



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 8, 2018 – 02:07 PM EST

PDB ID : 2XCU
Title : Membrane-embedded monofunctional glycosyltransferase WaaA of Aquifex aeolicus, complex with CMP
Authors : Schmidt, H.; Hansen, G.; Hilgenfeld, R.; Mamat, U.; Mesters, J.R.
Deposited on : 2010-04-26
Resolution : 2.42 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20030736
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20030736

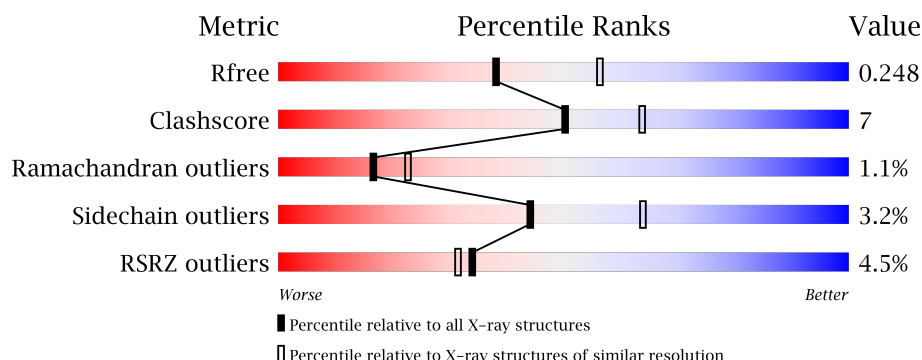
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.42 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}	100719	3709 (2.44-2.40)
Clashscore	112137	4241 (2.44-2.40)
Ramachandran outliers	110173	4178 (2.44-2.40)
Sidechain outliers	110143	4179 (2.44-2.40)
RSRZ outliers	101464	3740 (2.44-2.40)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	374	<div> <div>2%</div> <div>78% 14% • 6%</div> </div>
1	B	374	<div> <div>5%</div> <div>80% 13% • 6%</div> </div>
1	C	374	<div> <div>5%</div> <div>81% 12% • 6%</div> </div>
1	D	374	<div> <div>6%</div> <div>78% 14% • 6%</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	1PE	B	1353	-	-	X	-
4	CIT	A	1355	-	-	X	-
4	CIT	A	1356	-	-	-	X
5	BME	C	1354	-	-	-	X
5	BME	C	1355	-	-	-	X
5	BME	D	1355	-	-	-	X
6	CL	B	1356	-	-	-	X

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 11835 atoms, of which 0 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 3-DEOXY-D-MANNO-2-OCTULOSONIC ACID TRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	353	Total	C	N	O	S	0	0	0
			2877	1893	478	498	8			
1	B	352	Total	C	N	O	S	0	0	0
			2867	1887	475	497	8			
1	C	353	Total	C	N	O	S	0	0	0
			2877	1893	478	498	8			
1	D	352	Total	C	N	O	S	0	0	0
			2867	1887	475	497	8			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP O66663
A	-19	GLY	-	expression tag	UNP O66663
A	-18	HIS	-	expression tag	UNP O66663
A	-17	HIS	-	expression tag	UNP O66663
A	-16	HIS	-	expression tag	UNP O66663
A	-15	HIS	-	expression tag	UNP O66663
A	-14	HIS	-	expression tag	UNP O66663
A	-13	HIS	-	expression tag	UNP O66663
A	-12	HIS	-	expression tag	UNP O66663
A	-11	HIS	-	expression tag	UNP O66663
A	-10	HIS	-	expression tag	UNP O66663
A	-9	HIS	-	expression tag	UNP O66663
A	-8	SER	-	expression tag	UNP O66663
A	-7	SER	-	expression tag	UNP O66663
A	-6	GLY	-	expression tag	UNP O66663
A	-5	HIS	-	expression tag	UNP O66663
A	-4	ILE	-	expression tag	UNP O66663
A	-3	GLU	-	expression tag	UNP O66663
A	-2	GLY	-	expression tag	UNP O66663
A	-1	ARG	-	expression tag	UNP O66663

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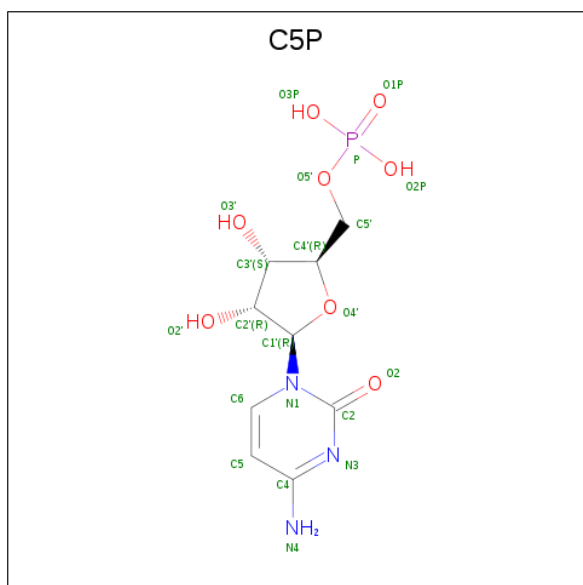
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	HIS	-	expression tag	UNP O66663
B	-20	MET	-	expression tag	UNP O66663
B	-19	GLY	-	expression tag	UNP O66663
B	-18	HIS	-	expression tag	UNP O66663
B	-17	HIS	-	expression tag	UNP O66663
B	-16	HIS	-	expression tag	UNP O66663
B	-15	HIS	-	expression tag	UNP O66663
B	-14	HIS	-	expression tag	UNP O66663
B	-13	HIS	-	expression tag	UNP O66663
B	-12	HIS	-	expression tag	UNP O66663
B	-11	HIS	-	expression tag	UNP O66663
B	-10	HIS	-	expression tag	UNP O66663
B	-9	HIS	-	expression tag	UNP O66663
B	-8	SER	-	expression tag	UNP O66663
B	-7	SER	-	expression tag	UNP O66663
B	-6	GLY	-	expression tag	UNP O66663
B	-5	HIS	-	expression tag	UNP O66663
B	-4	ILE	-	expression tag	UNP O66663
B	-3	GLU	-	expression tag	UNP O66663
B	-2	GLY	-	expression tag	UNP O66663
B	-1	ARG	-	expression tag	UNP O66663
B	0	HIS	-	expression tag	UNP O66663
C	-20	MET	-	expression tag	UNP O66663
C	-19	GLY	-	expression tag	UNP O66663
C	-18	HIS	-	expression tag	UNP O66663
C	-17	HIS	-	expression tag	UNP O66663
C	-16	HIS	-	expression tag	UNP O66663
C	-15	HIS	-	expression tag	UNP O66663
C	-14	HIS	-	expression tag	UNP O66663
C	-13	HIS	-	expression tag	UNP O66663
C	-12	HIS	-	expression tag	UNP O66663
C	-11	HIS	-	expression tag	UNP O66663
C	-10	HIS	-	expression tag	UNP O66663
C	-9	HIS	-	expression tag	UNP O66663
C	-8	SER	-	expression tag	UNP O66663
C	-7	SER	-	expression tag	UNP O66663
C	-6	GLY	-	expression tag	UNP O66663
C	-5	HIS	-	expression tag	UNP O66663
C	-4	ILE	-	expression tag	UNP O66663
C	-3	GLU	-	expression tag	UNP O66663
C	-2	GLY	-	expression tag	UNP O66663
C	-1	ARG	-	expression tag	UNP O66663

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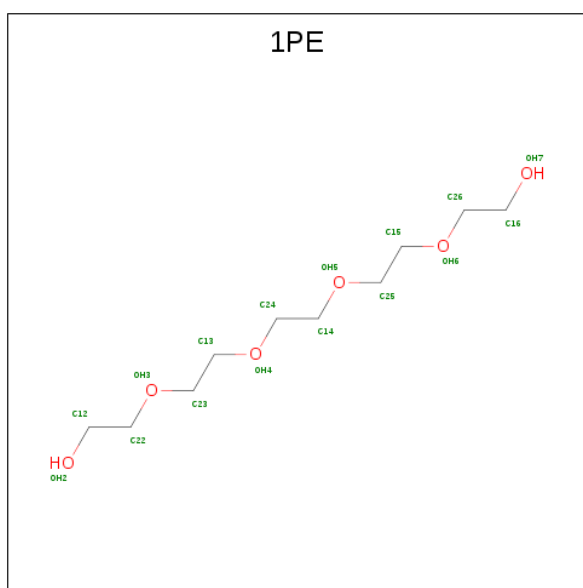
Chain	Residue	Modelled	Actual	Comment	Reference
C	0	HIS	-	expression tag	UNP O66663
D	-20	MET	-	expression tag	UNP O66663
D	-19	GLY	-	expression tag	UNP O66663
D	-18	HIS	-	expression tag	UNP O66663
D	-17	HIS	-	expression tag	UNP O66663
D	-16	HIS	-	expression tag	UNP O66663
D	-15	HIS	-	expression tag	UNP O66663
D	-14	HIS	-	expression tag	UNP O66663
D	-13	HIS	-	expression tag	UNP O66663
D	-12	HIS	-	expression tag	UNP O66663
D	-11	HIS	-	expression tag	UNP O66663
D	-10	HIS	-	expression tag	UNP O66663
D	-9	HIS	-	expression tag	UNP O66663
D	-8	SER	-	expression tag	UNP O66663
D	-7	SER	-	expression tag	UNP O66663
D	-6	GLY	-	expression tag	UNP O66663
D	-5	HIS	-	expression tag	UNP O66663
D	-4	ILE	-	expression tag	UNP O66663
D	-3	GLU	-	expression tag	UNP O66663
D	-2	GLY	-	expression tag	UNP O66663
D	-1	ARG	-	expression tag	UNP O66663
D	0	HIS	-	expression tag	UNP O66663

- Molecule 2 is CYTIDINE-5'-MONOPHOSPHATE (three-letter code: C5P) (formula: $C_9H_{14}N_3O_8P$).



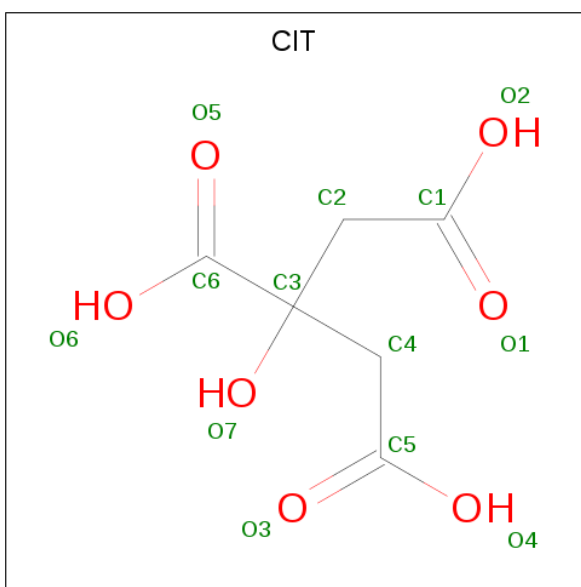
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			21	9	3	8	1		
2	B	1	Total	C	N	O	P	0	0
			21	9	3	8	1		
2	C	1	Total	C	N	O	P	0	0
			21	9	3	8	1		
2	D	1	Total	C	N	O	P	0	0
			21	9	3	8	1		

- Molecule 3 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: $C_{10}H_{22}O_6$).



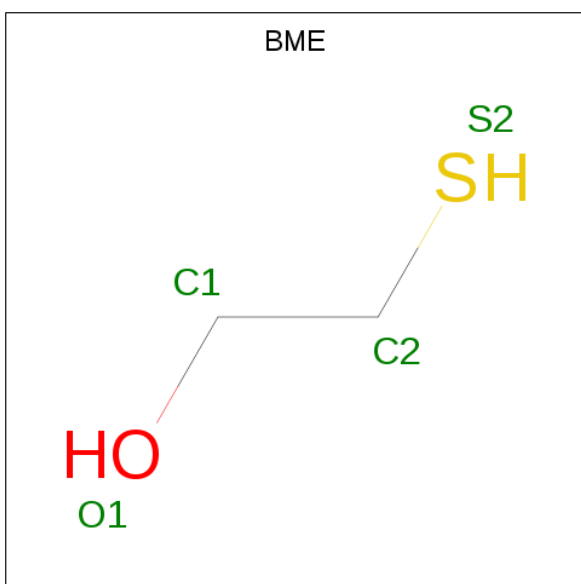
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			16	10	6		
3	A	1	Total	C	O	0	0
			16	10	6		
3	B	1	Total	C	O	0	0
			16	10	6		
3	D	1	Total	C	O	0	0
			16	10	6		

- Molecule 4 is CITRIC ACID (three-letter code: CIT) (formula: $C_6H_8O_7$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			13	6	7		
4	A	1	Total	C	O	0	0
			13	6	7		
4	B	1	Total	C	O	0	0
			13	6	7		
4	C	1	Total	C	O	0	0
			13	6	7		
4	D	1	Total	C	O	0	0
			13	6	7		

- Molecule 5 is BETA-MERCAPTOETHANOL (three-letter code: BME) (formula: C_2H_6OS).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total C O S 4 2 1 1	0	0
5	C	1	Total C O S 4 2 1 1	0	0
5	C	1	Total C O S 4 2 1 1	0	0
5	D	1	Total C O S 4 2 1 1	0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total Cl 1 1	0	0

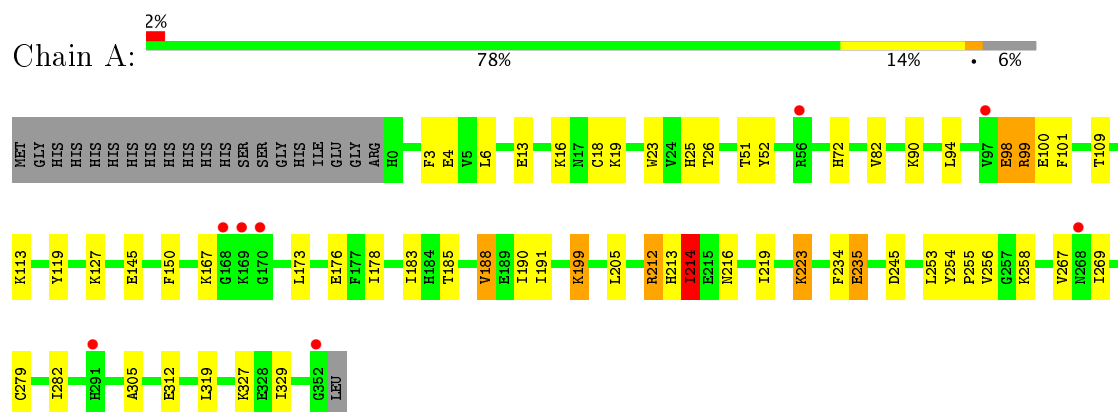
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	34	Total O 34 34	0	0
7	B	29	Total O 29 29	0	0
7	C	27	Total O 27 27	0	0
7	D	27	Total O 27 27	0	0

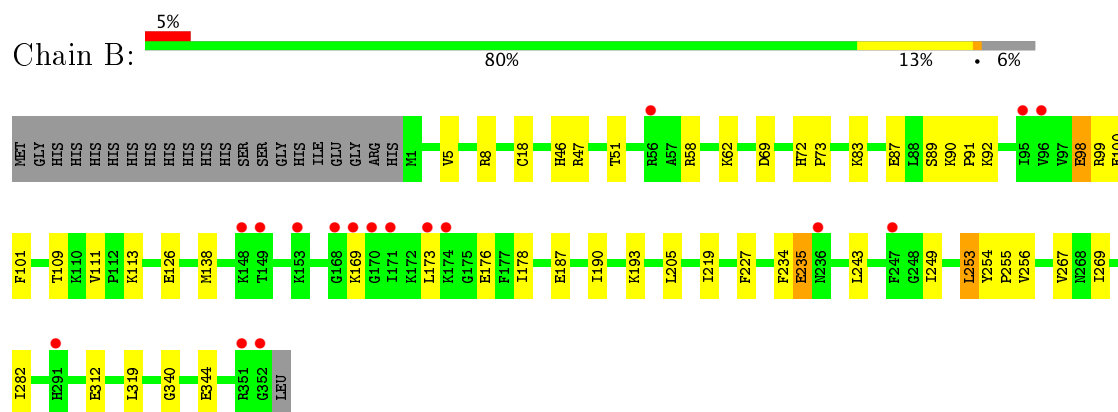
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

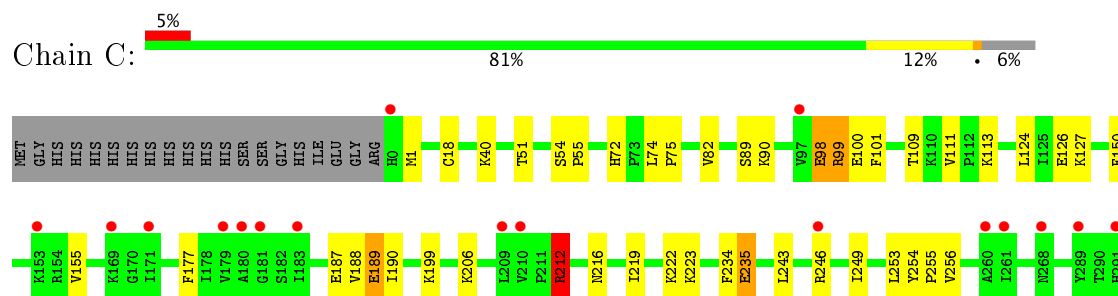
• Molecule 1: 3-DEOXY-D-MANNO-2-OCTULOSONIC ACID TRANSFERASE

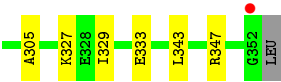


• Molecule 1: 3-DEOXY-D-MANNO-2-OCTULOSONIC ACID TRANSFERASE

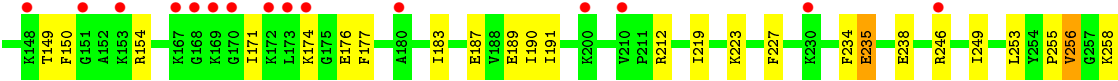
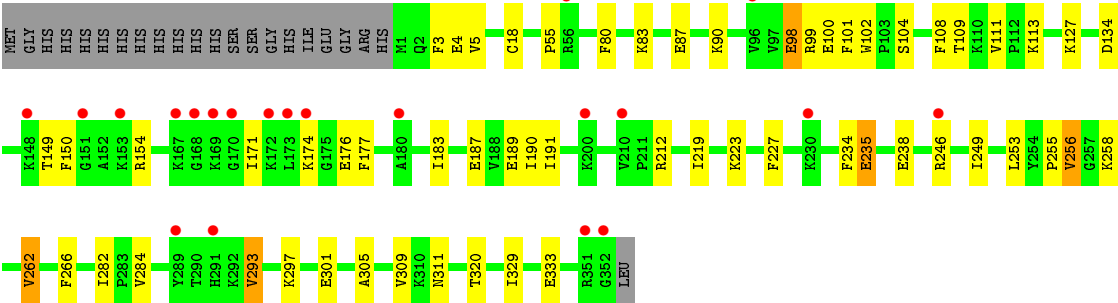
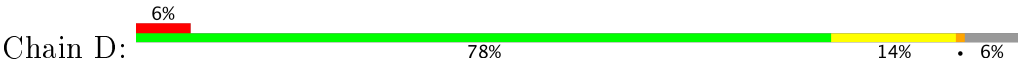


• Molecule 1: 3-DEOXY-D-MANNO-2-OCTULOSONIC ACID TRANSFERASE





● Molecule 1: 3-DEOXY-D-MANNO-2-OCTULOSONIC ACID TRANSFERASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	131.77Å 44.67Å 143.64Å 90.00° 97.15° 90.00°	Depositor
Resolution (Å)	31.22 – 2.42 31.06 – 2.42	Depositor EDS
% Data completeness (in resolution range)	97.2 (31.22-2.42) 97.2 (31.06-2.42)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.93 (at 2.42Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.202 , 0.251 0.200 , 0.248	Depositor DCC
R_{free} test set	3139 reflections (5.26%)	DCC
Wilson B-factor (Å ²)	41.6	Xtriage
Anisotropy	0.076	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	11835	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.22% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: C5P, 1PE, BME, CIT, CL

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	0.72	0/2941	0.75	0/3946
1	B	0.70	0/2930	0.72	0/3931
1	C	0.68	0/2941	0.72	2/3946 (0.1%)
1	D	0.69	0/2930	0.73	0/3931
All	All	0.70	0/11742	0.73	2/15754 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	212	ARG	NE-CZ-NH1	-6.92	116.84	120.30
1	C	212	ARG	NE-CZ-NH2	6.28	123.44	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	2877	0	3015	50	0
1	B	2867	0	3008	33	0
1	C	2877	0	3015	29	0
1	D	2867	0	3008	40	0
2	A	21	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	21	0	12	0	0
2	C	21	0	12	1	0
2	D	21	0	12	0	0
3	A	32	0	44	9	0
3	B	16	0	22	8	0
3	D	16	0	22	6	0
4	A	26	0	10	13	0
4	B	13	0	5	2	0
4	C	13	0	5	0	0
4	D	13	0	5	3	0
5	B	4	0	6	0	0
5	C	8	0	12	0	0
5	D	4	0	6	1	0
6	B	1	0	0	0	0
7	A	34	0	0	1	0
7	B	29	0	0	0	0
7	C	27	0	0	0	0
7	D	27	0	0	0	0
All	All	11835	0	12231	157	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 7.

All (157) 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:A:216:ASN:HD21	4:A:1355:CIT:H22	1.23	0.99
4:B:1354:CIT:O2	4:B:1354:CIT:H42	1.61	0.97
1:A:216:ASN:HD21	4:A:1355:CIT:C2	1.90	0.83
1:D:219:ILE:H	1:D:219:ILE:HD12	1.43	0.81
1:A:216:ASN:ND2	4:A:1355:CIT:H22	1.95	0.81
1:A:101:PHE:HB2	3:A:1354:1PE:H162	1.67	0.77
1:B:255:PRO:HA	1:B:282:ILE:CD1	2.21	0.70
1:D:262:VAL:HG22	1:D:284:VAL:CG2	2.21	0.69
3:B:1353:1PE:H222	1:D:55:PRO:HD3	1.73	0.69
1:C:343:LEU:O	1:C:347:ARG:HG3	1.93	0.69
1:A:99:ARG:HE	3:A:1354:1PE:H161	1.58	0.68
1:A:213:HIS:ND1	4:A:1355:CIT:O4	2.24	0.66
1:D:187:GLU:HG2	1:D:266:PHE:HB2	1.80	0.64
3:B:1353:1PE:H222	1:D:55:PRO:CD	2.28	0.64
1:A:173:LEU:HD12	1:A:256:VAL:HG11	1.80	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:190:ILE:HG13	1:B:312:GLU:HB2	1.80	0.63
1:D:111:VAL:O	1:D:113:LYS:HE3	1.98	0.63
1:A:190:ILE:HG13	1:A:312:GLU:HB2	1.79	0.63
1:B:176:GLU:HG3	1:B:205:LEU:HD23	1.82	0.62
1:C:101:PHE:HE1	1:C:126:GLU:HG2	1.64	0.61
1:C:305:ALA:HB2	1:C:329:ILE:HG23	1.84	0.60
1:C:99:ARG:O	1:C:100:GLU:C	2.38	0.60
1:C:187:GLU:O	1:C:190:ILE:HG22	2.02	0.60
1:D:100:GLU:HA	3:D:1353:1PE:C25	2.32	0.60
1:A:99:ARG:NE	3:A:1354:1PE:H161	2.16	0.60
1:B:340:GLY:O	1:B:344:GLU:HB2	2.02	0.59
1:D:171:ILE:O	1:D:256:VAL:HG23	2.01	0.59
1:D:223:LYS:O	1:D:227:PHE:HD2	1.84	0.59
1:A:13:GLU:O	1:A:16:LYS:HB2	2.03	0.59
1:D:80:PHE:HB3	5:D:1355:BME:H22	1.85	0.58
1:A:99:ARG:O	1:A:100:GLU:C	2.40	0.58
1:A:176:GLU:HG3	1:A:258:LYS:HE3	1.85	0.58
1:A:109:THR:OG1	1:A:113:LYS:HE3	2.03	0.58
1:A:185:THR:H	4:A:1355:CIT:C4	2.18	0.57
1:A:25:HIS:CD2	1:A:100:GLU:HG3	2.39	0.57
4:B:1354:CIT:C4	4:B:1354:CIT:O2	2.43	0.56
1:A:219:ILE:H	1:A:219:ILE:HD12	1.70	0.56
1:A:167:LYS:HD3	1:A:279:CYS:O	2.07	0.55
1:B:100:GLU:HA	3:B:1353:1PE:H152	1.87	0.55
1:A:212:ARG:HB3	4:A:1355:CIT:O4	2.06	0.55
1:C:189:GLU:OE2	1:C:223:LYS:HE2	2.07	0.54
1:D:234:PHE:O	1:D:235:GLU:HB2	2.07	0.54
1:A:6:LEU:HD21	1:C:124:LEU:HD23	1.90	0.54
1:B:100:GLU:HA	3:B:1353:1PE:C25	2.37	0.54
1:B:173:LEU:HD12	1:B:256:VAL:HG11	1.90	0.54
1:D:219:ILE:N	1:D:219:ILE:HD12	2.20	0.54
1:C:219:ILE:H	1:C:219:ILE:HD12	1.72	0.53
1:A:82:VAL:HG13	1:A:109:THR:HG23	1.90	0.53
1:C:254:TYR:N	1:C:255:PRO:HD2	2.22	0.53
1:D:262:VAL:HG22	1:D:284:VAL:HG21	1.89	0.53
1:D:234:PHE:CG	1:D:235:GLU:N	2.77	0.53
1:A:51:THR:HA	1:A:72:HIS:O	2.09	0.53
1:B:219:ILE:HD12	1:B:219:ILE:H	1.74	0.53
1:D:219:ILE:CD1	1:D:219:ILE:H	2.17	0.52
1:A:199:LYS:HE3	1:A:205:LEU:O	2.09	0.52
1:A:234:PHE:CG	1:A:235:GLU:N	2.77	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1353:IPE:H222	1:C:99:ARG:HG2	1.92	0.51
1:A:19:LYS:HG3	1:A:90:LYS:HB2	1.92	0.51
3:A:1353:IPE:H221	1:C:101:PHE:HB2	1.92	0.51
1:D:246:ARG:HB3	1:D:249:ILE:HD12	1.92	0.51
1:D:187:GLU:O	1:D:190:ILE:HG22	2.11	0.51
1:D:305:ALA:HA	1:D:329:ILE:HD12	1.93	0.50
4:A:1356:CIT:O2	4:A:1356:CIT:H42	2.11	0.50
1:A:23:TRP:CD2	1:A:94:LEU:HD13	2.46	0.50
7:A:2022:HOH:O	1:C:222:LYS:HD3	2.11	0.50
1:B:89:SER:O	1:B:90:LYS:C	2.50	0.49
1:C:246:ARG:HB3	1:C:249:ILE:HD12	1.94	0.49
1:A:100:GLU:OE2	1:A:100:GLU:HA	2.12	0.49
1:A:185:THR:H	4:A:1355:CIT:H41	1.76	0.49
1:C:109:THR:OG1	1:C:113:LYS:HE3	2.11	0.49
1:B:100:GLU:HA	3:B:1353:IPE:H252	1.93	0.49
1:D:262:VAL:CG2	1:D:284:VAL:HG21	2.43	0.48
1:A:127:LYS:HG2	1:A:150:PHE:CE1	2.47	0.48
1:B:8:ARG:HG2	1:B:73:PRO:HB2	1.95	0.48
1:A:267:VAL:HG23	1:A:269:ILE:HG12	1.96	0.48
4:A:1355:CIT:O5	1:C:216:ASN:ND2	2.37	0.48
1:D:127:LYS:HG2	1:D:150:PHE:CE1	2.48	0.48
1:A:216:ASN:ND2	4:A:1355:CIT:C2	2.66	0.47
1:B:253:LEU:O	1:B:256:VAL:HB	2.14	0.47
1:D:293:VAL:O	1:D:293:VAL:HG13	2.14	0.47
1:A:3:PHE:HB2	3:A:1353:IPE:H122	1.96	0.47
1:D:249:ILE:HG22	1:D:253:LEU:HD22	1.97	0.47
1:B:5:VAL:HG21	3:D:1353:IPE:H161	1.97	0.47
1:D:4:GLU:N	4:D:1354:CIT:H21	2.30	0.47
1:B:46:HIS:ND1	1:B:92:LYS:NZ	2.62	0.47
1:C:82:VAL:CG1	1:C:109:THR:HG23	2.45	0.47
1:D:183:ILE:HD12	1:D:191:ILE:CD1	2.45	0.47
1:B:267:VAL:HG23	1:B:269:ILE:HG12	1.97	0.47
1:A:190:ILE:HD11	1:A:312:GLU:N	2.30	0.47
1:A:254:TYR:N	1:A:255:PRO:HD2	2.30	0.46
1:C:82:VAL:HG13	1:C:109:THR:HG23	1.97	0.46
1:A:223:LYS:HD3	1:A:223:LYS:HA	1.72	0.46
1:D:5:VAL:H	4:D:1354:CIT:H21	1.81	0.46
1:B:234:PHE:CG	1:B:235:GLU:N	2.83	0.46
1:A:4:GLU:HA	4:A:1356:CIT:C6	2.46	0.46
1:C:234:PHE:CG	1:C:235:GLU:N	2.84	0.46
1:A:185:THR:H	4:A:1355:CIT:H42	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:101:PHE:HE1	1:B:126:GLU:HG2	1.81	0.46
1:B:178:ILE:HD13	1:B:319:LEU:HD22	1.98	0.46
1:B:47:ARG:HA	1:B:69:ASP:OD2	2.15	0.46
1:D:83:LYS:O	1:D:87:GLU:HB2	2.16	0.46
3:B:1353:1PE:H162	1:D:3:PHE:HB2	1.98	0.45
1:C:177:PHE:CD2	1:C:256:VAL:HG13	2.51	0.45
1:D:253:LEU:O	1:D:256:VAL:HB	2.17	0.45
1:A:185:THR:O	1:A:188:VAL:HG23	2.17	0.45
1:C:127:LYS:HG2	1:C:150:PHE:CE1	2.52	0.45
1:A:176:GLU:HG2	1:A:205:LEU:HD23	1.99	0.45
1:A:119:TYR:N	1:A:119:TYR:CD2	2.83	0.45
1:B:100:GLU:HA	3:B:1353:1PE:C15	2.46	0.44
1:B:254:TYR:N	1:B:255:PRO:HD2	2.32	0.44
1:C:109:THR:HB	1:C:111:VAL:HG12	1.98	0.44
1:A:305:ALA:HA	1:A:329:ILE:HD12	2.00	0.44
1:D:109:THR:OG1	1:D:113:LYS:HE2	2.18	0.44
1:A:3:PHE:HB2	3:A:1353:1PE:C12	2.48	0.43
1:B:58:ARG:NH1	1:B:62:LYS:NZ	2.65	0.43
1:A:183:ILE:HD12	1:A:191:ILE:CD1	2.48	0.43
1:C:212:ARG:HH12	2:C:400:C5P:P	2.41	0.43
1:A:253:LEU:O	1:A:256:VAL:HB	2.18	0.43
1:C:54:SER:HA	1:C:55:PRO:HD3	1.94	0.43
1:B:109:THR:OG1	1:B:113:LYS:HE3	2.19	0.43
1:D:255:PRO:HA	1:D:282:ILE:CD1	2.48	0.43
1:A:26:THR:O	1:A:52:TYR:HA	2.18	0.43
1:B:193:LYS:HG3	1:B:227:PHE:HE1	1.84	0.43
1:B:234:PHE:O	1:B:235:GLU:HB2	2.18	0.43
1:C:51:THR:HA	1:C:72:HIS:O	2.19	0.42
1:D:100:GLU:HA	3:D:1353:1PE:H252	2.00	0.42
1:D:297:LYS:HE2	1:D:301:GLU:OE2	2.19	0.42
3:B:1353:1PE:H142	3:B:1353:1PE:H232	2.01	0.42
1:B:219:ILE:N	1:B:219:ILE:HD12	2.34	0.42
1:B:255:PRO:HA	1:B:282:ILE:HD11	1.97	0.42
1:B:51:THR:HA	1:B:72:HIS:O	2.19	0.42
1:B:91:PRO:HG2	1:B:111:VAL:HG21	2.01	0.42
1:A:214:ILE:HD12	1:A:245:ASP:C	2.40	0.41
1:C:177:PHE:HA	1:C:206:LYS:O	2.20	0.41
1:D:101:PHE:N	3:D:1353:1PE:H252	2.35	0.41
1:B:193:LYS:HG3	1:B:227:PHE:CE1	2.55	0.41
1:D:102:TRP:CE2	3:D:1353:1PE:H141	2.55	0.41
1:D:253:LEU:C	1:D:255:PRO:HD2	2.40	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:5:VAL:CG2	3:D:1353:1PE:H161	2.50	0.41
1:A:305:ALA:CB	1:A:329:ILE:HD12	2.51	0.41
1:C:253:LEU:C	1:C:255:PRO:HD2	2.41	0.41
1:D:177:PHE:CD2	1:D:256:VAL:HG13	2.55	0.41
1:A:178:ILE:HD13	1:A:319:LEU:HD22	2.02	0.41
1:A:3:PHE:CB	3:A:1353:1PE:H122	2.50	0.41
1:B:187:GLU:O	1:B:190:ILE:HG22	2.20	0.41
1:B:83:LYS:O	1:B:87:GLU:HB2	2.20	0.41
3:A:1353:1PE:H232	1:C:101:PHE:N	2.35	0.41
1:D:176:GLU:HG2	1:D:258:LYS:HE3	2.02	0.41
1:C:74:LEU:HD12	1:C:75:PRO:HD2	2.02	0.41
1:D:134:ASP:O	1:D:154:ARG:HB2	2.21	0.41
1:D:190:ILE:HD11	1:D:311:ASN:C	2.41	0.41
1:A:255:PRO:HA	1:A:282:ILE:CD1	2.51	0.40
4:D:1354:CIT:O4	4:D:1354:CIT:O7	2.38	0.40
4:A:1356:CIT:O2	4:A:1356:CIT:C4	2.70	0.40
1:A:23:TRP:O	1:A:94:LEU:HA	2.22	0.40
1:C:89:SER:O	1:C:90:LYS:C	2.60	0.40
1:D:104:SER:O	1:D:108:PHE:HB2	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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	351/374 (94%)	336 (96%)	11 (3%)	4 (1%)	17	23
1	B	350/374 (94%)	334 (95%)	12 (3%)	4 (1%)	17	23
1	C	351/374 (94%)	333 (95%)	15 (4%)	3 (1%)	20	28
1	D	350/374 (94%)	337 (96%)	9 (3%)	4 (1%)	17	23
All	All	1402/1496 (94%)	1340 (96%)	47 (3%)	15 (1%)	17	23

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	214	ILE
1	B	235	GLU
1	A	98	GLU
1	A	235	GLU
1	B	98	GLU
1	C	99	ARG
1	C	235	GLU
1	D	99	ARG
1	D	149	THR
1	D	235	GLU
1	B	99	ARG
1	B	169	LYS
1	C	98	GLU
1	A	99	ARG
1	D	98	GLU

5.3.2 Protein sidechains ⓘ

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	316/334 (95%)	307 (97%)	9 (3%)	49	68
1	B	315/334 (94%)	309 (98%)	6 (2%)	62	79
1	C	316/334 (95%)	304 (96%)	12 (4%)	38	56
1	D	315/334 (94%)	302 (96%)	13 (4%)	35	53
All	All	1262/1336 (94%)	1222 (97%)	40 (3%)	44	64

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	CYS
1	A	98	GLU
1	A	145	GLU
1	A	188	VAL
1	A	199	LYS

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Mol	Chain	Res	Type
1	A	212	ARG
1	A	214	ILE
1	A	223	LYS
1	A	327	LYS
1	B	18	CYS
1	B	98	GLU
1	B	138	MET
1	B	243	LEU
1	B	249	ILE
1	B	253	LEU
1	C	1	MET
1	C	18	CYS
1	C	40	LYS
1	C	98	GLU
1	C	155	VAL
1	C	188	VAL
1	C	189	GLU
1	C	199	LYS
1	C	212	ARG
1	C	243	LEU
1	C	327	LYS
1	C	333	GLU
1	D	18	CYS
1	D	90	LYS
1	D	98	GLU
1	D	174	LYS
1	D	189	GLU
1	D	212	ARG
1	D	238	GLU
1	D	256	VAL
1	D	262	VAL
1	D	293	VAL
1	D	309	VAL
1	D	320	THR
1	D	333	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	GLN
1	A	216	ASN
1	B	141	GLN

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Mol	Chain	Res	Type
1	B	216	ASN
1	C	2	GLN
1	D	216	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 1 is monoatomic - leaving 17 for Mogul analysis.

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	$\# Z > 2$
3	1PE	A	1353	-	15,15,15	0.72	0	14,14,14	1.10	1 (7%)
3	1PE	A	1354	-	15,15,15	0.83	0	14,14,14	1.21	2 (14%)
4	CIT	A	1355	-	3,12,12	1.12	0	3,17,17	0.75	0
4	CIT	A	1356	-	3,12,12	1.82	1 (33%)	3,17,17	2.38	2 (66%)
2	C5P	A	400	-	19,22,22	1.99	3 (15%)	23,33,33	1.50	4 (17%)
3	1PE	B	1353	-	15,15,15	0.59	0	14,14,14	1.11	1 (7%)
4	CIT	B	1354	-	3,12,12	1.81	2 (66%)	3,17,17	2.76	2 (66%)
5	BME	B	1355	-	3,3,3	0.25	0	2,2,2	0.52	0
2	C5P	B	400	-	19,22,22	1.96	4 (21%)	23,33,33	1.01	1 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	CIT	C	1353	-	3,12,12	1.71	1 (33%)	3,17,17	2.24	2 (66%)
5	BME	C	1354	-	3,3,3	0.23	0	2,2,2	0.50	0
5	BME	C	1355	-	3,3,3	0.50	0	2,2,2	0.77	0
2	C5P	C	400	-	19,22,22	2.04	5 (26%)	23,33,33	0.98	1 (4%)
3	1PE	D	1353	-	15,15,15	0.51	0	14,14,14	0.96	1 (7%)
4	CIT	D	1354	-	3,12,12	1.54	0	3,17,17	1.59	1 (33%)
5	BME	D	1355	-	3,3,3	0.43	0	2,2,2	0.59	0
2	C5P	D	400	-	19,22,22	1.76	4 (21%)	23,33,33	1.25	4 (17%)

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
3	1PE	A	1353	-	-	0/13/13/13	0/0/0/0
3	1PE	A	1354	-	-	0/13/13/13	0/0/0/0
4	CIT	A	1355	-	-	0/6/16/16	0/0/0/0
4	CIT	A	1356	-	-	0/6/16/16	0/0/0/0
2	C5P	A	400	-	-	0/6/26/26	0/2/2/2
3	1PE	B	1353	-	-	0/13/13/13	0/0/0/0
4	CIT	B	1354	-	-	0/6/16/16	0/0/0/0
5	BME	B	1355	-	-	0/1/1/1	0/0/0/0
2	C5P	B	400	-	-	0/6/26/26	0/2/2/2
4	CIT	C	1353	-	-	0/6/16/16	0/0/0/0
5	BME	C	1354	-	-	0/1/1/1	0/0/0/0
5	BME	C	1355	-	-	0/1/1/1	0/0/0/0
2	C5P	C	400	-	-	0/6/26/26	0/2/2/2
3	1PE	D	1353	-	-	0/13/13/13	0/0/0/0
4	CIT	D	1354	-	-	0/6/16/16	0/0/0/0
5	BME	D	1355	-	-	0/1/1/1	0/0/0/0
2	C5P	D	400	-	-	0/6/26/26	0/2/2/2

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	400	C5P	P-O5'	-3.82	1.47	1.60
2	B	400	C5P	P-O5'	-3.64	1.48	1.60
2	A	400	C5P	P-O5'	-3.57	1.48	1.60
2	D	400	C5P	P-O5'	-2.61	1.51	1.60
4	C	1353	CIT	C2-C3	-2.17	1.51	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1354	CIT	C4-C3	-2.11	1.51	1.54
2	C	400	C5P	O5'-C5'	-2.10	1.36	1.44
4	B	1354	CIT	O7-C3	2.07	1.46	1.43
2	C	400	C5P	C4-N3	2.36	1.39	1.35
4	A	1356	CIT	O7-C3	3.03	1.47	1.43
2	D	400	C5P	O4'-C1'	3.05	1.45	1.41
2	B	400	C5P	C4-N3	3.21	1.41	1.35
2	B	400	C5P	C6-N1	3.59	1.40	1.35
2	D	400	C5P	C4-N3	3.70	1.41	1.35
2	C	400	C5P	C6-N1	3.84	1.41	1.35
2	A	400	C5P	C6-N1	4.23	1.41	1.35
2	D	400	C5P	C6-N1	4.31	1.41	1.35
2	B	400	C5P	O4'-C1'	5.34	1.48	1.41
2	A	400	C5P	O4'-C1'	5.39	1.48	1.41
2	C	400	C5P	O4'-C1'	5.73	1.49	1.41

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1354	CIT	C3-C2-C1	-3.42	109.61	114.95
4	B	1354	CIT	C3-C4-C5	-3.11	110.09	114.95
2	A	400	C5P	O2'-C2'-C1'	-3.10	101.92	111.61
2	A	400	C5P	N4-C4-N3	-3.01	111.58	116.64
4	A	1356	CIT	C3-C2-C1	-2.66	110.80	114.95
2	D	400	C5P	C5-C4-N3	-2.55	118.65	121.68
3	A	1353	1PE	C24-OH4-C13	-2.30	103.34	113.30
3	D	1353	1PE	OH6-C26-C16	-2.29	99.58	110.15
3	A	1354	1PE	OH3-C22-C12	-2.26	99.69	110.15
4	C	1353	CIT	C3-C2-C1	-2.08	111.70	114.95
2	D	400	C5P	O2P-P-O5'	2.06	112.22	106.73
3	B	1353	1PE	OH7-C16-C26	2.08	123.82	111.89
2	D	400	C5P	P-O5'-C5'	2.24	124.46	118.30
2	B	400	C5P	O4'-C1'-N1	2.37	112.83	108.08
3	A	1354	1PE	OH7-C16-C26	2.41	125.72	111.89
2	A	400	C5P	O4'-C1'-N1	2.44	112.97	108.08
4	D	1354	CIT	C4-C3-C2	2.46	115.88	109.75
4	A	1356	CIT	C4-C3-C2	2.53	116.06	109.75
2	A	400	C5P	C5-C4-N3	2.67	124.85	121.68
2	C	400	C5P	P-O5'-C5'	2.75	125.87	118.30
2	D	400	C5P	N4-C4-N3	3.04	121.77	116.64
4	C	1353	CIT	C3-C4-C5	3.24	120.01	114.95

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 43 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1353	1PE	6	0
3	A	1354	1PE	3	0
4	A	1355	CIT	10	0
4	A	1356	CIT	3	0
3	B	1353	1PE	8	0
4	B	1354	CIT	2	0
2	C	400	C5P	1	0
3	D	1353	1PE	6	0
4	D	1354	CIT	3	0
5	D	1355	BME	1	0

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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	353/374 (94%)	-0.10	8 (2%) 61 57	18, 42, 61, 71	0
1	B	352/374 (94%)	0.07	17 (4%) 31 29	19, 46, 69, 84	0
1	C	353/374 (94%)	0.13	18 (5%) 29 26	18, 44, 68, 82	0
1	D	352/374 (94%)	0.21	21 (5%) 23 20	18, 46, 71, 83	0
All	All	1410/1496 (94%)	0.08	64 (4%) 34 31	18, 45, 68, 84	0

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	153	LYS	4.9
1	C	169	LYS	4.2
1	C	180	ALA	4.2
1	B	352	GLY	4.1
1	B	169	LYS	3.9
1	D	173	LEU	3.7
1	D	148	LYS	3.6
1	D	351	ARG	3.5
1	D	169	LYS	3.5
1	B	153	LYS	3.5
1	B	236	ASN	3.5
1	C	209	LEU	3.3
1	A	169	LYS	3.3
1	D	352	GLY	3.3
1	D	246	ARG	3.3
1	D	291	HIS	3.2
1	B	148	LYS	3.2
1	D	174	LYS	3.2
1	D	200	LYS	3.2
1	C	352	GLY	3.2
1	C	183	ILE	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	351	ARG	3.1
1	C	261	ILE	3.0
1	B	174	LYS	3.0
1	C	291	HIS	2.9
1	D	170	GLY	2.9
1	C	260	ALA	2.8
1	C	181	GLY	2.8
1	B	291	HIS	2.8
1	A	268	ASN	2.7
1	D	230	LYS	2.7
1	B	96	VAL	2.6
1	D	172	LYS	2.6
1	C	179	VAL	2.6
1	A	170	GLY	2.6
1	B	170	GLY	2.6
1	C	0	HIS	2.5
1	A	352	GLY	2.5
1	D	56	ARG	2.5
1	B	173	LEU	2.5
1	D	289	TYR	2.5
1	A	168	GLY	2.4
1	A	56	ARG	2.4
1	B	149	THR	2.4
1	C	210	VAL	2.3
1	D	96	VAL	2.3
1	D	167	LYS	2.3
1	C	97	VAL	2.3
1	D	180	ALA	2.3
1	B	95	ILE	2.2
1	B	247	PHE	2.2
1	C	289	TYR	2.2
1	C	153	LYS	2.2
1	C	268	ASN	2.2
1	A	291	HIS	2.1
1	B	56	ARG	2.1
1	B	171	ILE	2.1
1	B	168	GLY	2.1
1	D	151	GLY	2.1
1	A	97	VAL	2.1
1	D	210	VAL	2.1
1	C	171	ILE	2.0
1	C	246	ARG	2.0

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Mol	Chain	Res	Type	RSRZ
1	D	168	GLY	2.0

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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
5	BME	C	1354	4/4	0.91	0.15	3.65	58,58,59,60	0
5	BME	D	1355	4/4	0.89	0.17	3.20	50,53,53,57	0
5	BME	C	1355	4/4	0.79	0.19	2.55	91,92,92,93	0
4	CIT	A	1356	13/13	0.80	0.20	2.40	33,38,47,47	0
6	CL	B	1356	1/1	0.99	0.15	2.14	29,29,29,29	0
4	CIT	A	1355	13/13	0.83	0.22	1.99	60,62,65,65	0
4	CIT	B	1354	13/13	0.80	0.21	1.98	42,49,57,58	0
3	1PE	A	1354	16/16	0.89	0.18	1.88	48,50,57,57	0
3	1PE	A	1353	16/16	0.86	0.20	1.81	44,49,53,54	0
4	CIT	D	1354	13/13	0.84	0.19	1.12	48,55,63,64	0
5	BME	B	1355	4/4	0.92	0.13	1.09	49,49,51,53	0
3	1PE	D	1353	16/16	0.93	0.15	0.70	46,48,51,52	0
3	1PE	B	1353	16/16	0.94	0.14	0.17	43,47,48,50	0
4	CIT	C	1353	13/13	0.92	0.14	0.02	37,43,46,47	0
2	C5P	B	400	21/21	0.96	0.10	-1.14	42,46,49,52	0
2	C5P	D	400	21/21	0.96	0.09	-1.48	40,46,48,49	0
2	C5P	A	400	21/21	0.97	0.09	-1.51	31,33,36,37	0
2	C5P	C	400	21/21	0.95	0.11	-1.81	36,39,42,42	0

6.5 Other polymers

There are no such residues in this entry.