HB2	2.49	0.47
1:A:400:VAL:HG13	1:A:440:ILE:HD12	1.95	0.47
1:A:59:ILE:HD11	1:A:246:ILE:HD11	1.96	0.47
1:A:427:THR:H	1:A:430:HIS:CD2	2.32	0.47
1:A:227:VAL:HG23	1:A:265:ASP:HA	1.97	0.46
1:A:118:GLY:HA3	1:A:266:LEU:O	2.15	0.46
1:B:118:GLY:HA3	1:B:266:LEU:O	2.15	0.46
1:B:227:VAL:HG23	1:B:265:ASP:HA	1.97	0.46
1:A:72:LEU:HD22	1:A:201:TYR:CD2	2.51	0.45
1:B:59:ILE:HD11	1:B:246:ILE:HD11	1.97	0.45
1:B:156:ASN:HD21	1:B:158:GLU:HB2	1.82	0.45
1:B:296:ILE:HD12	1:B:298:LEU:H	1.80	0.45
1:B:439:GLN:HE21	1:B:443:LYS:HZ2	1.65	0.45
1:B:134:GLU:HB2	1:B:184:LEU:HB3	1.99	0.45
1:B:440:ILE:HG13	1:B:441:MET:N	2.32	0.45
1:B:57:CYS:O	1:B:61:LEU:HB2	2.17	0.45
1:B:400:VAL:HG13	1:B:440:ILE:HD12	1.98	0.45
1:A:108:GLY:HA3	1:A:179:THR:HG21	2.00	0.44
1:B:454:ALA:O	1:B:458:LEU:HG	2.18	0.44
1:A:134:GLU:HB2	1:A:184:LEU:HB3	2.00	0.44
1:A:156:ASN:HD21	1:A:158:GLU:HB2	1.82	0.44
1:A:328:PHE:HD1	1:A:331:LEU:HD22	1.81	0.44
1:B:254:PRO:HD3	1:B:340:THR:HG21	2.00	0.43
1:A:440:ILE:HG13	1:A:441:MET:N	2.33	0.43
1:B:263:VAL:O	1:B:267:TYR:HB2	2.18	0.43
1:A:44:ARG:NH1	2:A:1000:CDC:N3	2.66	0.43
1:B:23:TRP:HB3	1:B:311:PHE:CE1	2.54	0.43
1:B:108:GLY:HA3	1:B:179:THR:HG21	2.00	0.43
1:B:474:GLU:O	1:B:477:THR:HG22	2.19	0.42
1:A:50:ASN:ND2	1:A:314:MET:HE3	2.35	0.42
1:A:427:THR:H	1:A:430:HIS:HD2	1.68	0.42
1:A:437:ASN:CB	1:A:440:ILE:HD11	2.36	0.42
1:B:59:ILE:HD11	1:B:246:ILE:CD1	2.49	0.42
1:B:247:PRO:O	1:B:251:GLN:HG2	2.19	0.42
1:A:42:GLU:HG3	1:A:49:LEU:HD12	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:467:THR:HG22	1:B:469:PHE:H	1.83	0.42
1:A:86:LYS:O	1:A:87:LYS:HB2	2.19	0.42
1:B:467:THR:HG22	1:B:469:PHE:N	2.35	0.42
1:B:427:THR:H	1:B:430:HIS:HD2	1.68	0.42
1:A:42:GLU:CG	1:A:49:LEU:HD12	2.50	0.42
1:A:336:LEU:HD12	1:A:336:LEU:HA	1.97	0.41
1:A:254:PRO:HD3	1:A:340:THR:HG21	2.01	0.41
1:A:247:PRO:O	1:A:251:GLN:HG2	2.20	0.41
1:B:51:ALA:HA	1:B:86:LYS:HE3	2.02	0.41
1:B:336:LEU:HD12	1:B:336:LEU:HA	1.95	0.41
1:B:439:GLN:HE21	1:B:443:LYS:NZ	2.19	0.41
1:B:437:ASN:CB	1:B:440:ILE:HD11	2.39	0.41
1:A:17:TYR:CD2	1:A:283:THR:HG23	2.56	0.40
1:B:7:ASN:HB2	1:B:64:GLU:HA	2.02	0.40
1:B:111:ALA:HB3	1:B:176:HIS:HA	2.03	0.40
1:B:254:PRO:HD2	1:B:280:ILE:CG2	2.51	0.40
1:B:108:GLY:HA3	1:B:179:THR:CG2	2.52	0.40
1:A:474:GLU:O	1:A:477:THR:HG22	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	478/512 (93%)	461 (96%)	16 (3%)	1 (0%)	43	56
1	B	477/512 (93%)	459 (96%)	17 (4%)	1 (0%)	43	56
All	All	955/1024 (93%)	920 (96%)	33 (4%)	2 (0%)	43	56

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	95	ASN
1	A	95	ASN

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	416/447 (93%)	362 (87%)	54 (13%)	4	4
1	B	416/447 (93%)	364 (88%)	52 (12%)	4	4
All	All	832/894 (93%)	726 (87%)	106 (13%)	4	4

All (106) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	GLU
1	A	53	LEU
1	A	54	GLU
1	A	59	ILE
1	A	61	LEU
1	A	63	VAL
1	A	69	GLU
1	A	72	LEU
1	A	74	VAL
1	A	76	LEU
1	A	86	LYS
1	A	95	ASN
1	A	99	LEU
1	A	109	ILE
1	A	117	LYS
1	A	146	ARG
1	A	166	GLN
1	A	186	VAL
1	A	190	VAL
1	A	209	GLU
1	A	211	LEU
1	A	215	LEU

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Mol	Chain	Res	Type
1	A	227	VAL
1	A	232	ARG
1	A	240	VAL
1	A	266	LEU
1	A	291	LYS
1	A	294	THR
1	A	296	ILE
1	A	305	LEU
1	A	306	GLU
1	A	315	LEU
1	A	323	ILE
1	A	330	ASP
1	A	331	LEU
1	A	338	LEU
1	A	340	THR
1	A	347	LEU
1	A	351	TYR
1	A	360	LEU
1	A	367	LYS
1	A	368	LEU
1	A	371	SER
1	A	378	ILE
1	A	384	GLN
1	A	401	ILE
1	A	441	MET
1	A	451	GLN
1	A	452	GLU
1	A	453	ASP
1	A	455	ILE
1	A	467	THR
1	A	480	LEU
1	A	484	LEU
1	B	42	GLU
1	B	53	LEU
1	B	54	GLU
1	B	59	ILE
1	B	63	VAL
1	B	69	GLU
1	B	72	LEU
1	B	74	VAL
1	B	75	ASP
1	B	82	LYS

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Mol	Chain	Res	Type
1	B	95	ASN
1	B	99	LEU
1	B	109	ILE
1	B	117	LYS
1	B	146	ARG
1	B	160	ILE
1	B	166	GLN
1	B	186	VAL
1	B	190	VAL
1	B	209	GLU
1	B	211	LEU
1	B	215	LEU
1	B	227	VAL
1	B	240	VAL
1	B	266	LEU
1	B	291	LYS
1	B	296	ILE
1	B	305	LEU
1	B	306	GLU
1	B	315	LEU
1	B	323	ILE
1	B	330	ASP
1	B	331	LEU
1	B	336	LEU
1	B	338	LEU
1	B	340	THR
1	B	347	LEU
1	B	351	TYR
1	B	360	LEU
1	B	367	LYS
1	B	368	LEU
1	B	371	SER
1	B	380	GLN
1	B	384	GLN
1	B	441	MET
1	B	451	GLN
1	B	452	GLU
1	B	455	ILE
1	B	467	THR
1	B	480	LEU
1	B	482	SER
1	B	484	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	7	ASN
1	A	156	ASN
1	A	221	HIS
1	A	241	ASN
1	A	242	ASN
1	A	245	ASN
1	A	250	GLN
1	A	251	GLN
1	A	302	HIS
1	A	332	ASN
1	A	348	ASN
1	A	374	ASN
1	A	430	HIS
1	A	439	GLN
1	B	92	GLN
1	B	156	ASN
1	B	199	GLN
1	B	221	HIS
1	B	241	ASN
1	B	245	ASN
1	B	251	GLN
1	B	302	HIS
1	B	332	ASN
1	B	348	ASN
1	B	374	ASN
1	B	384	GLN
1	B	430	HIS
1	B	439	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

9 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	GOL	A	3000	-	5,5,5	0.09	0	5,5,5	0.30	0
3	SO4	B	2001	-	4,4,4	0.25	0	6,6,6	0.10	0
3	SO4	A	2000	-	4,4,4	0.24	0	6,6,6	0.09	0
4	GOL	B	3000	-	5,5,5	0.15	0	5,5,5	0.15	0
2	CDC	A	1000	-	32,32,32	1.01	1 (3%)	46,49,49	0.58	1 (2%)
4	GOL	B	3001	-	5,5,5	0.06	0	5,5,5	0.35	0
2	CDC	B	1000	-	32,32,32	1.10	1 (3%)	46,49,49	0.62	1 (2%)
3	SO4	A	2001	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	B	2000	-	4,4,4	0.26	0	6,6,6	0.08	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	A	3000	-	-	2/4/4/4	-
4	GOL	B	3001	-	-	2/4/4/4	-
2	CDC	A	1000	-	-	5/24/40/40	0/2/2/2
4	GOL	B	3000	-	-	2/4/4/4	-
2	CDC	B	1000	-	-	7/24/40/40	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1000	CDC	PA-O3A	-5.72	1.53	1.59
2	A	1000	CDC	PA-O3A	-5.20	1.53	1.59

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1000	CDC	O3A-PA-O1A	2.53	118.32	110.70
2	A	1000	CDC	O3A-PA-O1A	2.38	117.87	110.70

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1000	CDC	C5'-O5'-PA-O3A
2	B	1000	CDC	C5'-O5'-PA-O3A
2	B	1000	CDC	PA-O3A-PB-O1B
2	B	1000	CDC	C14-O1B-PB-O2B
2	B	1000	CDC	O1B-C14-C15-N11
4	A	3000	GOL	C1-C2-C3-O3
4	B	3000	GOL	C1-C2-C3-O3
4	B	3000	GOL	O2-C2-C3-O3
4	B	3001	GOL	O1-C1-C2-O2
4	B	3001	GOL	O2-C2-C3-O3
2	A	1000	CDC	PB-O3A-PA-O5'
2	B	1000	CDC	PB-O3A-PA-O5'
4	A	3000	GOL	O2-C2-C3-O3
2	A	1000	CDC	C5'-O5'-PA-O1A
2	B	1000	CDC	C5'-O5'-PA-O1A
2	B	1000	CDC	C14-O1B-PB-O3A
2	A	1000	CDC	C3'-C4'-C5'-O5'
2	A	1000	CDC	O4'-C4'-C5'-O5'

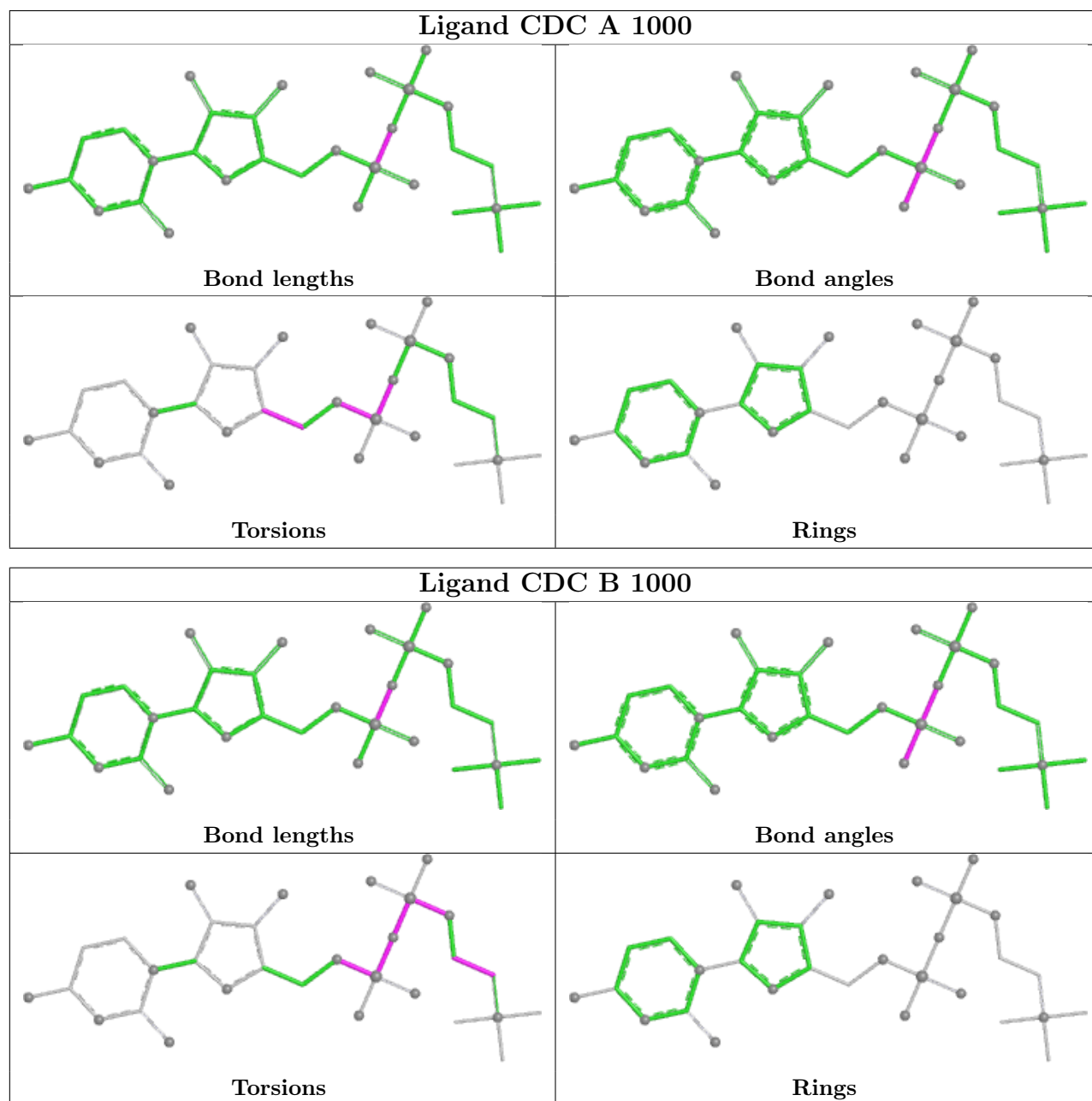
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1000	CDC	1	0
2	B	1000	CDC	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	480/512 (93%)	0.42	9 (1%) 66 66	42, 68, 101, 125	1 (0%)
1	B	479/512 (93%)	0.36	6 (1%) 75 75	43, 64, 96, 125	1 (0%)
All	All	959/1024 (93%)	0.39	15 (1%) 70 71	42, 66, 99, 125	2 (0%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	440	ILE	3.2
1	B	484	LEU	2.7
1	B	440	ILE	2.6
1	A	323	ILE	2.5
1	A	484	LEU	2.5
1	A	470	HIS	2.5
1	A	455	ILE	2.4
1	B	6	PRO	2.4
1	A	94	LYS	2.4
1	B	330	ASP	2.2
1	B	105	VAL	2.1
1	A	207	THR	2.1
1	A	349	GLU	2.1
1	A	324	LYS	2.1
1	B	349	GLU	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

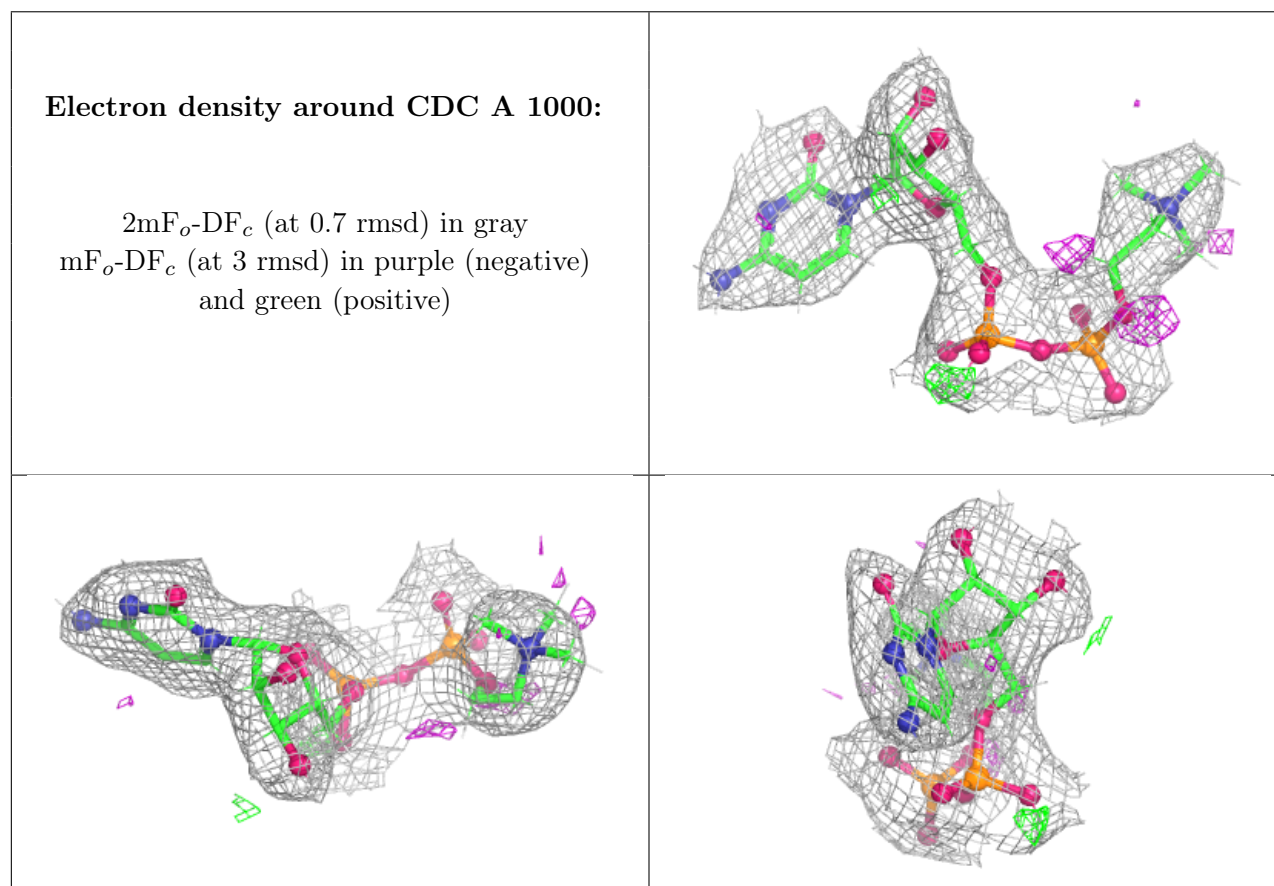
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

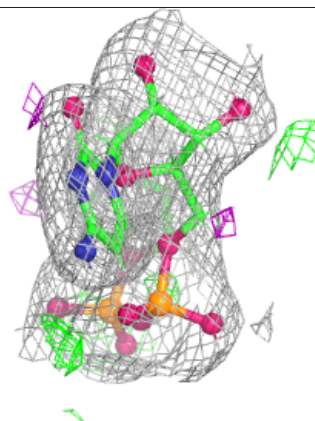
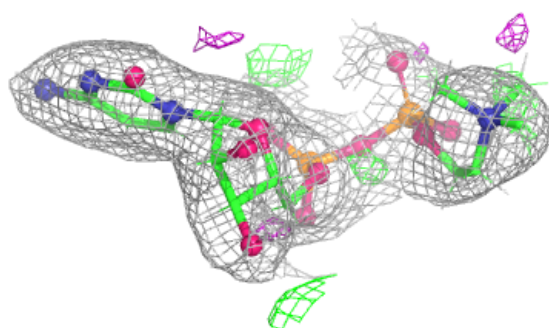
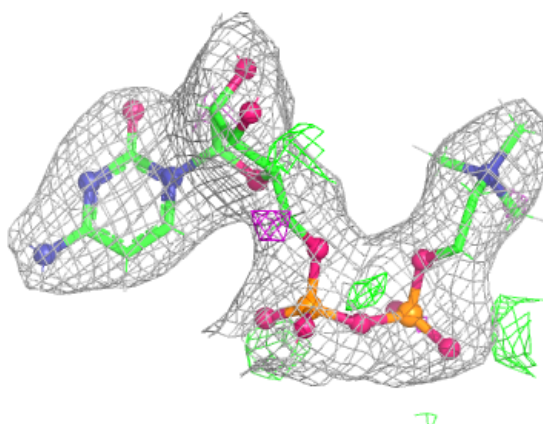
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	GOL	B	3001	6/6	0.78	0.19	77,78,79,79	0
3	SO4	B	2001	5/5	0.81	0.16	140,140,141,141	0
3	SO4	A	2001	5/5	0.84	0.17	154,154,154,155	0
3	SO4	A	2000	5/5	0.86	0.14	146,147,147,147	0
4	GOL	B	3000	6/6	0.88	0.10	64,64,64,64	0
3	SO4	B	2000	5/5	0.89	0.11	122,122,122,122	0
4	GOL	A	3000	6/6	0.94	0.07	60,61,65,65	0
2	CDC	A	1000	31/31	0.94	0.08	54,56,64,64	0
2	CDC	B	1000	31/31	0.94	0.08	47,54,59,63	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



Electron density around CDC B 1000:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers ⓘ

There are no such residues in this entry.