Full wwPDB X-ray Structure Validation Report (i)

Oct 4, 2023 – 12:19 AM EDT

PDB ID	:	6PD1
Title	:	PntC-AEPT: fusion protein of phosphonate-specific cytidylyltransferase and 2 -aminoethylphosphonate (AEP) transaminase from Treponema denticola
Authors	:	Suits, M.D.L.; Whiteside, J.
Deposited on	:	2019-06-18
Resolution	:	2.72 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 (i) 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 (i)) were used in the production of this report:

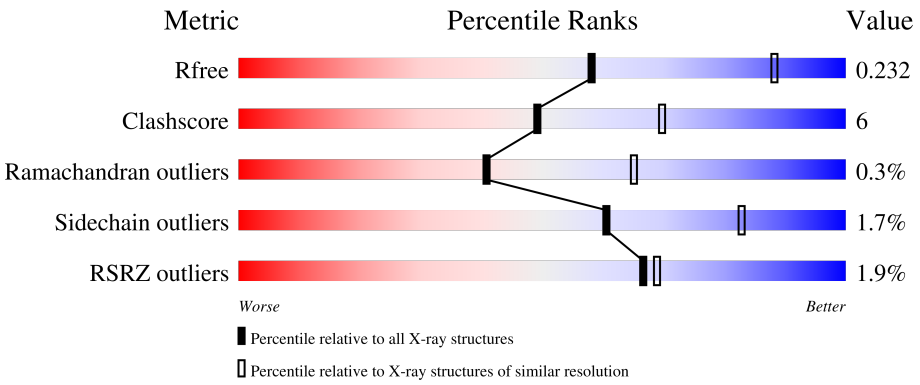
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.72 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}	130704	3359 (2.74-2.70)
Clashscore	141614	3686 (2.74-2.70)
Ramachandran outliers	138981	3622 (2.74-2.70)
Sidechain outliers	138945	3623 (2.74-2.70)
RSRZ outliers	127900	3276 (2.74-2.70)

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 <=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	624	2% 83% 14% • •
1	B	624	86% 11% •
1	C	624	2% 84% 13% • •
1	D	624	2% 82% 15% • •

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
4	EDO	C	1101	-	-	-	X

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 19503 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 Nucleotidyl transferase/aminotransferase, class V.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	613	4817	3077	795	910	35	0	0	0
1	B	607	4769	3047	785	902	35	0	0	0
1	C	617	4858	3101	807	915	35	0	0	0
1	D	611	4797	3065	789	908	35	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	617	LEU	-	expression tag	UNP Q73MU2
A	618	GLU	-	expression tag	UNP Q73MU2
A	619	HIS	-	expression tag	UNP Q73MU2
A	620	HIS	-	expression tag	UNP Q73MU2
A	621	HIS	-	expression tag	UNP Q73MU2
A	622	HIS	-	expression tag	UNP Q73MU2
A	623	HIS	-	expression tag	UNP Q73MU2
A	624	HIS	-	expression tag	UNP Q73MU2
B	617	LEU	-	expression tag	UNP Q73MU2
B	618	GLU	-	expression tag	UNP Q73MU2
B	619	HIS	-	expression tag	UNP Q73MU2
B	620	HIS	-	expression tag	UNP Q73MU2
B	621	HIS	-	expression tag	UNP Q73MU2
B	622	HIS	-	expression tag	UNP Q73MU2
B	623	HIS	-	expression tag	UNP Q73MU2
B	624	HIS	-	expression tag	UNP Q73MU2
C	617	LEU	-	expression tag	UNP Q73MU2
C	618	GLU	-	expression tag	UNP Q73MU2
C	619	HIS	-	expression tag	UNP Q73MU2
C	620	HIS	-	expression tag	UNP Q73MU2
C	621	HIS	-	expression tag	UNP Q73MU2

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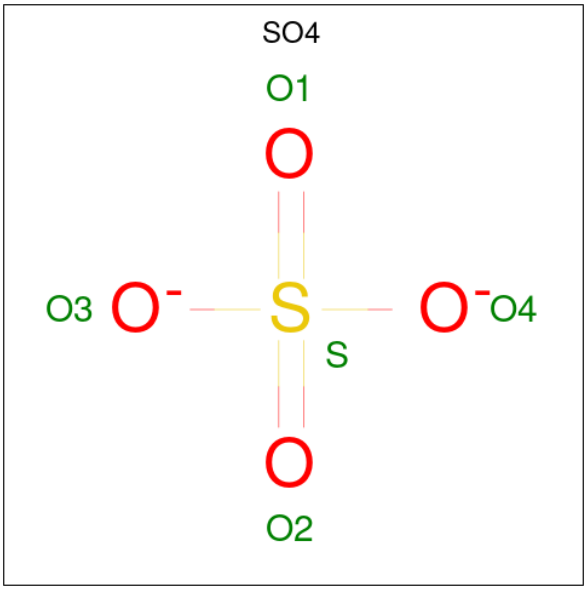
Chain	Residue	Modelled	Actual	Comment	Reference
C	622	HIS	-	expression tag	UNP Q73MU2
C	623	HIS	-	expression tag	UNP Q73MU2
C	624	HIS	-	expression tag	UNP Q73MU2
D	617	LEU	-	expression tag	UNP Q73MU2
D	618	GLU	-	expression tag	UNP Q73MU2
D	619	HIS	-	expression tag	UNP Q73MU2
D	620	HIS	-	expression tag	UNP Q73MU2
D	621	HIS	-	expression tag	UNP Q73MU2
D	622	HIS	-	expression tag	UNP Q73MU2
D	623	HIS	-	expression tag	UNP Q73MU2
D	624	HIS	-	expression tag	UNP Q73MU2

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

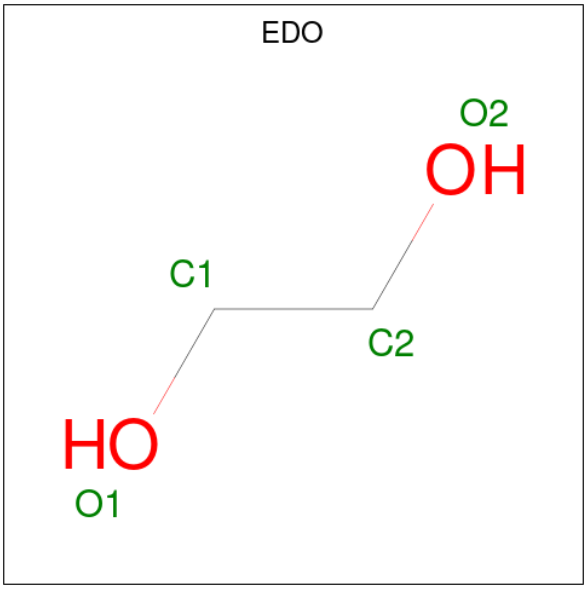
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
2	A	1	1	1	0	0
2	B	1	1	1	0	0
2	C	1	1	1	0	0
2	D	1	1	1	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



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

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



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

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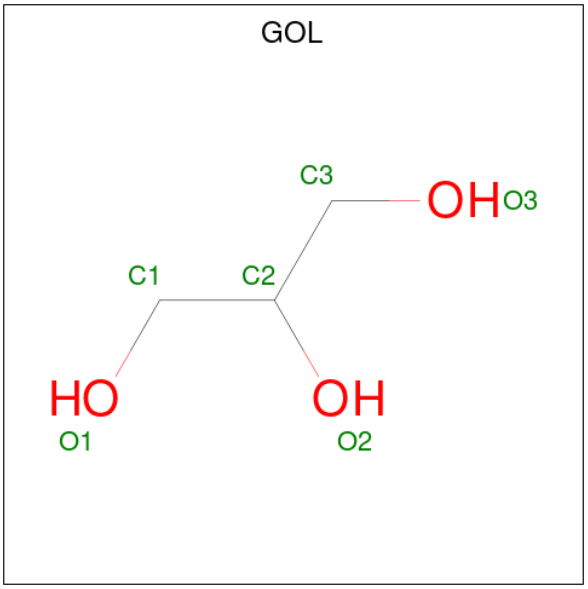
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
4	A	1	4	2	2	0	0
			Total	C	O		
4	B	1	4	2	2	0	0
			Total	C	O		
4	C	1	4	2	2	0	0
			Total	C	O		
4	C	1	4	2	2	0	0
			Total	C	O		
4	D	1	4	2	2	0	0

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ni		
6	C	1	1	1	0	0

- Molecule 7 is water.

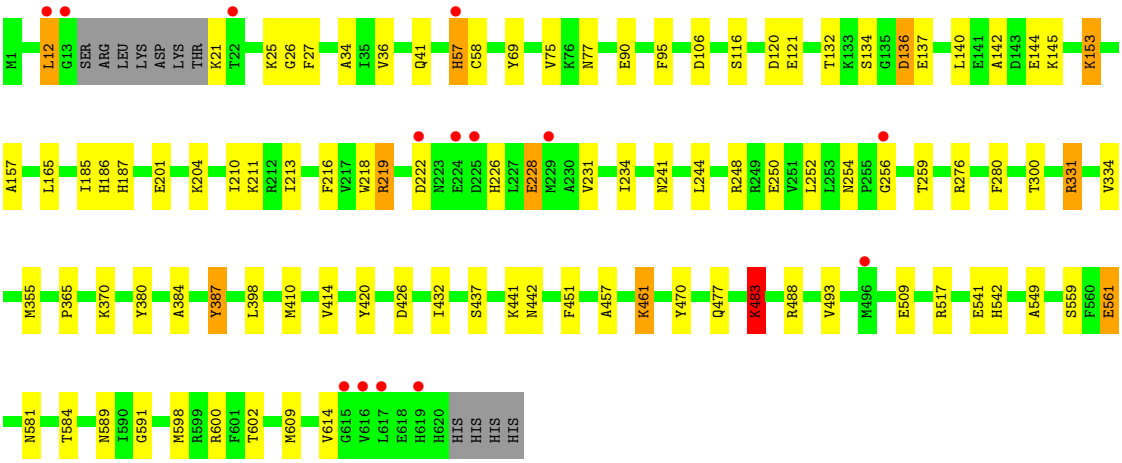
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	49	49	49	0	0
			Total	O		
7	B	47	47	47	0	0
			Total	O		
7	C	38	38	38	0	0
			Total	O		
7	D	38	38	38	0	0

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.

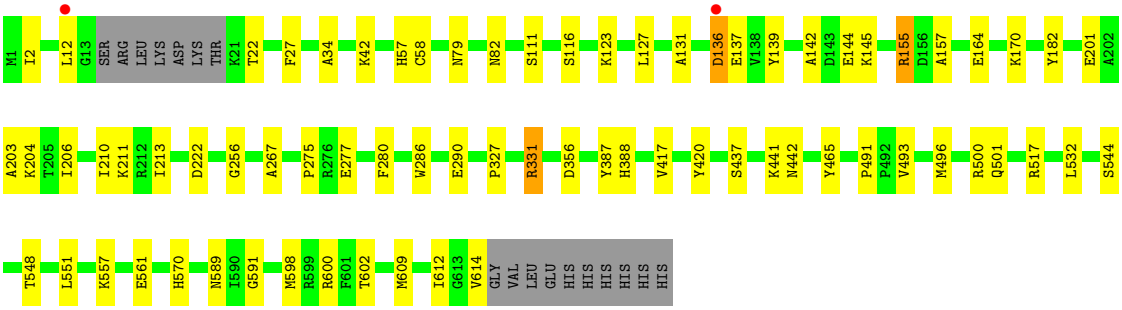
• Molecule 1: Nucleotidyl transferase/aminotransferase, class V

Chain A:



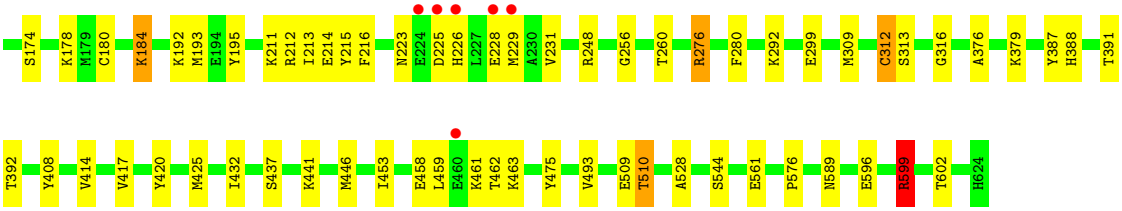
• Molecule 1: Nucleotidyl transferase/aminotransferase, class V

Chain B:



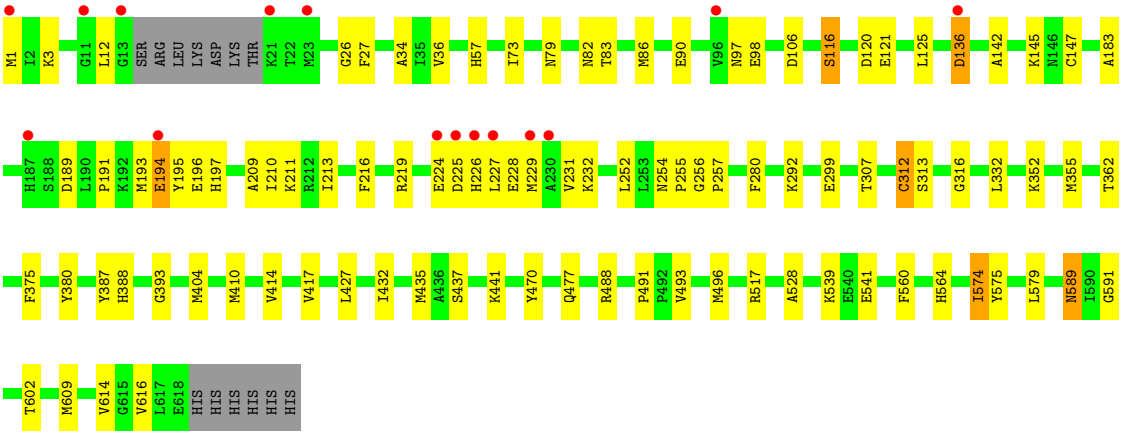
• Molecule 1: Nucleotidyl transferase/aminotransferase, class V

Chain C:



- Molecule 1: Nucleotidyl transferase/aminotransferase, class V

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	89.05Å 129.01Å 135.80Å 90.00° 92.99° 90.00°	Depositor
Resolution (Å)	38.00 – 2.72 135.61 – 2.72	Depositor EDS
% Data completeness (in resolution range)	99.8 (38.00-2.72) 99.8 (135.61-2.72)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.23 (at 2.73Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.199 , 0.233 0.199 , 0.232	Depositor DCC
R_{free} test set	4104 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	51.1	Xtriage
Anisotropy	0.311	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 47.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.023 for h,-k,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	19503	wwPDB-VP
Average B, all atoms (Å^2)	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.69% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: SO4, EDO, GOL, NI, MG

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	0.34	3/4912 (0.1%)	0.58	9/6639 (0.1%)
1	B	0.30	1/4862 (0.0%)	0.50	1/6571 (0.0%)
1	C	0.31	0/4957	0.58	7/6699 (0.1%)
1	D	0.36	2/4890 (0.0%)	0.63	10/6609 (0.2%)
All	All	0.33	6/19621 (0.0%)	0.57	27/26518 (0.1%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	483	LYS	CE-NZ	7.45	1.67	1.49
1	D	232	LYS	CD-CE	5.85	1.65	1.51
1	A	561	GLU	CB-CG	-5.43	1.41	1.52
1	D	232	LYS	CE-NZ	5.31	1.62	1.49
1	A	541	GLU	CD-OE2	5.15	1.31	1.25
1	B	561	GLU	CB-CG	-5.08	1.42	1.52

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	229	MET	CA-CB-CG	-12.05	92.81	113.30
1	C	248	ARG	NE-CZ-NH2	-10.63	114.98	120.30
1	D	145	LYS	CD-CE-NZ	-8.86	91.33	111.70
1	C	599	ARG	NE-CZ-NH1	8.10	124.35	120.30
1	C	599	ARG	NE-CZ-NH2	-7.79	116.40	120.30
1	A	12	LEU	CB-CG-CD2	7.57	123.88	111.00
1	D	194	GLU	CA-CB-CG	7.56	130.02	113.40
1	C	248	ARG	NE-CZ-NH1	7.52	124.06	120.30
1	D	229	MET	CB-CG-SD	7.48	134.85	112.40
1	A	461	LYS	CA-CB-CG	-7.18	97.60	113.40
1	A	483	LYS	CD-CE-NZ	-6.90	95.83	111.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	144	GLU	CA-CB-CG	6.79	128.34	113.40
1	B	561	GLU	N-CA-CB	-6.62	98.69	110.60
1	C	599	ARG	CD-NE-CZ	6.54	132.76	123.60
1	D	574	ILE	CG1-CB-CG2	-6.29	97.57	111.40
1	A	541	GLU	CA-CB-CG	6.18	126.99	113.40
1	D	73	ILE	CG1-CB-CG2	6.14	124.92	111.40
1	A	461	LYS	CB-CG-CD	6.12	127.52	111.60
1	D	136	ASP	N-CA-CB	-5.99	99.83	110.60
1	D	145	LYS	CA-CB-CG	-5.77	100.70	113.40
1	D	574	ILE	N-CA-CB	5.51	123.47	110.80
1	A	370	LYS	CA-CB-CG	5.37	125.22	113.40
1	A	12	LEU	CA-CB-CG	5.26	127.41	115.30
1	A	145	LYS	CA-CB-CG	5.26	124.97	113.40
1	C	510	THR	CA-CB-CG2	-5.15	105.19	112.40
1	A	153	LYS	CA-CB-CG	5.15	124.73	113.40
1	D	231	VAL	CG1-CB-CG2	-5.10	102.74	110.90

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	4817	0	4839	56	0
1	B	4769	0	4795	45	0
1	C	4858	0	4866	63	0
1	D	4797	0	4825	72	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	15	0	0	0	0
3	B	20	0	0	0	0
3	C	10	0	0	1	0
3	D	10	0	0	1	0
4	A	8	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	4	0	6	0	0
4	C	8	0	11	1	0
4	D	4	0	6	0	0
5	C	6	0	8	0	0
6	C	1	0	0	0	0
7	A	49	0	0	0	0
7	B	47	0	0	1	0
7	C	38	0	0	1	0
7	D	38	0	0	0	0
All	All	19503	0	19368	230	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 6.

All (230) 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:483:LYS:CE	1:A:483:LYS:NZ	1.67	1.55
1:D:224:GLU:OE2	1:D:228:GLU:OE1	1.64	1.13
1:D:86:MET:HG3	1:D:193:MET:HE3	1.37	1.02
1:C:599:ARG:O	1:C:602:THR:HG22	1.73	0.88
1:C:134:SER:HB2	1:C:226:HIS:HE1	1.40	0.86
1:A:483:LYS:NZ	1:A:483:LYS:CD	2.40	0.84
1:C:223:ASN:ND2	1:C:226:HIS:HD2	1.79	0.80
1:D:12:LEU:HD21	1:D:57:HIS:CG	2.17	0.80
1:C:86:MET:HG2	1:C:195:TYR:HA	1.64	0.80
1:A:228:GLU:HA	1:A:231:VAL:HG12	1.63	0.78
1:A:470:TYR:O	1:A:488:ARG:NH2	2.17	0.78
1:A:517:ARG:NH2	1:A:591:GLY:O	2.17	0.78
1:B:155:ARG:O	1:B:155:ARG:NH2	2.18	0.77
1:C:134:SER:HB2	1:C:226:HIS:CE1	2.20	0.77
1:C:596:GLU:OE1	1:C:599:ARG:NE	2.18	0.76
1:B:517:ARG:NH2	1:B:591:GLY:O	2.19	0.75
1:A:549:ALA:HB1	1:A:584:THR:HG21	1.69	0.74
1:D:517:ARG:NH2	1:D:591:GLY:O	2.20	0.74
1:C:509:GLU:O	1:C:510:THR:OG1	2.03	0.72
1:D:194:GLU:HG2	1:D:196:GLU:HB2	1.72	0.72
1:A:457:ALA:O	1:A:461:LYS:HG3	1.90	0.71
1:D:194:GLU:OE2	1:D:197:HIS:HB2	1.90	0.71
1:C:86:MET:HG3	1:C:193:MET:HE3	1.73	0.70
1:C:313:SER:OG	3:C:1103:SO4:O3	2.10	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:1:MET:SD	1:D:3:LYS:NZ	2.65	0.68
1:B:127:LEU:HD11	1:B:213:ILE:HD12	1.75	0.68
1:D:86:MET:HG2	1:D:195:TYR:HA	1.75	0.68
1:D:227:LEU:HD12	1:D:228:GLU:CD	2.14	0.68
1:D:560:PHE:CE1	1:D:574:ILE:HD12	2.28	0.68
1:C:391:THR:HG23	1:C:392:THR:HG23	1.75	0.67
1:B:331:ARG:CZ	1:B:356:ASP:OD1	2.24	0.65
1:B:267:ALA:HB2	1:B:501:GLN:HG3	1.78	0.65
1:D:194:GLU:CD	1:D:197:HIS:HB2	2.17	0.65
1:A:609:MET:HB3	1:A:614:VAL:HG21	1.80	0.64
1:D:120:ASP:OD2	1:D:211:LYS:NZ	2.30	0.64
1:B:12:LEU:HD23	1:B:12:LEU:H	1.64	0.63
1:C:223:ASN:HD21	1:C:226:HIS:HD2	1.46	0.62
1:D:470:TYR:O	1:D:488:ARG:NH2	2.31	0.61
1:C:223:ASN:ND2	1:C:225:ASP:HB2	2.15	0.61
1:A:559:SER:OG	1:A:561:GLU:HB2	2.01	0.61
1:A:559:SER:OG	1:A:561:GLU:OE1	2.19	0.60
1:A:331:ARG:HG2	1:A:380:TYR:HD1	1.68	0.59
1:B:609:MET:HB3	1:B:614:VAL:HB	1.85	0.59
1:B:137:GLU:HG3	1:B:139:TYR:CZ	2.38	0.59
1:C:509:GLU:C	1:C:510:THR:HG1	1.99	0.59
1:A:219:ARG:HG3	1:A:234:ILE:HG13	1.85	0.58
1:A:116:SER:OG	1:A:211:LYS:HE2	2.03	0.58
1:C:414:VAL:HG21	1:C:432:ILE:HG12	1.85	0.58
1:C:599:ARG:HA	1:C:602:THR:HG22	1.85	0.58
1:D:227:LEU:HD12	1:D:228:GLU:OE1	2.04	0.58
1:D:86:MET:HG3	1:D:193:MET:CE	2.24	0.58
1:D:227:LEU:HD12	1:D:228:GLU:OE2	2.04	0.58
1:D:313:SER:OG	3:D:703:SO4:O2	2.21	0.57
1:B:331:ARG:NH1	1:B:356:ASP:OD1	2.36	0.57
1:C:120:ASP:OD2	1:C:211:LYS:NZ	2.34	0.57
1:C:140:LEU:HD21	1:C:151:LEU:HD12	1.86	0.57
1:D:86:MET:HE2	1:D:183:ALA:HB2	1.86	0.57
1:A:121:GLU:CD	1:A:121:GLU:H	2.07	0.56
1:A:185:ILE:HG13	1:A:186:HIS:CD2	2.40	0.56
1:A:213:ILE:HB	1:A:216:PHE:HB2	1.87	0.56
1:A:609:MET:HB3	1:A:614:VAL:CG2	2.35	0.56
1:A:25:LYS:HD3	1:A:106:ASP:HB3	1.87	0.56
1:A:380:TYR:HB2	1:A:410:MET:HE3	1.86	0.55
1:C:213:ILE:HB	1:C:216:PHE:HB2	1.89	0.55
1:D:194:GLU:CG	1:D:196:GLU:HB2	2.35	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:42:LYS:HD3	1:B:111:SER:HB3	1.88	0.55
1:B:491:PRO:HB2	1:B:496:MET:HE1	1.90	0.54
1:D:86:MET:CE	1:D:183:ALA:HB2	2.36	0.54
1:A:477:GLN:OE1	1:A:488:ARG:NH1	2.40	0.54
1:C:12:LEU:HD23	1:C:57:HIS:CD2	2.42	0.54
1:D:312:CYS:SG	1:D:316:GLY:HA3	2.47	0.54
1:D:491:PRO:HB2	1:D:496:MET:HE1	1.90	0.54
1:D:26:GLY:O	1:D:36:VAL:HG22	2.07	0.53
1:A:218:TRP:O	1:A:219:ARG:HG2	2.09	0.53
1:C:309:MET:HB2	4:C:1104:EDO:H21	1.89	0.53
1:D:12:LEU:HD21	1:D:57:HIS:CD2	2.43	0.53
1:D:27:PHE:HA	1:D:34:ALA:HB1	1.90	0.53
1:C:312:CYS:SG	1:C:316:GLY:HA3	2.50	0.52
1:D:299:GLU:N	1:D:299:GLU:OE1	2.43	0.52
1:A:581:ASN:HD21	1:B:551:LEU:HD22	1.75	0.52
1:C:420:TYR:HA	1:C:425:MET:HE1	1.91	0.52
1:D:332:LEU:O	1:D:355:MET:HA	2.09	0.52
1:A:144:GLU:CD	1:A:144:GLU:H	2.13	0.51
1:A:250:GLU:O	1:A:259:THR:OG1	2.26	0.51
1:A:276:ARG:HE	1:C:576:PRO:HG3	1.75	0.51
1:B:142:ALA:HB2	1:B:210:ILE:HD12	1.93	0.51
1:D:539:LYS:HB3	1:D:541:GLU:OE1	2.09	0.51
1:B:144:GLU:HG2	1:B:145:LYS:N	2.25	0.51
1:A:248:ARG:HB2	1:C:119:ASN:O	2.11	0.51
1:A:26:GLY:O	1:A:36:VAL:HG22	2.11	0.51
1:A:27:PHE:HA	1:A:34:ALA:HB1	1.93	0.51
1:C:561:GLU:OE2	1:C:561:GLU:N	2.36	0.51
1:D:219:ARG:HD2	1:D:226:HIS:ND1	2.26	0.51
1:C:180:CYS:O	1:C:184:LYS:HD2	2.10	0.50
1:A:222:ASP:OD1	1:A:222:ASP:N	2.29	0.50
1:C:276:ARG:HG2	1:C:276:ARG:O	2.12	0.50
1:D:560:PHE:CE1	1:D:574:ILE:CD1	2.94	0.50
1:D:609:MET:HB3	1:D:614:VAL:HG21	1.92	0.50
1:A:136:ASP:HB2	1:A:153:LYS:HE2	1.94	0.50
1:D:491:PRO:HB2	1:D:496:MET:CE	2.41	0.50
1:D:12:LEU:CD2	1:D:57:HIS:CG	2.92	0.49
1:D:147:CYS:HA	1:D:209:ALA:HA	1.94	0.49
1:D:194:GLU:OE2	1:D:197:HIS:CB	2.60	0.49
1:A:598:MET:O	1:A:602:THR:HG23	2.13	0.48
1:C:21:LYS:C	1:C:23:MET:H	2.16	0.48
1:C:292:LYS:HA	1:C:453:ILE:HD13	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:194:GLU:HG2	1:D:197:HIS:H	1.78	0.48
1:B:417:VAL:HA	1:B:437:SER:HA	1.96	0.48
1:A:276:ARG:O	1:A:276:ARG:HG2	2.14	0.48
1:C:223:ASN:ND2	1:C:226:HIS:H	2.12	0.48
1:C:223:ASN:HD21	1:C:226:HIS:H	1.62	0.48
1:B:388:HIS:CD2	1:B:544:SER:HG	2.31	0.48
1:D:213:ILE:HB	1:D:216:PHE:HB2	1.96	0.47
1:A:280:PHE:CE1	1:A:493:VAL:HG13	2.49	0.47
1:B:491:PRO:HB2	1:B:496:MET:CE	2.44	0.47
1:B:280:PHE:CE1	1:B:493:VAL:HG13	2.49	0.47
1:B:116:SER:OG	1:B:211:LYS:HE2	2.13	0.47
1:B:155:ARG:HH21	1:B:155:ARG:C	2.18	0.47
1:B:277:GLU:OE2	1:D:564:HIS:NE2	2.37	0.47
1:C:2:ILE:HG21	1:C:101:LEU:HG	1.97	0.47
1:C:459:LEU:O	1:C:462:THR:HB	2.14	0.47
1:C:599:ARG:HA	1:C:602:THR:CG2	2.44	0.47
1:D:388:HIS:HE2	1:D:393:GLY:HA2	1.80	0.47
1:C:139:TYR:HB3	1:C:161:ILE:HD12	1.96	0.46
1:C:280:PHE:CE1	1:C:493:VAL:HG13	2.50	0.46
1:B:2:ILE:HD11	1:B:170:LYS:HD2	1.97	0.46
1:D:116:SER:OG	1:D:211:LYS:HE2	2.15	0.46
1:A:201:GLU:HA	1:A:204:LYS:HE3	1.98	0.46
1:D:125:LEU:HD21	1:D:211:LYS:HB2	1.97	0.46
1:B:22:THR:O	1:B:22:THR:HG22	2.16	0.46
1:B:203:ALA:HA	1:B:206:ILE:O	2.15	0.46
1:B:286:TRP:CZ3	1:B:500:ARG:HG3	2.51	0.46
1:D:224:GLU:O	1:D:224:GLU:HG3	2.12	0.46
1:D:417:VAL:HA	1:D:437:SER:HA	1.98	0.46
1:C:223:ASN:HD21	1:C:226:HIS:CD2	2.30	0.46
1:D:477:GLN:OE1	1:D:488:ARG:NH1	2.39	0.46
1:B:79:ASN:OD1	1:B:82:ASN:HB2	2.16	0.46
1:C:256:GLY:HA2	1:C:441:LYS:NZ	2.31	0.46
1:D:83:THR:HA	1:D:191:PRO:O	2.15	0.46
1:B:420:TYR:O	1:B:442:ASN:HB2	2.16	0.46
1:D:560:PHE:HE1	1:D:574:ILE:HD12	1.79	0.46
1:C:27:PHE:HA	1:C:34:ALA:HB1	1.97	0.45
1:A:334:VAL:HG22	1:A:384:ALA:HB3	1.98	0.45
1:A:90:GLU:CD	1:A:187:HIS:HE2	2.20	0.45
1:D:224:GLU:OE2	1:D:227:LEU:HB3	2.16	0.45
1:B:256:GLY:HA2	1:B:441:LYS:HZ2	1.81	0.45
1:A:241:ASN:HA	1:A:244:LEU:HD12	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:27:PHE:HA	1:B:34:ALA:HB1	1.97	0.45
1:C:599:ARG:C	1:C:602:THR:HG22	2.34	0.45
1:D:255:PRO:O	1:D:441:LYS:NZ	2.40	0.45
1:C:260:THR:HG21	1:C:446:MET:CE	2.46	0.45
1:C:299:GLU:OE1	1:C:299:GLU:N	2.50	0.45
1:B:57:HIS:CE1	1:B:58:CYS:HG	2.35	0.44
1:B:327:PRO:HD3	1:B:465:TYR:CE2	2.52	0.44
1:D:528:ALA:HB2	1:D:602:THR:HG23	1.99	0.44
1:C:50:LYS:HD2	1:C:73:ILE:HD12	2.00	0.44
1:D:194:GLU:HB2	1:D:196:GLU:OE1	2.17	0.44
1:C:379:LYS:NZ	7:C:1204:HOH:O	2.49	0.44
1:D:142:ALA:HB2	1:D:210:ILE:HD12	1.99	0.44
1:C:388:HIS:CD2	1:C:544:SER:HG	2.36	0.44
1:B:201:GLU:OE1	1:B:204:LYS:NZ	2.47	0.44
1:C:228:GLU:O	1:C:231:VAL:HG12	2.18	0.44
1:A:256:GLY:HA2	1:A:441:LYS:NZ	2.33	0.44
1:A:300:THR:HG21	1:A:426:ASP:OD1	2.17	0.43
1:C:223:ASN:CG	1:C:226:HIS:H	2.22	0.43
1:D:427:LEU:HD21	1:D:435:MET:HE2	2.00	0.43
1:C:223:ASN:OD1	1:C:226:HIS:N	2.49	0.43
1:C:417:VAL:HA	1:C:437:SER:HA	1.99	0.43
1:D:86:MET:O	1:D:90:GLU:HG3	2.19	0.43
1:C:136:ASP:CG	1:C:136:ASP:O	2.56	0.43
1:C:528:ALA:HB2	1:C:602:THR:OG1	2.18	0.43
1:D:414:VAL:HG21	1:D:432:ILE:HG12	2.01	0.43
1:A:331:ARG:HG2	1:A:380:TYR:CD1	2.52	0.43
1:D:280:PHE:CE1	1:D:493:VAL:HG13	2.54	0.43
1:D:496:MET:HB2	1:D:496:MET:HE3	1.58	0.43
1:A:581:ASN:ND2	1:B:551:LEU:HD22	2.33	0.43
1:B:570:HIS:O	1:B:600:ARG:NH2	2.52	0.43
1:B:598:MET:O	1:B:602:THR:HG23	2.18	0.43
1:C:214:GLU:HG2	1:C:215:TYR:CE2	2.53	0.43
1:D:79:ASN:OD1	1:D:82:ASN:HB2	2.18	0.43
1:D:256:GLY:HA2	1:D:257:PRO:C	2.38	0.43
1:D:362:THR:HG21	1:D:579:LEU:CD2	2.49	0.43
1:A:252:LEU:HB3	1:A:254:ASN:OD1	2.19	0.43
1:C:34:ALA:O	1:C:38:GLN:HG3	2.19	0.43
1:C:117:LEU:HD11	1:C:127:LEU:HB2	2.01	0.43
1:D:292:LYS:HB3	1:D:307:THR:OG1	2.19	0.42
1:A:414:VAL:HG21	1:A:432:ILE:HG12	2.00	0.42
1:A:437:SER:HB3	1:A:451:PHE:CE1	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:123:LYS:HB2	1:B:123:LYS:HE3	1.79	0.42
1:D:224:GLU:O	1:D:225:ASP:C	2.57	0.42
1:C:599:ARG:CA	1:C:602:THR:HG22	2.48	0.42
1:B:222:ASP:OD1	1:B:222:ASP:N	2.52	0.42
1:C:420:TYR:HA	1:C:425:MET:CE	2.50	0.42
1:C:458:GLU:HA	1:C:461:LYS:HE3	2.02	0.42
1:A:420:TYR:O	1:A:442:ASN:HB2	2.20	0.42
1:D:97:ASN:OD1	1:D:98:GLU:HG3	2.19	0.42
1:A:57:HIS:CE1	1:A:58:CYS:HG	2.38	0.42
1:B:136:ASP:OD1	1:B:136:ASP:O	2.38	0.41
1:D:12:LEU:CD2	1:D:57:HIS:CD2	3.03	0.41
1:D:352:LYS:HA	1:D:352:LYS:HD3	1.78	0.41
1:C:83:THR:O	1:C:192:LYS:HE3	2.19	0.41
1:A:142:ALA:HB2	1:A:210:ILE:HD12	2.02	0.41
1:C:596:GLU:OE2	1:C:599:ARG:HD3	2.21	0.41
1:D:528:ALA:CB	1:D:602:THR:HG23	2.50	0.41
1:B:548:THR:HG23	7:B:801:HOH:O	2.21	0.41
1:D:380:TYR:HB2	1:D:410:MET:HE3	2.02	0.41
1:C:226:HIS:HA	1:C:229:MET:HG3	2.02	0.41
1:D:106:ASP:OD1	1:D:106:ASP:N	2.50	0.41
1:D:194:GLU:HG2	1:D:197:HIS:N	2.36	0.41
1:B:275:PRO:HD3	1:D:257:PRO:HG2	2.03	0.41
1:B:182:TYR:CD1	1:B:201:GLU:HG2	2.55	0.41
1:B:532:LEU:HD12	1:B:532:LEU:HA	1.85	0.41
1:C:212:ARG:NH1	1:C:214:GLU:OE1	2.53	0.41
1:C:463:LYS:HB2	1:C:475:TYR:CZ	2.56	0.41
1:D:252:LEU:HB3	1:D:254:ASN:OD1	2.21	0.41
1:D:589:ASN:O	1:D:589:ASN:ND2	2.51	0.41
1:A:41:GLN:NE2	1:A:69:TYR:OH	2.51	0.41
1:A:75:VAL:HG21	1:A:95:PHE:HE2	1.85	0.41
1:A:132:THR:HG22	1:A:137:GLU:HG2	2.03	0.41
1:A:365:PRO:HG3	1:A:542:HIS:CD2	2.56	0.41
1:A:509:GLU:OE2	1:A:517:ARG:NH1	2.48	0.41
1:A:140:LEU:HD21	1:A:165:LEU:HB2	2.03	0.41
1:B:131:ALA:HA	1:B:164:GLU:OE1	2.22	0.40
1:C:376:ALA:HA	1:C:408:TYR:CE2	2.56	0.40
1:A:120:ASP:OD2	1:A:211:LYS:NZ	2.43	0.40
1:B:557:LYS:HB3	1:B:612:ILE:HB	2.04	0.40
1:B:286:TRP:CE2	1:B:290:GLU:HG3	2.57	0.40
1:A:134:SER:HB2	1:A:226:HIS:NE2	2.37	0.40
1:A:387:TYR:CG	1:A:398:LEU:HD22	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:375:PHE:CE2	1:D:404:MET:HE3	2.57	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	609/624 (98%)	585 (96%)	22 (4%)	2 (0%)	41	65
1	B	603/624 (97%)	581 (96%)	20 (3%)	2 (0%)	41	65
1	C	613/624 (98%)	589 (96%)	23 (4%)	1 (0%)	47	72
1	D	607/624 (97%)	578 (95%)	27 (4%)	2 (0%)	41	65
All	All	2432/2496 (97%)	2333 (96%)	92 (4%)	7 (0%)	41	65

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	157	ALA
1	B	136	ASP
1	D	136	ASP
1	A	136	ASP
1	B	157	ALA
1	C	157	ALA
1	D	616	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	522/533 (98%)	510 (98%)	12 (2%)	50	77
1	B	517/533 (97%)	513 (99%)	4 (1%)	81	92
1	C	526/533 (99%)	514 (98%)	12 (2%)	50	77
1	D	520/533 (98%)	513 (99%)	7 (1%)	69	86
All	All	2085/2132 (98%)	2050 (98%)	35 (2%)	60	83

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	12	LEU
1	A	21	LYS
1	A	57	HIS
1	A	77	ASN
1	A	219	ARG
1	A	228	GLU
1	A	331	ARG
1	A	355	MET
1	A	387	TYR
1	A	483	LYS
1	A	589	ASN
1	A	600	ARG
1	B	155	ARG
1	B	331	ARG
1	B	387	TYR
1	B	589	ASN
1	C	12	LEU
1	C	23	MET
1	C	68	LYS
1	C	116	SER
1	C	174	SER
1	C	178	LYS
1	C	184	LYS
1	C	276	ARG
1	C	312	CYS
1	C	387	TYR
1	C	589	ASN
1	C	599	ARG
1	D	116	SER
1	D	121	GLU

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Mol	Chain	Res	Type
1	D	189	ASP
1	D	312	CYS
1	D	387	TYR
1	D	575	TYR
1	D	589	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	581	ASN
1	A	620	HIS
1	C	57	HIS
1	C	64	ASN
1	C	226	HIS
1	D	197	HIS
1	D	226	HIS
1	D	486	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 23 ligands modelled in this entry, 5 are monoatomic - leaving 18 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	$\#\|Z\| > 2$
4	EDO	A	704	-	3,3,3	0.45	0	2,2,2	0.35	0
3	SO4	A	703	-	4,4,4	0.14	0	6,6,6	0.07	0
3	SO4	C	1107	-	4,4,4	0.15	0	6,6,6	0.08	0
4	EDO	C	1101	1	3,3,3	0.78	0	2,2,2	0.78	0
4	EDO	B	703	-	3,3,3	0.45	0	2,2,2	0.34	0
4	EDO	D	702	-	3,3,3	0.45	0	2,2,2	0.31	0
3	SO4	A	706	-	4,4,4	0.15	0	6,6,6	0.06	0
3	SO4	B	702	-	4,4,4	0.14	0	6,6,6	0.08	0
3	SO4	B	704	-	4,4,4	0.14	0	6,6,6	0.07	0
3	SO4	D	704	-	4,4,4	0.15	0	6,6,6	0.06	0
5	GOL	C	1105	-	5,5,5	0.88	0	5,5,5	1.02	0
3	SO4	D	703	-	4,4,4	0.15	0	6,6,6	0.06	0
3	SO4	A	702	-	4,4,4	0.15	0	6,6,6	0.10	0
4	EDO	C	1104	-	3,3,3	0.45	0	2,2,2	0.39	0
3	SO4	B	705	-	4,4,4	0.13	0	6,6,6	0.05	0
4	EDO	A	705	-	3,3,3	0.46	0	2,2,2	0.34	0
3	SO4	C	1103	-	4,4,4	0.15	0	6,6,6	0.09	0
3	SO4	B	706	-	4,4,4	0.13	0	6,6,6	0.05	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	EDO	A	704	-	-	0/1/1/1	-
4	EDO	C	1101	1	-	1/1/1/1	-
4	EDO	B	703	-	-	0/1/1/1	-
4	EDO	D	702	-	-	0/1/1/1	-
5	GOL	C	1105	-	-	1/4/4/4	-
4	EDO	C	1104	-	-	1/1/1/1	-
4	EDO	A	705	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	1101	EDO	O1-C1-C2-O2
5	C	1105	GOL	O1-C1-C2-C3
4	A	705	EDO	O1-C1-C2-O2
4	C	1104	EDO	O1-C1-C2-O2

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	703	SO4	1	0
4	C	1104	EDO	1	0
3	C	1103	SO4	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 (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	613/624 (98%)	0.29	14 (2%)	60	62	32, 49, 71, 108	0
1	B	607/624 (97%)	0.17	2 (0%)	94	95	31, 44, 61, 98	0
1	C	617/624 (98%)	0.29	15 (2%)	59	60	30, 49, 83, 116	0
1	D	611/624 (97%)	0.26	15 (2%)	57	59	31, 45, 77, 110	0
All	All	2448/2496 (98%)	0.25	46 (1%)	66	69	30, 47, 75, 116	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	225	ASP	7.5
1	C	226	HIS	4.2
1	B	136	ASP	4.1
1	C	23	MET	4.1
1	D	136	ASP	3.9
1	D	13	GLY	3.5
1	D	1	MET	3.5
1	A	616	VAL	3.4
1	C	144	GLU	3.1
1	C	229	MET	3.1
1	A	13	GLY	3.1
1	C	83	THR	3.1
1	A	256	GLY	2.9
1	A	222	ASP	2.9
1	C	228	GLU	2.8
1	C	22	THR	2.8
1	D	194	GLU	2.8
1	D	227	LEU	2.8
1	D	226	HIS	2.6
1	A	229	MET	2.5
1	C	224	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	D	187	HIS	2.5
1	D	230	ALA	2.5
1	C	136	ASP	2.4
1	D	225	ASP	2.4
1	C	12	LEU	2.3
1	A	22	THR	2.3
1	A	224	GLU	2.3
1	A	496	MET	2.3
1	C	159	LYS	2.3
1	D	11	GLY	2.3
1	B	12	LEU	2.3
1	D	229	MET	2.3
1	D	23	MET	2.2
1	C	161	ILE	2.2
1	A	57	HIS	2.2
1	C	57	HIS	2.2
1	A	617	LEU	2.2
1	A	619	HIS	2.2
1	A	225	ASP	2.2
1	D	224	GLU	2.1
1	A	12	LEU	2.1
1	A	615	GLY	2.1
1	D	21	LYS	2.1
1	D	96	VAL	2.0
1	C	460	GLU	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 monosaccharides 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	EDO	C	1101	4/4	0.37	0.55	42,54,55,77	0
2	MG	D	701	1/1	0.63	0.11	74,74,74,74	0
3	SO4	B	705	5/5	0.68	0.21	61,71,97,109	0
2	MG	C	1102	1/1	0.76	0.20	61,61,61,61	0
3	SO4	D	704	5/5	0.83	0.30	65,73,73,88	0
3	SO4	B	702	5/5	0.84	0.36	57,67,80,95	0
3	SO4	A	702	5/5	0.84	0.26	55,56,70,80	0
3	SO4	B	706	5/5	0.87	0.28	50,51,64,78	0
4	EDO	B	703	4/4	0.87	0.19	47,48,49,50	0
3	SO4	C	1107	5/5	0.87	0.32	56,63,77,84	0
3	SO4	C	1103	5/5	0.88	0.17	48,56,62,75	0
3	SO4	D	703	5/5	0.89	0.14	45,57,64,83	0
3	SO4	B	704	5/5	0.89	0.13	49,58,67,81	0
5	GOL	C	1105	6/6	0.89	0.17	49,51,58,60	0
3	SO4	A	706	5/5	0.90	0.14	49,65,69,83	0
4	EDO	A	705	4/4	0.92	0.21	50,57,58,63	0
3	SO4	A	703	5/5	0.92	0.24	58,62,82,87	0
4	EDO	C	1104	4/4	0.94	0.24	45,46,50,51	0
4	EDO	D	702	4/4	0.94	0.21	40,41,43,43	0
4	EDO	A	704	4/4	0.94	0.18	39,39,39,40	0
2	MG	A	701	1/1	0.96	0.14	50,50,50,50	0
2	MG	B	701	1/1	0.96	0.26	34,34,34,34	0
6	NI	C	1106	1/1	0.98	0.38	55,55,55,55	0

6.5 Other polymers (i)

There are no such residues in this entry.