



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 08:54 AM UTC

PDB ID : 5B89 / pdb_00005b89
Title : Crystal structure of a Cysteine Desulfurase from *Thermococcus onnurineus* NA1 in complex with alanine at 1.5 Angstrom resolution
Authors : Ho, T.-H.; Kang, L.-W.
Deposited on : 2016-06-13
Resolution : 1.50 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
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

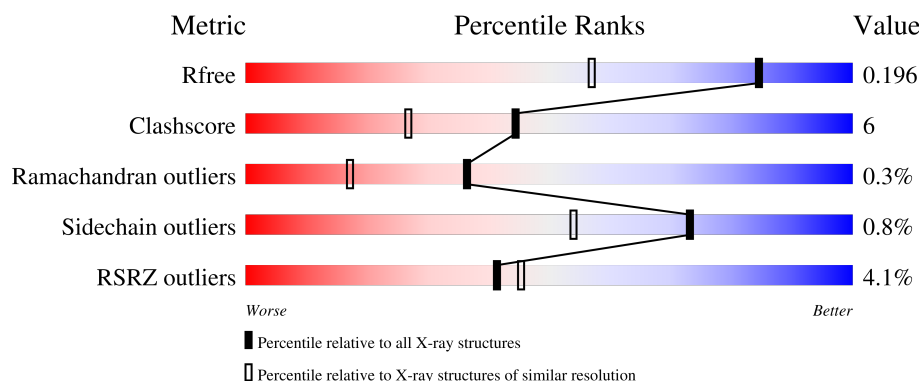
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.50 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	4037 (1.50-1.50)
Clashscore	190562	4235 (1.50-1.50)
Ramachandran outliers	187476	4153 (1.50-1.50)
Sidechain outliers	187428	4150 (1.50-1.50)
RSRZ outliers	180081	4039 (1.50-1.50)

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	419	<div> <div>5%</div> <div> <div></div> <div>65%</div> <div>28%</div> <div>• 5%</div> </div> </div>
1	B	419	<div> <div>2%</div> <div> <div></div> <div>69%</div> <div>24%</div> <div>• •</div> </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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	ALA	B	401	-	X	-	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6853 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 Cysteine desulfurase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	400	Total	C	N	O	S	0	0	0
			3121	1989	540	581	11			
1	B	402	Total	C	N	O	S	0	0	0
			3135	1997	544	583	11			

There are 40 discrepancies between the modelled and reference sequences:

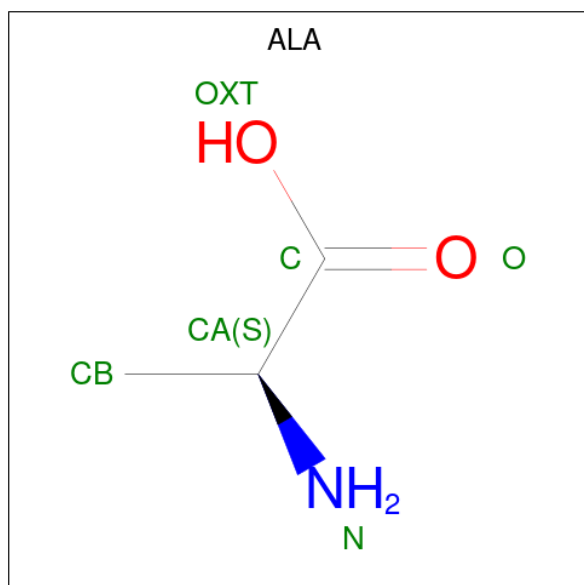
Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP B6YT87
A	-18	HIS	-	expression tag	UNP B6YT87
A	-17	HIS	-	expression tag	UNP B6YT87
A	-16	HIS	-	expression tag	UNP B6YT87
A	-15	HIS	-	expression tag	UNP B6YT87
A	-14	HIS	-	expression tag	UNP B6YT87
A	-13	HIS	-	expression tag	UNP B6YT87
A	-12	SER	-	expression tag	UNP B6YT87
A	-11	SER	-	expression tag	UNP B6YT87
A	-10	GLU	-	expression tag	UNP B6YT87
A	-9	ASN	-	expression tag	UNP B6YT87
A	-8	LEU	-	expression tag	UNP B6YT87
A	-7	TYR	-	expression tag	UNP B6YT87
A	-6	PHE	-	expression tag	UNP B6YT87
A	-5	GLN	-	expression tag	UNP B6YT87
A	-4	GLY	-	expression tag	UNP B6YT87
A	-3	HIS	-	expression tag	UNP B6YT87
A	-2	MET	-	expression tag	UNP B6YT87
A	-1	ALA	-	expression tag	UNP B6YT87
A	0	SER	-	expression tag	UNP B6YT87
B	-19	MET	-	expression tag	UNP B6YT87
B	-18	HIS	-	expression tag	UNP B6YT87
B	-17	HIS	-	expression tag	UNP B6YT87
B	-16	HIS	-	expression tag	UNP B6YT87
B	-15	HIS	-	expression tag	UNP B6YT87

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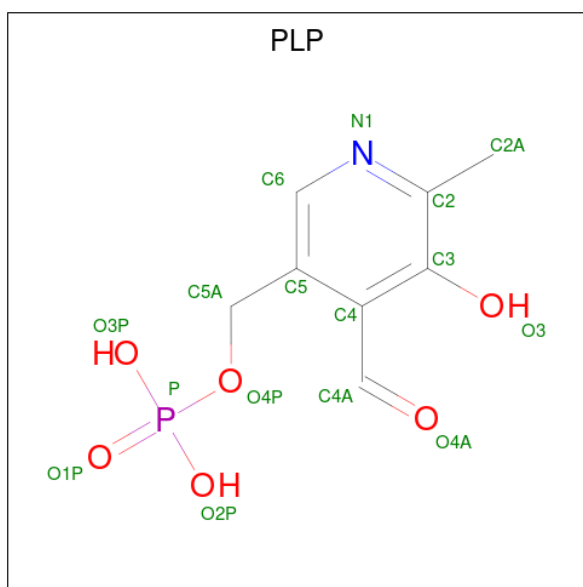
Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP B6YT87
B	-13	HIS	-	expression tag	UNP B6YT87
B	-12	SER	-	expression tag	UNP B6YT87
B	-11	SER	-	expression tag	UNP B6YT87
B	-10	GLU	-	expression tag	UNP B6YT87
B	-9	ASN	-	expression tag	UNP B6YT87
B	-8	LEU	-	expression tag	UNP B6YT87
B	-7	TYR	-	expression tag	UNP B6YT87
B	-6	PHE	-	expression tag	UNP B6YT87
B	-5	GLN	-	expression tag	UNP B6YT87
B	-4	GLY	-	expression tag	UNP B6YT87
B	-3	HIS	-	expression tag	UNP B6YT87
B	-2	MET	-	expression tag	UNP B6YT87
B	-1	ALA	-	expression tag	UNP B6YT87
B	0	SER	-	expression tag	UNP B6YT87

- Molecule 2 is ALANINE (CCD ID: ALA) (formula: $C_3H_7NO_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			6	3	1	2		
2	B	1	Total	C	N	O	0	0
			6	3	1	2		

- Molecule 3 is PYRIDOXAL-5'-PHOSPHATE (CCD ID: PLP) (formula: $C_8H_{10}NO_6P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
3	B	1	Total	C	N	O	P	0	0
			15	8	1	5	1		

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		

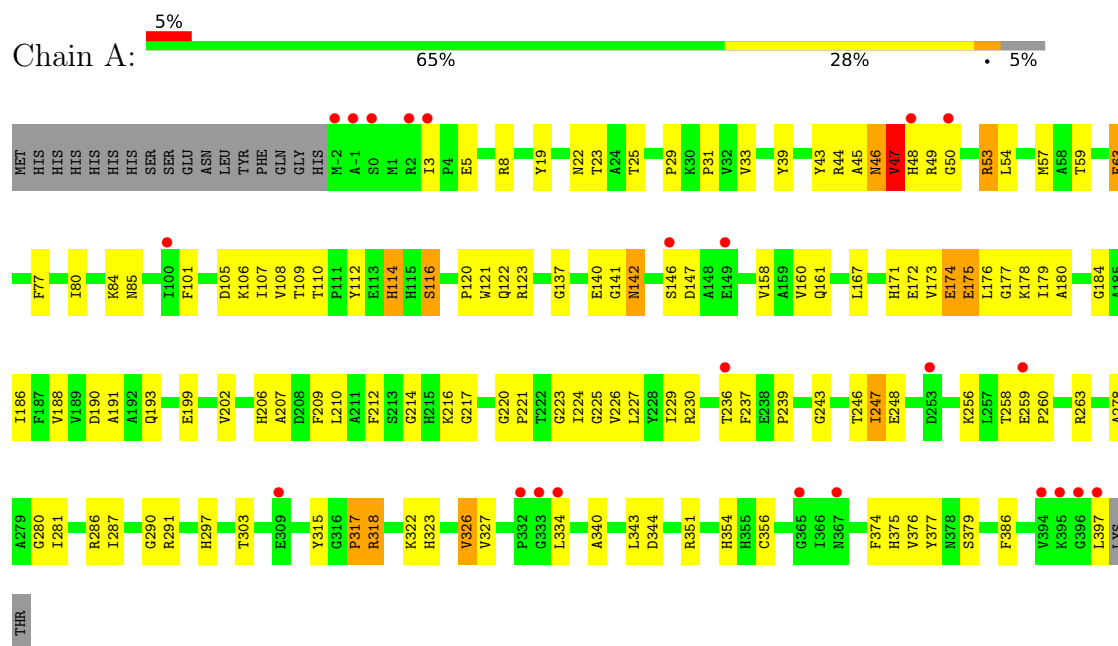
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	254	Total	O	0	0
			254	254		
6	B	291	Total	O	0	0
			291	291		

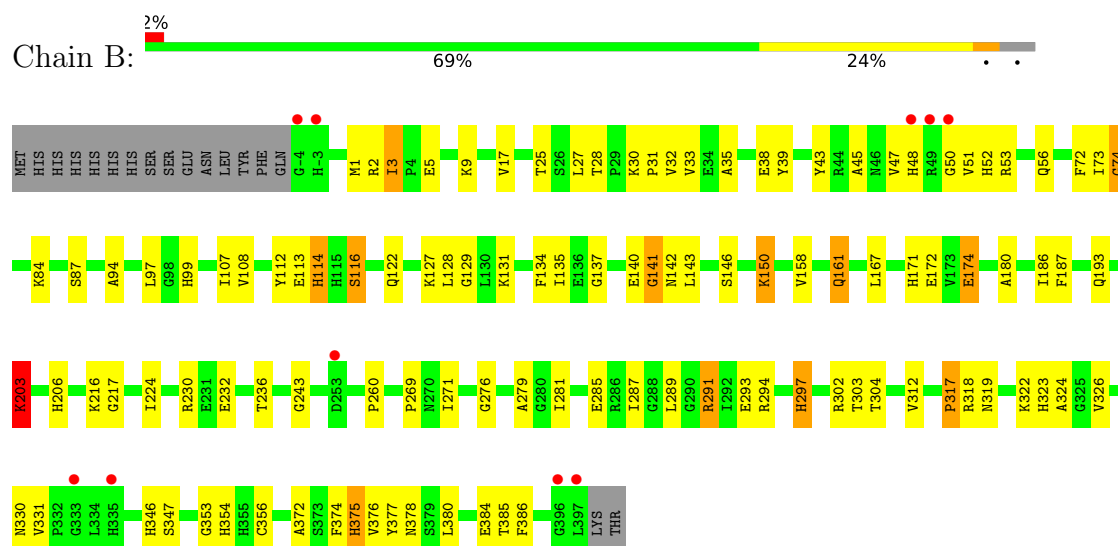
3 Residue-property plots [i](#)

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: Cysteine desulfurase



• Molecule 1: Cysteine desulfurase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	62.94Å 78.72Å 171.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.16 – 1.50 49.16 – 1.50	Depositor EDS
% Data completeness (in resolution range)	94.1 (49.16-1.50) 94.0 (49.16-1.50)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.66 (at 1.50Å)	Xtriage
Refinement program	REFMAC 5.8.0135	Depositor
R, R_{free}	0.167 , 0.194 0.171 , 0.196	Depositor DCC
R_{free} test set	6444 reflections (4.72%)	wwPDB-VP
Wilson B-factor (Å ²)	16.3	Xtriage
Anisotropy	0.039	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 35.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6853	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.16% 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, PLP, EDO, CSS

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	1.87	90/3180 (2.8%)	1.37	21/4297 (0.5%)
1	B	1.90	77/3195 (2.4%)	1.40	18/4317 (0.4%)
All	All	1.88	167/6375 (2.6%)	1.38	39/8614 (0.5%)

All (167) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	243	GLY	C-O	9.38	1.30	1.23
1	B	28	THR	C-O	-8.18	1.15	1.24
1	B	291	ARG	C-O	-8.14	1.14	1.24
1	B	45	ALA	C-O	-8.07	1.15	1.23
1	B	107	ILE	C-O	-7.85	1.15	1.24
1	A	77	PHE	C-O	7.83	1.33	1.24
1	B	43	TYR	C-O	-7.81	1.15	1.24
1	B	353	GLY	C-O	-7.71	1.13	1.23
1	B	297	HIS	C-O	-7.65	1.15	1.24
1	A	278	ALA	C-O	7.63	1.33	1.24
1	A	216	LYS	C-O	-7.58	1.14	1.24
1	B	385	THR	C-O	-7.57	1.15	1.24
1	A	54	LEU	C-O	-7.44	1.15	1.24
1	A	260	PRO	C-O	-7.43	1.18	1.25
1	A	220	GLY	C-O	-7.38	1.14	1.24
1	A	226	VAL	C-O	-7.30	1.16	1.24
1	A	172	GLU	C-O	-7.30	1.15	1.23
1	B	161	GLN	C-O	-7.21	1.15	1.23
1	B	224	ILE	C-N	-7.11	1.26	1.34
1	A	114	HIS	C-O	-7.02	1.15	1.23
1	B	137	GLY	C-O	-7.01	1.16	1.23
1	A	186	ILE	C-O	-6.93	1.15	1.24
1	A	23	THR	C-O	-6.86	1.15	1.24
1	B	319	ASN	N-CA	-6.85	1.37	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	263	ARG	C-O	-6.85	1.15	1.24
1	A	179	ILE	C-O	-6.83	1.16	1.24
1	B	317	PRO	C-O	-6.83	1.15	1.23
1	B	322	LYS	CA-CB	6.83	1.62	1.53
1	A	3	ILE	C-O	-6.77	1.17	1.23
1	B	377	TYR	C-O	-6.72	1.15	1.24
1	A	84	LYS	C-O	-6.62	1.15	1.24
1	B	312	VAL	C-O	-6.62	1.16	1.24
1	A	351	ARG	C-O	-6.59	1.15	1.23
1	B	51	VAL	C-O	-6.58	1.16	1.24
1	A	177	GLY	C-O	-6.56	1.15	1.23
1	A	209	PHE	C-O	-6.55	1.16	1.23
1	A	63	GLU	C-O	-6.53	1.16	1.24
1	B	94	ALA	C-O	6.53	1.31	1.24
1	A	147	ASP	C-O	-6.53	1.16	1.24
1	A	221	PRO	C-O	-6.52	1.15	1.23
1	A	191	ALA	N-CA	-6.52	1.38	1.46
1	B	324	ALA	C-O	-6.49	1.17	1.23
1	A	343	LEU	C-O	-6.46	1.16	1.24
1	A	291	ARG	C-O	-6.39	1.16	1.24
1	B	386	PHE	C-O	-6.38	1.16	1.24
1	A	45	ALA	C-O	-6.37	1.16	1.23
1	A	173	VAL	C-O	-6.36	1.16	1.24
1	A	176	LEU	C-O	-6.36	1.16	1.24
1	B	230	ARG	CD-NE	-6.36	1.37	1.46
1	B	73	ILE	C-O	-6.36	1.15	1.24
1	B	134	PHE	C-O	6.35	1.31	1.24
1	A	317	PRO	C-O	-6.34	1.16	1.23
1	B	260	PRO	CA-C	-6.33	1.48	1.51
1	A	47	VAL	C-O	-6.33	1.16	1.24
1	B	17	VAL	C-O	-6.32	1.17	1.23
1	B	129	GLY	C-O	-6.31	1.15	1.23
1	A	229	ILE	C-O	-6.29	1.17	1.24
1	A	39	TYR	C-O	-6.29	1.16	1.24
1	B	140	GLU	C-O	-6.29	1.15	1.24
1	A	8	ARG	C-O	-6.28	1.16	1.24
1	B	285	GLU	N-CA	6.24	1.54	1.46
1	B	72	PHE	C-O	-6.24	1.16	1.24
1	A	207	ALA	C-O	-6.22	1.16	1.23
1	B	32	VAL	C-O	-6.20	1.16	1.24
1	B	97	LEU	C-O	-6.18	1.15	1.24
1	A	121	TRP	C-O	-6.06	1.16	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	326	VAL	C-O	-6.00	1.17	1.24
1	B	380	LEU	C-O	-5.97	1.16	1.24
1	A	258	THR	C-O	-5.96	1.17	1.23
1	B	31	PRO	C-O	-5.96	1.16	1.24
1	B	141	GLY	C-O	-5.95	1.15	1.24
1	A	227	LEU	C-O	-5.95	1.17	1.24
1	B	158	VAL	CA-CB	-5.93	1.47	1.54
1	A	43	TYR	C-O	-5.93	1.17	1.24
1	B	216	LYS	C-O	-5.92	1.16	1.24
1	B	131	LYS	C-O	-5.90	1.16	1.24
1	A	315	TYR	C-O	-5.87	1.16	1.23
1	A	223	GLY	C-O	-5.86	1.16	1.24
1	B	33	VAL	C-O	-5.81	1.17	1.24
1	B	39	TYR	C-O	-5.79	1.17	1.24
1	B	318	ARG	C-O	-5.78	1.16	1.24
1	B	372	ALA	C-O	-5.78	1.17	1.24
1	A	224	ILE	C-O	-5.78	1.18	1.24
1	B	30	LYS	CA-C	-5.78	1.45	1.52
1	A	374	PHE	C-O	-5.74	1.16	1.23
1	B	135	ILE	C-O	-5.74	1.17	1.24
1	B	302	ARG	C-O	-5.72	1.17	1.24
1	A	210	LEU	C-O	-5.71	1.16	1.23
1	A	225	GLY	C-O	-5.71	1.15	1.23
1	A	160	VAL	C-O	-5.71	1.18	1.23
1	B	56	GLN	C-O	5.67	1.30	1.24
1	A	146	SER	C-O	-5.66	1.17	1.24
1	B	203	LYS	N-CA	5.64	1.53	1.46
1	A	256	LYS	CA-C	5.64	1.59	1.52
1	B	186	ILE	CA-CB	-5.62	1.47	1.54
1	B	25	THR	C-O	-5.61	1.16	1.23
1	A	109	THR	C-O	-5.60	1.17	1.24
1	B	285	GLU	C-O	5.60	1.31	1.24
1	A	158	VAL	N-CA	-5.59	1.39	1.46
1	A	105	ASP	C-O	-5.59	1.17	1.23
1	B	384	GLU	C-O	-5.58	1.17	1.24
1	A	175	GLU	N-CA	5.56	1.52	1.46
1	A	344	ASP	C-O	-5.56	1.17	1.24
1	A	327	VAL	C-O	-5.55	1.17	1.24
1	A	44	ARG	C-O	-5.55	1.17	1.24
1	A	85	ASN	C-O	-5.54	1.18	1.24
1	B	378	ASN	C-O	-5.53	1.17	1.23
1	A	167	LEU	C-O	-5.51	1.17	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	375	HIS	C-O	-5.51	1.16	1.23
1	A	80	ILE	N-CA	5.51	1.53	1.46
1	B	27	LEU	C-O	-5.51	1.16	1.23
1	A	318	ARG	C-O	-5.51	1.17	1.24
1	B	9	LYS	C-O	-5.49	1.17	1.24
1	A	101	PHE	C-O	-5.49	1.17	1.23
1	A	188	VAL	N-CA	5.47	1.52	1.46
1	A	19	TYR	C-O	-5.47	1.17	1.23
1	A	214	GLY	C-O	-5.47	1.16	1.23
1	A	246	THR	C-O	-5.46	1.16	1.23
1	A	379	SER	C-O	-5.46	1.16	1.23
1	A	212	PHE	C-O	-5.45	1.17	1.23
1	B	116	SER	C-O	-5.44	1.17	1.24
1	A	174	GLU	C-O	-5.43	1.17	1.24
1	B	74	GLY	C-O	5.41	1.31	1.23
1	A	120	PRO	C-O	-5.40	1.17	1.24
1	B	281	ILE	CA-CB	-5.40	1.47	1.54
1	A	281	ILE	N-CA	5.38	1.52	1.46
1	A	230	ARG	N-CA	5.36	1.52	1.46
1	A	25	THR	C-O	-5.35	1.17	1.23
1	A	243	GLY	CA-C	-5.35	1.46	1.52
1	A	286	ARG	C-O	5.34	1.30	1.24
1	A	184	GLY	C-O	-5.34	1.16	1.23
1	B	269	PRO	CA-C	-5.34	1.46	1.52
1	B	331	VAL	C-O	-5.34	1.18	1.24
1	B	108	VAL	CA-CB	-5.33	1.47	1.54
1	B	143	LEU	C-O	-5.33	1.17	1.23
1	A	108	VAL	C-O	-5.32	1.18	1.24
1	B	142	ASN	C-O	-5.32	1.17	1.24
1	A	377	TYR	C-O	-5.31	1.17	1.24
1	B	330	ASN	C-O	-5.31	1.17	1.23
1	B	146	SER	C-O	-5.30	1.18	1.24
1	B	128	LEU	C-O	-5.28	1.16	1.23
1	A	386	PHE	C-O	-5.27	1.18	1.24
1	B	113	GLU	C-O	-5.26	1.17	1.23
1	B	303	THR	CA-CB	5.24	1.61	1.53
1	B	122	GLN	CA-C	-5.23	1.46	1.52
1	A	22	ASN	C-O	-5.18	1.17	1.24
1	A	116	SER	C-O	-5.17	1.17	1.24
1	B	150	LYS	C-O	-5.17	1.18	1.24
1	B	279	ALA	CA-C	-5.16	1.46	1.52
1	A	142	ASN	C-O	-5.15	1.18	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	259	GLU	C-O	-5.13	1.17	1.23
1	A	137	GLY	CA-C	-5.13	1.46	1.51
1	B	38	GLU	C-O	-5.12	1.18	1.24
1	B	5	GLU	C-O	-5.12	1.18	1.24
1	A	107	ILE	C-O	-5.11	1.18	1.24
1	B	84	LYS	C-O	-5.10	1.17	1.24
1	B	174	GLU	C-O	-5.10	1.18	1.24
1	B	172	GLU	C-O	-5.10	1.18	1.23
1	B	87	SER	C-O	5.08	1.29	1.24
1	A	287	ILE	C-O	5.06	1.29	1.24
1	A	202	VAL	N-CA	-5.04	1.40	1.46
1	A	237	PHE	C-O	-5.04	1.18	1.24
1	A	199	GLU	C-O	-5.03	1.17	1.23
1	A	236	THR	C-O	-5.02	1.17	1.24
1	A	303	THR	CA-CB	5.01	1.61	1.53
1	A	259	GLU	C-N	5.01	1.38	1.33
1	A	122	GLN	C-O	-5.00	1.18	1.24

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	5	GLU	N-CA-C	8.19	121.24	111.33
1	A	340	ALA	CA-C-O	7.60	128.61	120.55
1	A	50	GLY	N-CA-C	-7.58	103.99	112.33
1	B	374	PHE	N-CA-C	7.16	120.76	109.81
1	A	33	VAL	O-C-N	-6.70	115.38	121.87
1	B	5	GLU	N-CA-C	6.70	119.14	111.11
1	B	50	GLY	N-CA-C	-6.56	104.39	111.93
1	B	52	HIS	N-CA-C	6.30	118.85	110.53
1	B	127	LYS	N-CA-C	6.20	118.04	111.28
1	B	276	GLY	O-C-N	6.17	128.12	122.19
1	A	374	PHE	N-CA-C	6.12	119.17	109.81
1	A	248	GLU	N-CA-C	-6.04	105.94	113.55
1	A	247	ILE	N-CA-C	6.04	118.56	109.20
1	A	3	ILE	C-N-CD	5.94	133.67	120.60
1	B	27	LEU	N-CA-C	-5.85	102.66	110.55
1	B	304	THR	O-C-N	5.83	128.30	122.12
1	B	187	PHE	O-C-N	5.75	130.06	123.27
1	A	114	HIS	N-CA-C	-5.71	102.44	110.50
1	B	236	THR	N-CA-C	-5.56	106.42	113.43
1	A	110	THR	CA-C-N	-5.53	114.31	120.45
1	A	110	THR	C-N-CA	-5.53	114.31	120.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	340	ALA	N-CA-C	5.51	117.29	111.28
1	B	35	ALA	CA-C-O	5.48	126.36	120.55
1	A	379	SER	N-CA-C	5.45	118.47	109.85
1	A	180	ALA	N-CA-C	5.38	117.15	111.28
1	A	53	ARG	N-CA-C	5.36	117.87	111.71
1	B	113	GLU	N-CA-C	5.34	117.97	110.23
1	B	53	ARG	N-CA-C	5.32	117.08	111.28
1	A	173	VAL	N-CA-C	5.21	115.93	110.62
1	B	114	HIS	N-CA-C	-5.21	103.16	110.50
1	B	167	LEU	N-CA-C	5.20	119.68	113.23
1	A	239	PRO	CA-C-N	-5.13	114.37	119.56
1	A	239	PRO	C-N-CA	-5.13	114.37	119.56
1	A	123	ARG	NE-CZ-NH1	-5.12	116.38	121.50
1	A	106	LYS	N-CA-C	5.08	117.77	109.59
1	B	271	ILE	O-C-N	-5.07	116.94	121.91
1	A	280	GLY	CA-C-O	-5.02	115.58	120.75
1	B	180	ALA	CA-C-O	-5.00	115.12	120.42
1	B	3	ILE	C-N-CD	5.00	131.60	120.60

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	3121	0	3127	40	0
1	B	3135	0	3137	34	0
2	A	6	0	4	2	0
2	B	6	0	4	1	0
3	A	15	0	6	4	0
3	B	15	0	6	2	0
4	A	6	0	8	0	0
5	A	4	0	6	3	0
6	A	254	0	0	8	0
6	B	291	0	0	13	2
All	All	6853	0	6298	76	2

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 6.

All (76) 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:178:LYS:HD3	6:A:664:HOH:O	1.19	1.30
1:A:161:GLN:HE21	1:A:171:HIS:HE1	1.25	0.85
1:B:114:HIS:HD2	1:B:116:SER:H	1.25	0.85
1:A:46:ASN:HD22	1:A:47:VAL:H	1.25	0.84
2:A:400:ALA:N	3:A:401:PLP:C4A	2.41	0.84
1:A:114:HIS:HD2	1:A:116:SER:H	1.26	0.82
1:A:375:HIS:CD2	1:A:376:VAL:H	1.99	0.80
1:A:375:HIS:HD2	1:A:376:VAL:H	1.30	0.78
1:A:53:ARG:NH2	1:B:347:SER:OG	2.18	0.77
1:B:161:GLN:HE21	1:B:171:HIS:HE1	1.32	0.77
1:B:375:HIS:CD2	1:B:376:VAL:H	2.03	0.77
1:B:375:HIS:HD2	1:B:376:VAL:H	1.33	0.74
1:A:178:LYS:HG2	1:A:206:HIS:CE1	2.22	0.74
1:A:114:HIS:CD2	1:A:116:SER:H	2.05	0.73
1:B:114:HIS:CD2	1:B:116:SER:H	2.06	0.73
1:B:1:MET:HE1	1:B:287:ILE:HG12	1.75	0.67
1:A:161:GLN:HE21	1:A:171:HIS:CE1	2.10	0.67
2:B:401:ALA:HB3	6:B:756:HOH:O	1.95	0.67
2:A:400:ALA:HB3	6:A:724:HOH:O	1.95	0.65
1:B:48:HIS:HD2	6:B:703:HOH:O	1.81	0.63
1:B:323:HIS:HE1	1:B:326:VAL:O	1.82	0.63
1:B:294:ARG:HG3	6:B:501:HOH:O	1.98	0.63
1:B:1:MET:HE2	1:B:3:ILE:HD11	1.81	0.62
1:A:49:ARG:HG2	1:A:59:THR:HG21	1.83	0.61
1:B:161:GLN:HE21	1:B:171:HIS:CE1	2.15	0.60
1:B:112:TYR:CZ	1:B:141:GLY:HA2	2.38	0.58
1:A:206:HIS:HE1	6:A:664:HOH:O	1.87	0.58
1:A:171:HIS:HD2	6:A:541:HOH:O	1.86	0.57
1:A:217:GLY:O	1:A:375:HIS:HE1	1.88	0.56
1:B:217:GLY:O	1:B:375:HIS:HE1	1.88	0.56
1:A:323:HIS:HE1	1:A:326:VAL:O	1.89	0.56
1:B:1:MET:CE	1:B:3:ILE:HD11	2.36	0.55
1:B:174:GLU:HG3	6:B:657:HOH:O	2.07	0.55
1:A:247:ILE:C	1:A:247:ILE:HD12	2.32	0.55
1:B:297:HIS:HE1	6:B:753:HOH:O	1.89	0.54
1:B:317:PRO:O	1:B:323:HIS:HD2	1.90	0.54
1:A:193:GLN:HG2	3:A:401:PLP:O3	2.08	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:46:ASN:HD22	1:A:47:VAL:N	2.00	0.53
1:A:57:MET:HE3	6:A:739:HOH:O	2.08	0.53
1:B:206:HIS:HE1	6:B:754:HOH:O	1.92	0.53
1:A:175:GLU:HA	1:A:178:LYS:HE2	1.90	0.52
1:B:48:HIS:CD2	6:B:703:HOH:O	2.60	0.51
1:B:2:ARG:HH11	1:B:2:ARG:HG3	1.75	0.51
1:A:317:PRO:O	1:A:323:HIS:HD2	1.93	0.50
1:B:114:HIS:HE1	6:B:756:HOH:O	1.95	0.49
1:B:171:HIS:HD2	6:B:632:HOH:O	1.96	0.49
1:A:178:LYS:CG	1:A:206:HIS:CE1	2.95	0.48
1:A:142:ASN:HD22	1:A:322:LYS:NZ	2.10	0.48
1:B:289:LEU:O	1:B:293:GLU:HG3	2.13	0.48
1:B:323:HIS:CE1	1:B:326:VAL:O	2.64	0.48
1:B:354:HIS:HD2	1:B:356:CSS:N	2.11	0.48
1:B:74:GLY:O	1:B:203:LYS:HE3	2.14	0.47
1:A:290:GLY:HA3	5:A:403:EDO:H11	1.97	0.47
1:B:193:GLN:HG2	3:B:400:PLP:O3	2.15	0.47
1:B:193:GLN:NE2	3:B:400:PLP:O3	2.35	0.46
1:B:150:LYS:HE3	6:B:681:HOH:O	2.15	0.46
1:A:193:GLN:NE2	3:A:401:PLP:O3	2.38	0.46
1:A:375:HIS:CD2	1:A:376:VAL:N	2.79	0.46
1:A:29:PRO:HB2	1:A:31:PRO:HD2	1.97	0.45
1:B:294:ARG:NH1	6:B:501:HOH:O	2.44	0.45
1:A:112:TYR:CZ	1:A:141:GLY:HA2	2.52	0.45
1:A:354:HIS:HD2	1:A:356:CSS:N	2.15	0.44
1:A:140:GLU:OE2	1:A:318:ARG:HG2	2.17	0.44
1:B:346:HIS:HD2	6:B:771:HOH:O	2.01	0.44
1:A:174:GLU:O	1:A:178:LYS:HG3	2.18	0.44
1:A:290:GLY:H	5:A:403:EDO:H11	1.85	0.42
1:A:323:HIS:CE1	1:A:326:VAL:O	2.70	0.42
1:A:375:HIS:HD2	1:A:376:VAL:N	2.09	0.42
1:B:99:HIS:HD2	6:B:665:HOH:O	2.03	0.41
1:A:297:HIS:HD2	6:A:645:HOH:O	2.02	0.41
1:B:287:ILE:O	1:B:291:ARG:HD2	2.21	0.41
1:A:48:HIS:HE1	6:A:545:HOH:O	2.03	0.41
1:A:290:GLY:H	5:A:403:EDO:C1	2.34	0.41
1:A:190:ASP:OD2	3:A:401:PLP:N1	2.54	0.40
1:A:114:HIS:HE1	6:A:724:HOH:O	2.04	0.40
1:A:49:ARG:NH2	1:A:63:GLU:OE2	2.55	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:B:605:HOH:O	6:B:746:HOH:O[1_455]	1.84	0.36
6:B:678:HOH:O	6:B:746:HOH:O[1_455]	2.12	0.08

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	397/419 (95%)	392 (99%)	4 (1%)	1 (0%)	36	17
1	B	399/419 (95%)	393 (98%)	5 (1%)	1 (0%)	36	17
All	All	796/838 (95%)	785 (99%)	9 (1%)	2 (0%)	36	17

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	47	VAL
1	A	47	VAL

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	332/350 (95%)	329 (99%)	3 (1%)	70	49
1	B	333/350 (95%)	331 (99%)	2 (1%)	78	62
All	All	665/700 (95%)	660 (99%)	5 (1%)	73	54

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	ASN
1	A	334	LEU
1	A	397	LEU
1	B	203	LYS
1	B	232	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	ASN
1	A	46	ASN
1	A	48	HIS
1	A	114	HIS
1	A	142	ASN
1	A	161	GLN
1	A	171	HIS
1	A	206	HIS
1	A	295	GLN
1	A	297	HIS
1	A	323	HIS
1	A	330	ASN
1	A	354	HIS
1	A	375	HIS
1	B	114	HIS
1	B	142	ASN
1	B	161	GLN
1	B	171	HIS
1	B	193	GLN
1	B	206	HIS
1	B	297	HIS
1	B	323	HIS
1	B	346	HIS
1	B	354	HIS
1	B	375	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	CSS	B	356	1	4,6,7	1.21	0	2,6,8	0.99	0
1	CSS	A	356	1	4,6,7	0.82	0	2,6,8	0.50	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
1	CSS	B	356	1	-	0/1/5/7	-
1	CSS	A	356	1	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	356	CSS	1	0
1	A	356	CSS	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

6 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$
2	ALA	A	400	-	5,5,5	0.96	0	6,6,6	0.99	0
2	ALA	B	401	3	5,5,5	1.24	1 (20%)	6,6,6	2.65	5 (83%)
5	EDO	A	403	-	3,3,3	0.22	0	2,2,2	1.33	0
3	PLP	B	400	2,1	15,15,16	1.45	2 (13%)	21,22,23	2.02	6 (28%)
3	PLP	A	401	1	15,15,16	2.64	5 (33%)	21,22,23	2.32	7 (33%)
4	GOL	A	402	-	5,5,5	0.92	0	5,5,5	1.50	1 (20%)

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
2	ALA	A	400	-	-	2/4/4/4	-
2	ALA	B	401	3	-	2/4/4/4	-
5	EDO	A	403	-	-	1/1/1/1	-
3	PLP	B	400	2,1	-	0/6/6/8	0/1/1/1
3	PLP	A	401	1	-	0/6/6/8	0/1/1/1
4	GOL	A	402	-	-	0/4/4/4	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	401	PLP	C3-C2	6.06	1.47	1.41
3	A	401	PLP	C5-C4	5.00	1.46	1.40
3	A	401	PLP	C3-C4	4.06	1.47	1.40
3	B	400	PLP	C4A-C4	3.42	1.58	1.51
3	A	401	PLP	P-O2P	-3.11	1.43	1.54
3	A	401	PLP	P-O3P	-2.62	1.45	1.54
3	B	400	PLP	P-O3P	-2.34	1.46	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	401	ALA	CA-N	2.16	1.54	1.48

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	401	PLP	C6-C5-C4	6.53	123.45	118.10
3	B	400	PLP	C5-C6-N1	-4.14	117.09	123.83
3	B	400	PLP	C6-N1-C2	3.92	126.31	119.20
3	A	401	PLP	C5-C6-N1	-3.76	117.71	123.83
3	B	400	PLP	C6-C5-C4	3.67	121.11	118.10
2	B	401	ALA	OXT-C-CA	3.65	126.36	113.79
3	A	401	PLP	C6-N1-C2	3.58	125.68	119.20
3	B	400	PLP	C3-C2-N1	-3.45	116.60	120.96
3	A	401	PLP	O3P-P-O2P	3.12	119.49	107.80
3	A	401	PLP	C4-C3-C2	-3.09	115.27	119.89
3	A	401	PLP	C5A-C5-C4	-3.00	116.72	122.64
2	B	401	ALA	C-CA-N	2.90	118.20	107.93
3	B	400	PLP	C4A-C4-C5	2.89	123.92	120.94
3	A	401	PLP	O3-C3-C2	2.88	123.56	117.58
2	B	401	ALA	OXT-C-O	-2.80	117.73	124.08
4	A	402	GOL	O1-C1-C2	2.63	122.20	110.38
3	B	400	PLP	C5A-C5-C4	-2.17	118.35	122.64
2	B	401	ALA	CB-CA-C	-2.13	105.52	110.29
2	B	401	ALA	O-C-CA	-2.10	115.60	122.07

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	401	ALA	O-C-CA-CB
5	A	403	EDO	O1-C1-C2-O2
2	A	400	ALA	O-C-CA-CB
2	A	400	ALA	OXT-C-CA-CB
2	B	401	ALA	OXT-C-CA-CB

There are no ring outliers.

5 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	400	ALA	2	0
2	B	401	ALA	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	403	EDO	3	0
3	B	400	PLP	2	0
3	A	401	PLP	4	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	399/419 (95%)	0.50	23 (5%) 29 31	10, 19, 36, 54	0
1	B	401/419 (95%)	0.14	10 (2%) 58 62	9, 16, 29, 46	0
All	All	800/838 (95%)	0.32	33 (4%) 41 45	9, 18, 34, 54	0

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	397	LEU	6.3
1	A	-1	ALA	4.4
1	A	0	SER	4.1
1	B	49	ARG	4.1
1	B	48	HIS	3.5
1	B	397	LEU	3.3
1	A	333	GLY	3.2
1	B	-4	GLY	3.1
1	A	-2	MET	2.9
1	A	259	GLU	2.8
1	B	335	HIS	2.8
1	A	48	HIS	2.8
1	A	395	LYS	2.7
1	A	3	ILE	2.7
1	A	396	GLY	2.7
1	B	333	GLY	2.7
1	A	253	ASP	2.7
1	B	-3	HIS	2.6
1	A	146	SER	2.5
1	A	394	VAL	2.3
1	B	396	GLY	2.3
1	A	334	LEU	2.3
1	A	100	ILE	2.2
1	B	253	ASP	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	50	GLY	2.2
1	B	50	GLY	2.2
1	A	367	ASN	2.1
1	A	332	PRO	2.1
1	A	149	GLU	2.0
1	A	365	GLY	2.0
1	A	2	ARG	2.0
1	A	236	THR	2.0
1	A	309	GLU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	CSS	A	356	7/8	0.96	0.08	17,18,25,25	0
1	CSS	B	356	7/8	0.96	0.07	17,18,27,29	0

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
5	EDO	A	403	4/4	0.85	0.15	25,33,33,34	0
2	ALA	B	401	6/6	0.87	0.13	27,34,37,37	0
2	ALA	A	400	6/6	0.87	0.14	25,29,33,33	0
4	GOL	A	402	6/6	0.89	0.11	20,22,25,29	0
3	PLP	A	401	15/16	0.97	0.08	12,24,32,36	0
3	PLP	B	400	15/16	0.98	0.08	11,21,33,34	0

6.5 Other polymers [i](#)

There are no such residues in this entry.