



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 16, 2025 – 04:15 PM JST

PDB ID : 9LHW / pdb_00009lhw
Title : Crystal structure of a wild-type tagose isomerase (TsT4Ease WT) from Thermotoga bacterium
Authors : Wei, H.L.; Wang, Y.X.; Liu, W.D.; Zhu, L.L.
Deposited on : 2025-01-13
Resolution : 2.55 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.47

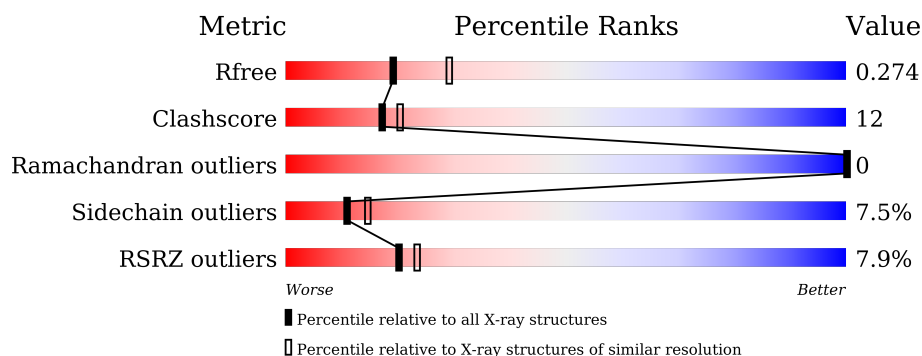
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1004 (2.54-2.54)
Clashscore	180529	1055 (2.54-2.54)
Ramachandran outliers	177936	1048 (2.54-2.54)
Sidechain outliers	177891	1048 (2.54-2.54)
RSRZ outliers	164620	1004 (2.54-2.54)

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

Mol	Chain	Length	Quality of chain
1	A	507	0% 85% 13% 2%
1	B	507	2% 73% 24% 3%
1	C	507	5% 68% 28% 5%
1	D	507	8% 63% 31% 6%
1	E	507	23% 56% 34% 6%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 19930 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 Tagaturonate/fructuronate epimerase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	501	Total	C	N	O	P	S	0	0	0
			4037	2570	687	772	1	7			
1	B	500	Total	C	N	O	P	S	0	0	0
			3984	2542	668	766	1	7			
1	C	501	Total	C	N	O	P	S	0	0	0
			4004	2547	680	769	1	7			
1	D	497	Total	C	N	O	P	S	0	0	0
			3909	2498	644	759	1	7			
1	E	486	Total	C	N	O	S		0	0	0
			3786	2411	628	740	7				

There are 35 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	MET	-	initiating methionine	UNP A0A3D6D9W2
A	-4	HIS	-	expression tag	UNP A0A3D6D9W2
A	-3	HIS	-	expression tag	UNP A0A3D6D9W2
A	-2	HIS	-	expression tag	UNP A0A3D6D9W2
A	-1	HIS	-	expression tag	UNP A0A3D6D9W2
A	0	HIS	-	expression tag	UNP A0A3D6D9W2
A	1	HIS	-	expression tag	UNP A0A3D6D9W2
B	-5	MET	-	initiating methionine	UNP A0A3D6D9W2
B	-4	HIS	-	expression tag	UNP A0A3D6D9W2
B	-3	HIS	-	expression tag	UNP A0A3D6D9W2
B	-2	HIS	-	expression tag	UNP A0A3D6D9W2
B	-1	HIS	-	expression tag	UNP A0A3D6D9W2
B	0	HIS	-	expression tag	UNP A0A3D6D9W2
B	1	HIS	-	expression tag	UNP A0A3D6D9W2
C	-5	MET	-	initiating methionine	UNP A0A3D6D9W2
C	-4	HIS	-	expression tag	UNP A0A3D6D9W2
C	-3	HIS	-	expression tag	UNP A0A3D6D9W2
C	-2	HIS	-	expression tag	UNP A0A3D6D9W2
C	-1	HIS	-	expression tag	UNP A0A3D6D9W2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	0	HIS	-	expression tag	UNP A0A3D6D9W2
C	1	HIS	-	expression tag	UNP A0A3D6D9W2
D	-5	MET	-	initiating methionine	UNP A0A3D6D9W2
D	-4	HIS	-	expression tag	UNP A0A3D6D9W2
D	-3	HIS	-	expression tag	UNP A0A3D6D9W2
D	-2	HIS	-	expression tag	UNP A0A3D6D9W2
D	-1	HIS	-	expression tag	UNP A0A3D6D9W2
D	0	HIS	-	expression tag	UNP A0A3D6D9W2
D	1	HIS	-	expression tag	UNP A0A3D6D9W2
E	-5	MET	-	initiating methionine	UNP A0A3D6D9W2
E	-4	HIS	-	expression tag	UNP A0A3D6D9W2
E	-3	HIS	-	expression tag	UNP A0A3D6D9W2
E	-2	HIS	-	expression tag	UNP A0A3D6D9W2
E	-1	HIS	-	expression tag	UNP A0A3D6D9W2
E	0	HIS	-	expression tag	UNP A0A3D6D9W2
E	1	HIS	-	expression tag	UNP A0A3D6D9W2

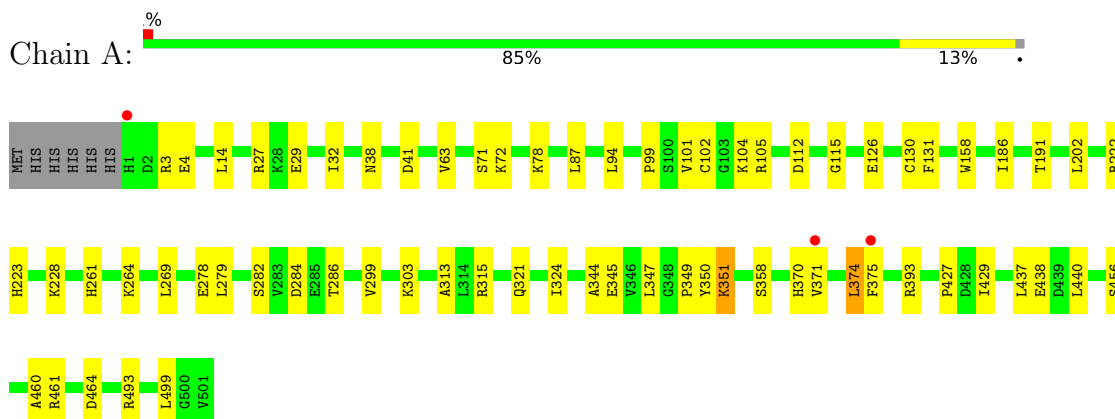
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	149	Total O 149 149	0	0
2	B	35	Total O 35 35	0	0
2	C	17	Total O 17 17	0	0
2	D	5	Total O 5 5	0	0
2	E	4	Total O 4 4	0	0

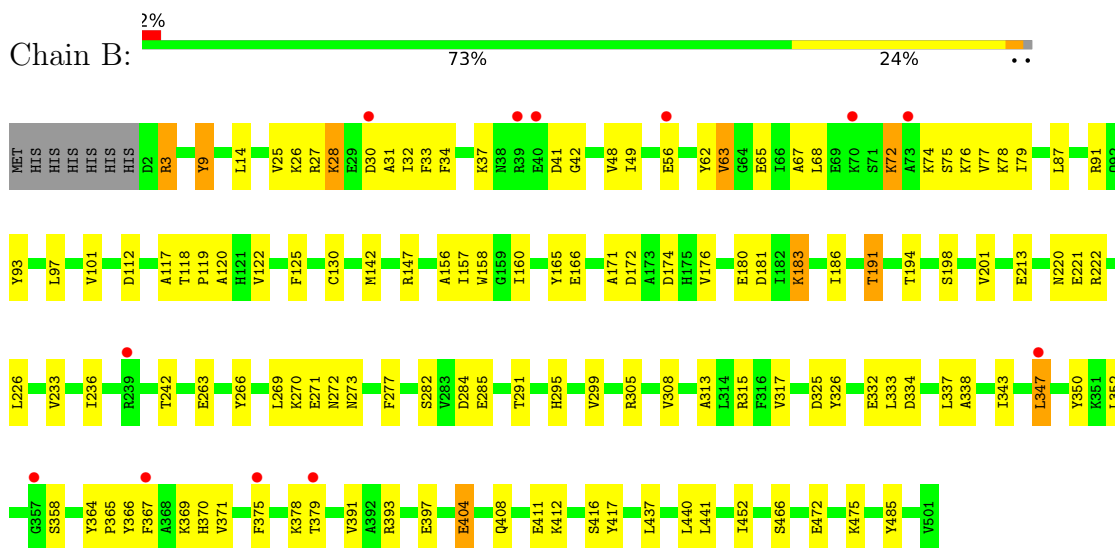
3 Residue-property plots

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

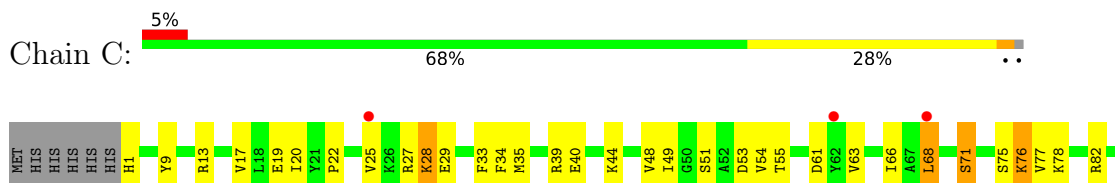
- Molecule 1: Tagaturonate/fructuronate epimerase

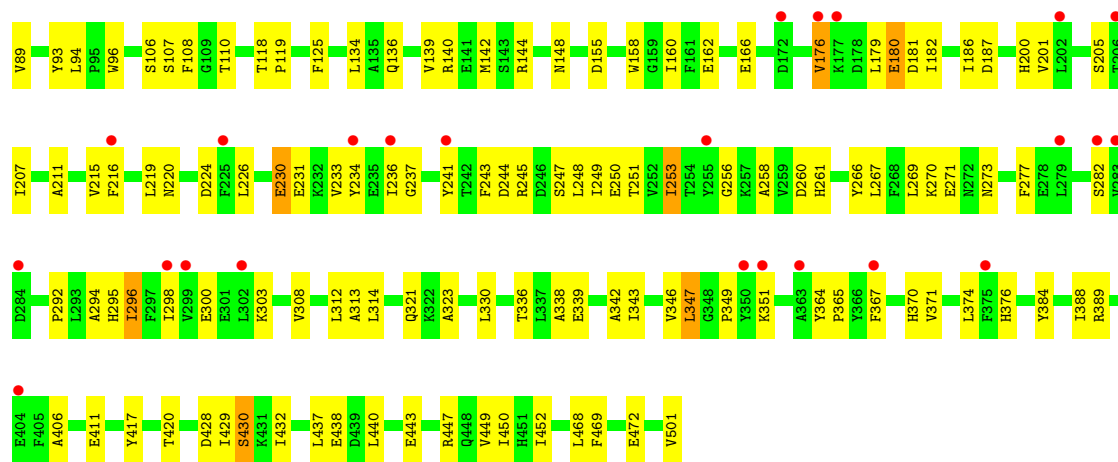


- Molecule 1: Tagaturonate/fructuronate epimerase

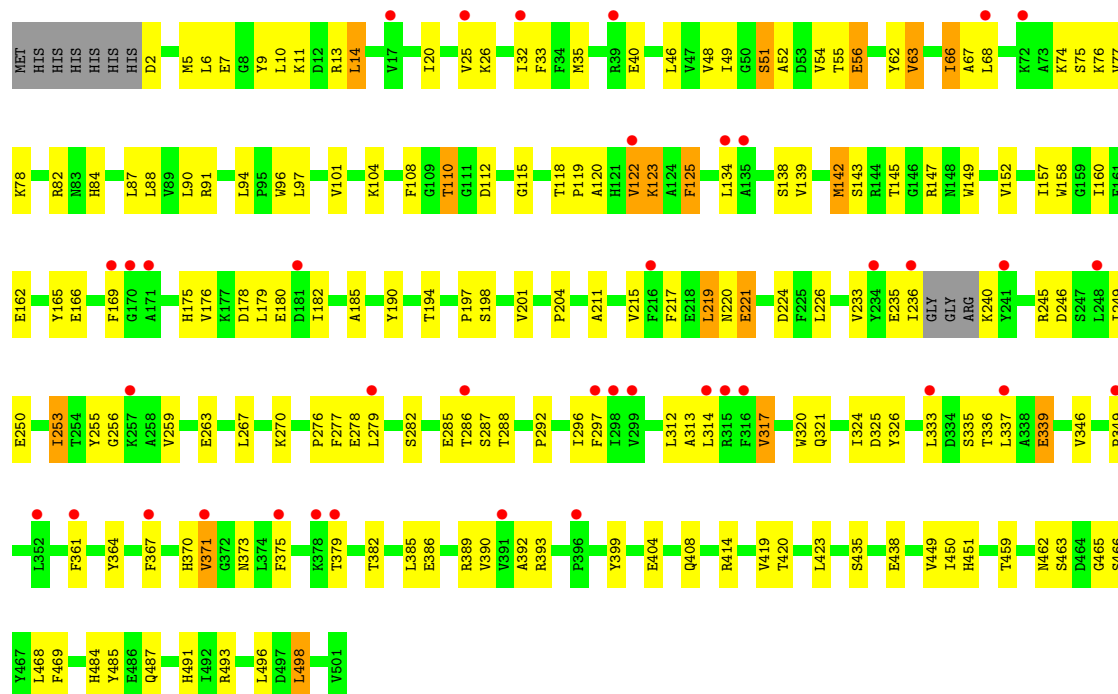


- Molecule 1: Tagaturonate/fructuronate epimerase

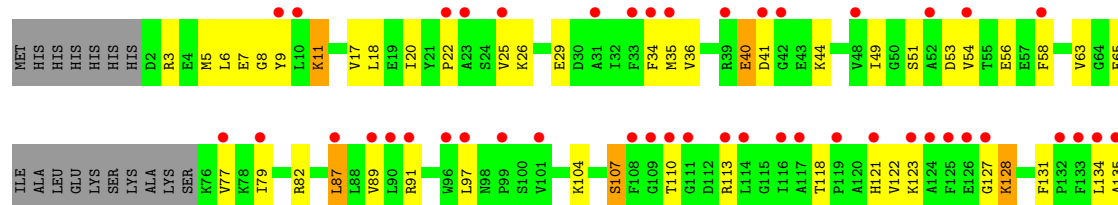


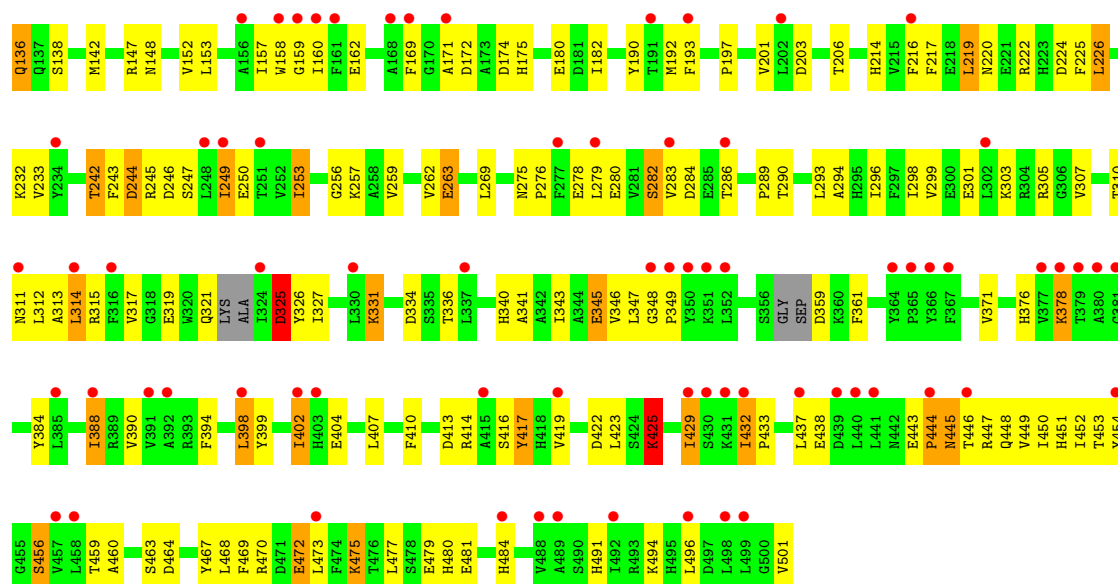


• Molecule 1: Tagaturonate/fructuronate epimerase



• Molecule 1: Tagaturonate/fructuronate epimerase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	102.86Å 108.21Å 138.78Å 90.00° 108.05° 90.00°	Depositor
Resolution (Å)	48.95 – 2.55 48.95 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.95-2.55) 99.5 (48.95-2.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.55 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.229 , 0.267 0.240 , 0.274	Depositor DCC
R_{free} test set	4525 reflections (4.78%)	wwPDB-VP
Wilson B-factor (Å ²)	63.6	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 63.3	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	0.94	EDS
Total number of atoms	19930	wwPDB-VP
Average B, all atoms (Å ²)	86.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.66% 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: SEP

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	0.67	0/4118	0.84	2/5564 (0.0%)
1	B	0.63	0/4064	0.89	1/5500 (0.0%)
1	C	0.63	0/4085	0.93	3/5531 (0.1%)
1	D	0.65	0/3988	0.98	1/5411 (0.0%)
1	E	0.70	0/3870	1.07	9/5255 (0.2%)
All	All	0.66	0/20125	0.94	16/27261 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	127	GLY	N-CA-C	-7.88	103.27	112.73
1	C	349	PRO	N-CA-C	-6.70	100.68	110.80
1	E	425	LYS	CA-C-N	-6.42	118.24	122.60
1	E	425	LYS	C-N-CA	-6.42	118.24	122.60
1	E	134	LEU	N-CA-C	-5.91	106.61	113.88
1	E	40	GLU	N-CA-C	-5.75	105.92	113.17
1	C	472	GLU	N-CA-CB	-5.72	102.12	110.53
1	C	472	GLU	CB-CA-C	5.68	119.63	109.29
1	E	463	SER	N-CA-C	-5.56	105.22	111.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	444	PRO	N-CA-C	5.42	121.07	113.53
1	E	325	ASP	CA-CB-CG	5.26	117.86	112.60
1	B	379	THR	CA-C-O	-5.16	116.87	121.67
1	E	225	PHE	CB-CA-C	-5.16	102.22	110.79
1	A	370	HIS	CA-C-N	-5.04	116.04	123.10
1	A	370	HIS	C-N-CA	-5.04	116.04	123.10
1	D	339	GLU	N-CA-CB	-5.00	102.60	109.91

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	358	SEP	Mainchain
1	B	358	SEP	Mainchain

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	4037	0	3949	44	0
1	B	3984	0	3865	73	0
1	C	4004	0	3868	101	0
1	D	3909	0	3727	124	0
1	E	3786	0	3561	137	0
2	A	149	0	0	7	0
2	B	35	0	0	0	0
2	C	17	0	0	2	0
2	D	5	0	0	0	0
2	E	4	0	0	0	0
All	All	19930	0	18970	478	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 12.

All (478) 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:D:10:LEU:O	1:D:14:LEU:HB2	1.36	1.26
1:B:63:VAL:HG13	1:B:77:VAL:HG23	1.43	0.99
1:B:317:VAL:HG11	1:B:332:GLU:HG2	1.44	0.98
1:C:351:LYS:HD2	1:C:374:LEU:HB2	1.42	0.98
1:C:267:LEU:O	1:C:271:GLU:HB2	1.65	0.97
1:E:325:ASP:OD1	1:E:326:TYR:N	1.97	0.96
1:E:259:VAL:HG23	1:E:305:ARG:HH22	1.30	0.94
1:D:236:ILE:HG12	1:D:346:VAL:HG21	1.52	0.92
1:B:437:LEU:O	1:B:440:LEU:HD12	1.71	0.90
1:E:246:ASP:O	1:E:249:ILE:HG13	1.75	0.86
1:C:249:ILE:O	1:C:253:ILE:HG13	1.73	0.86
1:E:325:ASP:HB2	1:E:359:ASP:O	1.75	0.85
1:E:7:GLU:HG2	1:E:20:ILE:HD13	1.56	0.84
1:E:341:ALA:O	1:E:345:GLU:HB2	1.79	0.81
1:E:5:MET:SD	1:E:6:LEU:HG	2.20	0.81
1:E:282:SER:HA	1:E:313:ALA:HB3	1.63	0.80
1:E:193:PHE:CE2	1:E:269:LEU:HD11	2.16	0.79
1:D:9:TYR:HE1	1:D:66:ILE:HG12	1.48	0.79
1:C:142:MET:HE3	1:C:148:ASN:HA	1.64	0.77
1:C:384:TYR:CZ	1:C:388:ILE:HD11	2.19	0.77
1:D:108:PHE:HB3	1:D:125:PHE:HZ	1.49	0.77
1:D:87:LEU:HD12	1:D:158:TRP:CE2	2.20	0.76
1:C:49:ILE:HG12	1:C:77:VAL:HG22	1.68	0.75
1:E:87:LEU:HD13	1:E:158:TRP:CE2	2.22	0.75
1:C:294:ALA:O	1:C:298:ILE:HG13	1.88	0.73
1:E:384:TYR:CZ	1:E:388:ILE:HD11	2.24	0.73
1:E:157:ILE:HA	1:E:160:ILE:HD12	1.70	0.73
1:D:321:GLN:HB2	1:D:324:ILE:HD11	1.70	0.73
1:E:413:ASP:HB3	1:E:452:ILE:HG22	1.69	0.73
1:B:317:VAL:HG11	1:B:332:GLU:CG	2.19	0.72
1:D:10:LEU:O	1:D:14:LEU:CB	2.28	0.72
1:E:20:ILE:HG13	1:E:36:VAL:HG12	1.71	0.72
1:D:110:THR:O	1:D:110:THR:OG1	2.04	0.72
1:D:2:ASP:O	1:D:6:LEU:HD13	1.91	0.71
1:E:193:PHE:CD2	1:E:269:LEU:HD11	2.26	0.70
1:A:223:HIS:O	1:A:228:LYS:NZ	2.25	0.70
1:E:107:SER:HB3	1:E:131:PHE:HB3	1.74	0.70
1:E:259:VAL:CG2	1:E:305:ARG:HH22	2.04	0.70
1:E:152:VAL:HG23	1:E:190:TYR:OH	1.92	0.69
1:C:321:GLN:HE22	1:C:420:THR:HG23	1.57	0.69
1:C:82:ARG:NH2	2:C:601:HOH:O	2.26	0.68
1:A:105:ARG:HD3	2:A:646:HOH:O	1.92	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:351:LYS:HD2	1:C:374:LEU:CB	2.23	0.67
1:D:336:THR:O	1:D:339:GLU:HB3	1.94	0.67
1:D:49:ILE:HG12	1:D:77:VAL:HG22	1.77	0.66
1:C:244:ASP:OD2	1:C:247:SER:N	2.26	0.66
1:C:323:ALA:O	1:C:447:ARG:NH1	2.29	0.66
1:E:340:HIS:HA	1:E:343:ILE:HD12	1.76	0.66
1:C:140:ARG:NH1	1:C:417:TYR:OH	2.24	0.66
1:E:243:PHE:HE1	1:E:293:LEU:HB3	1.60	0.65
1:C:384:TYR:CE2	1:C:388:ILE:HD11	2.30	0.65
1:D:82:ARG:HB3	1:D:158:TRP:CE2	2.31	0.65
1:E:87:LEU:HD13	1:E:158:TRP:CD2	2.32	0.65
1:B:172:ASP:OD2	1:B:378:LYS:HE2	1.97	0.65
1:A:261:HIS:ND1	2:A:602:HOH:O	2.29	0.65
1:D:2:ASP:O	1:D:5:MET:HB3	1.96	0.64
1:A:130:CYS:N	2:A:603:HOH:O	2.29	0.64
1:B:68:LEU:HD13	1:B:75:SER:HB2	1.79	0.64
1:D:14:LEU:HD21	1:D:63:VAL:HG23	1.79	0.64
1:A:461:ARG:NH2	1:B:213:GLU:OE1	2.30	0.64
1:C:51:SER:O	1:C:55:THR:HG23	1.98	0.64
1:D:220:ASN:O	1:D:220:ASN:ND2	2.28	0.64
1:E:147:ARG:CZ	1:E:152:VAL:HG12	2.28	0.64
1:C:429:ILE:HG22	1:C:440:LEU:HD11	1.81	0.63
1:E:444:PRO:HA	1:E:447:ARG:HD3	1.80	0.63
1:D:147:ARG:CZ	1:D:152:VAL:HG12	2.29	0.63
1:D:220:ASN:HD22	1:D:220:ASN:C	2.07	0.62
1:C:364:TYR:N	1:C:365:PRO:HD2	2.13	0.62
1:D:108:PHE:HB3	1:D:125:PHE:CZ	2.33	0.62
1:E:305:ARG:HB3	1:E:307:VAL:HG23	1.81	0.62
1:C:247:SER:O	1:C:251:THR:HG23	2.00	0.62
1:C:443:GLU:O	1:C:447:ARG:HG3	1.98	0.62
1:D:67:ALA:HB2	1:D:74:LYS:HD3	1.81	0.62
1:E:193:PHE:CD2	1:E:269:LEU:HD21	2.35	0.62
1:E:299:VAL:O	1:E:303:LYS:HG3	2.00	0.62
1:A:351:LYS:HG2	1:A:374:LEU:HD13	1.82	0.62
1:B:333:LEU:O	1:B:337:LEU:HB2	1.99	0.62
1:D:385:LEU:HD11	1:D:451:HIS:HB2	1.82	0.62
1:E:259:VAL:HG23	1:E:305:ARG:NH2	2.10	0.62
1:E:280:GLU:HB2	1:E:311:ASN:HB2	1.81	0.62
1:C:282:SER:HA	1:C:313:ALA:HB3	1.82	0.61
1:C:44:LYS:NZ	1:C:162:GLU:OE1	2.33	0.61
1:E:172:ASP:OD2	1:E:378:LYS:NZ	2.31	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:46:LEU:HD22	1:D:90:LEU:HD12	1.82	0.61
1:E:160:ILE:HD13	1:E:169:PHE:CE2	2.36	0.61
1:E:136:GLN:NE2	1:E:378:LYS:HE3	2.16	0.60
1:C:107:SER:OG	1:C:376:HIS:ND1	2.29	0.60
1:D:226:LEU:HD13	1:D:245:ARG:HH11	1.67	0.60
1:E:244:ASP:OD2	1:E:247:SER:HB2	2.01	0.60
1:D:414:ARG:NH2	1:D:419:VAL:HG23	2.16	0.60
1:E:496:LEU:O	1:E:501:VAL:HG12	2.02	0.60
1:B:33:PHE:CD2	1:B:48:VAL:HG12	2.37	0.60
1:E:51:SER:HB2	1:E:53:ASP:OD1	2.02	0.59
1:C:266:TYR:CE1	1:C:270:LYS:HD3	2.37	0.59
1:E:232:LYS:O	1:E:242:THR:HA	2.03	0.59
1:E:410:PHE:O	1:E:414:ARG:N	2.36	0.58
1:E:35:MET:HE3	1:E:44:LYS:HB3	1.85	0.58
1:E:301:GLU:O	1:E:305:ARG:HG2	2.03	0.58
1:E:376:HIS:NE2	1:E:378:LYS:HD2	2.18	0.58
1:B:49:ILE:HG23	1:B:77:VAL:HG12	1.86	0.58
1:D:226:LEU:HD13	1:D:245:ARG:NH1	2.18	0.58
1:E:312:LEU:CD2	1:E:314:LEU:HD23	2.32	0.58
1:B:183:LYS:HA	1:B:186:ILE:HD12	1.86	0.58
1:D:414:ARG:HH21	1:D:419:VAL:HG23	1.69	0.57
1:C:303:LYS:NZ	1:C:347:LEU:O	2.35	0.57
1:B:334:ASP:OD1	1:B:370:HIS:NE2	2.28	0.57
1:C:61:ASP:O	1:C:78:LYS:HG3	2.05	0.57
1:D:9:TYR:CE1	1:D:66:ILE:HG12	2.36	0.57
1:D:320:TRP:CH2	1:D:367:PHE:HZ	2.23	0.57
1:D:312:LEU:HD12	1:D:314:LEU:HG	1.87	0.57
1:C:51:SER:OG	1:C:53:ASP:OD1	2.24	0.56
1:E:331:LYS:HA	1:E:334:ASP:HB2	1.87	0.56
1:A:222:ARG:O	1:A:222:ARG:HG3	2.04	0.56
1:B:26:LYS:NZ	1:B:166:GLU:OE2	2.37	0.56
1:D:178:ASP:HB3	1:D:180:GLU:OE1	2.05	0.56
1:D:462:ASN:N	1:D:466:SER:O	2.38	0.56
1:B:220:ASN:HD21	1:B:226:LEU:HD12	1.70	0.56
1:B:63:VAL:CG1	1:B:77:VAL:HG23	2.29	0.56
1:D:211:ALA:O	1:D:215:VAL:HG23	2.06	0.56
1:B:233:VAL:HG23	1:B:242:THR:HG22	1.87	0.56
1:C:321:GLN:NE2	1:C:420:THR:HG23	2.21	0.56
1:A:321:GLN:HB2	1:A:324:ILE:HD11	1.86	0.55
1:E:294:ALA:O	1:E:298:ILE:HG13	2.06	0.55
1:D:9:TYR:HD2	1:D:9:TYR:O	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:404:GLU:O	1:D:408:GLN:HG3	2.06	0.55
1:B:78:LYS:HG3	1:B:79:ILE:N	2.20	0.55
1:D:389:ARG:HG2	1:D:438:GLU:HG3	1.88	0.55
1:E:193:PHE:HD2	1:E:269:LEU:HD21	1.71	0.55
1:E:20:ILE:HG13	1:E:36:VAL:CG1	2.36	0.55
1:C:110:THR:O	1:C:110:THR:OG1	2.25	0.55
1:B:337:LEU:HD11	1:B:367:PHE:CD1	2.42	0.54
1:C:186:ILE:HD11	1:C:269:LEU:HD12	1.88	0.54
1:C:292:PRO:O	1:C:296:ILE:HD12	2.06	0.54
1:E:384:TYR:CZ	1:E:388:ILE:CD1	2.89	0.54
1:E:259:VAL:HB	1:E:305:ARG:HH12	1.73	0.54
1:A:427:PRO:HG2	1:A:440:LEU:HD23	1.90	0.54
1:D:317:VAL:HG23	1:D:333:LEU:HD13	1.89	0.54
1:E:148:ASN:O	1:E:152:VAL:HG22	2.07	0.54
1:E:192:MET:HB2	1:E:278:GLU:HG3	1.90	0.54
1:C:176:VAL:HG23	1:C:181:ASP:HB2	1.88	0.54
1:D:204:PRO:HG2	1:D:250:GLU:HG3	1.90	0.54
1:E:417:TYR:CD1	1:E:452:ILE:HD12	2.43	0.54
1:C:236:ILE:HG21	1:C:343:ILE:HA	1.90	0.54
1:A:104:LYS:HE3	1:A:349:PRO:O	2.07	0.54
1:C:237:GLY:HA3	1:C:342:ALA:HB1	1.90	0.53
1:D:87:LEU:HD12	1:D:158:TRP:CD2	2.42	0.53
1:E:110:THR:HG21	1:E:121:HIS:HB3	1.90	0.53
1:D:220:ASN:ND2	1:D:224:ASP:HA	2.22	0.53
1:E:152:VAL:HG23	1:E:190:TYR:HH	1.73	0.53
1:A:186:ILE:HD11	1:A:269:LEU:HD23	1.90	0.53
1:C:220:ASN:ND2	1:C:224:ASP:HA	2.24	0.53
1:D:235:GLU:HA	1:D:240:LYS:HA	1.91	0.53
1:B:31:ALA:C	1:B:32:ILE:HD12	2.34	0.53
1:B:404:GLU:O	1:B:408:GLN:HG3	2.09	0.53
1:D:270:LYS:HD2	1:D:277:PHE:HZ	1.74	0.53
1:A:87:LEU:HD13	1:A:158:TRP:CE2	2.44	0.53
1:D:198:SER:O	1:D:201:VAL:HG12	2.09	0.53
1:C:49:ILE:HG13	1:C:77:VAL:HG13	1.90	0.53
1:D:9:TYR:HE2	1:D:13:ARG:HD2	1.74	0.53
1:C:220:ASN:OD1	1:C:226:LEU:HG	2.10	0.52
1:D:7:GLU:CG	1:D:20:ILE:HD12	2.38	0.52
1:E:243:PHE:CE1	1:E:293:LEU:HB3	2.41	0.52
1:D:101:VAL:HG13	1:D:278:GLU:HG3	1.91	0.52
1:D:493:ARG:HA	1:D:496:LEU:HD12	1.91	0.52
1:E:293:LEU:HA	1:E:296:ILE:HD12	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:VAL:HG13	1:A:278:GLU:HG3	1.91	0.52
1:C:300:GLU:HA	1:C:303:LYS:HB2	1.91	0.52
1:D:9:TYR:HE2	1:D:13:ARG:CD	2.23	0.52
1:C:216:PHE:CE2	1:C:249:ILE:HG13	2.43	0.52
1:D:390:VAL:HG21	1:D:484:HIS:HA	1.92	0.52
1:A:126:GLU:O	1:A:493:ARG:NH1	2.35	0.52
1:B:28:LYS:HD2	1:B:93:TYR:O	2.08	0.52
1:E:319:GLU:HB2	1:E:327:ILE:HB	1.90	0.52
1:A:78:LYS:NZ	2:A:617:HOH:O	2.43	0.52
1:E:118:THR:HB	1:E:159:GLY:HA3	1.92	0.52
1:E:283:VAL:HG12	1:E:283:VAL:O	2.08	0.52
1:B:266:TYR:OH	1:B:308:VAL:HG12	2.09	0.52
1:E:263:GLU:HB2	1:E:305:ARG:HD2	1.91	0.52
1:E:468:LEU:HD23	1:E:469:PHE:H	1.75	0.52
1:A:303:LYS:NZ	1:A:347:LEU:O	2.43	0.52
1:D:286:THR:HG22	1:D:288:THR:H	1.73	0.51
1:D:371:VAL:O	1:D:375:PHE:HB3	2.10	0.51
1:E:172:ASP:CG	1:E:378:LYS:HZ1	2.16	0.51
1:E:263:GLU:HG3	1:E:305:ARG:HD2	1.92	0.51
1:C:245:ARG:O	1:C:249:ILE:HD13	2.10	0.51
1:E:138:SER:HB2	1:E:175:HIS:HB2	1.92	0.51
1:E:203:ASP:O	1:E:206:THR:OG1	2.27	0.51
1:D:139:VAL:HA	1:D:142:MET:HE2	1.92	0.51
1:D:255:TYR:O	1:D:259:VAL:HG13	2.10	0.51
1:D:256:GLY:O	1:D:259:VAL:HG22	2.11	0.51
1:A:344:ALA:HA	1:A:350:TYR:CZ	2.46	0.51
1:B:120:ALA:HB2	1:B:485:TYR:HA	1.91	0.51
1:C:220:ASN:ND2	1:C:220:ASN:O	2.41	0.51
1:D:104:LYS:HD2	1:D:349:PRO:HB2	1.92	0.51
1:C:231:GLU:HA	1:C:243:PHE:O	2.10	0.51
1:C:234:TYR:O	1:C:241:TYR:N	2.42	0.51
1:D:361:PHE:HA	1:D:364:TYR:CD2	2.46	0.51
1:C:200:HIS:HD2	1:C:261:HIS:HB2	1.75	0.51
1:D:25:VAL:C	1:D:26:LYS:HD2	2.36	0.51
1:E:9:TYR:OH	1:E:65:GLU:O	2.22	0.51
1:E:122:VAL:O	1:E:123:LYS:C	2.53	0.51
1:D:321:GLN:HE22	1:D:420:THR:HB	1.76	0.50
1:D:87:LEU:C	1:D:87:LEU:HD23	2.36	0.50
1:E:429:ILE:HA	1:E:432:ILE:HB	1.94	0.50
1:B:156:ALA:O	1:B:160:ILE:HG13	2.10	0.50
1:D:9:TYR:CE1	1:D:66:ILE:HG23	2.47	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:140:ARG:NH1	1:C:417:TYR:CZ	2.80	0.50
1:D:87:LEU:HD21	1:D:91:ARG:HD2	1.93	0.50
1:D:118:THR:O	1:D:122:VAL:HG12	2.12	0.50
1:E:317:VAL:HG11	1:E:336:THR:HG21	1.93	0.49
1:E:321:GLN:OE1	1:E:448:GLN:NE2	2.44	0.49
1:C:339:GLU:O	1:C:343:ILE:HG13	2.12	0.49
1:D:9:TYR:C	1:D:9:TYR:CD2	2.90	0.49
1:B:220:ASN:ND2	1:B:226:LEU:HD12	2.27	0.49
1:B:271:GLU:OE1	1:B:272:ASN:ND2	2.46	0.49
1:E:53:ASP:OD1	1:E:54:VAL:N	2.45	0.49
1:E:153:LEU:O	1:E:157:ILE:HG13	2.13	0.49
1:D:87:LEU:HD23	1:D:87:LEU:O	2.12	0.49
1:D:255:TYR:HB2	1:D:297:PHE:HE2	1.78	0.49
1:E:407:LEU:HD23	1:E:449:VAL:HG21	1.94	0.49
1:A:282:SER:HA	1:A:313:ALA:HB3	1.95	0.49
1:C:19:GLU:OE1	1:C:39:ARG:HD3	2.13	0.49
1:C:211:ALA:O	1:C:215:VAL:HG22	2.12	0.49
1:A:393:ARG:HG3	1:A:438:GLU:HG3	1.95	0.49
1:C:20:ILE:O	1:C:22:PRO:HD3	2.13	0.49
1:D:152:VAL:HG23	1:D:190:TYR:OH	2.13	0.49
1:C:25:VAL:HA	1:C:34:PHE:HB3	1.95	0.49
1:D:312:LEU:CD1	1:D:314:LEU:HG	2.42	0.49
1:D:324:ILE:C	1:D:324:ILE:HD12	2.38	0.48
1:E:460:ALA:HB3	1:E:468:LEU:CD2	2.42	0.48
1:C:176:VAL:HG21	1:C:182:ILE:HG12	1.95	0.48
1:E:305:ARG:HG3	1:E:305:ARG:HH11	1.77	0.48
1:E:398:LEU:HD13	1:E:472:GLU:HB3	1.95	0.48
1:E:245:ARG:O	1:E:249:ILE:HG12	2.12	0.48
1:A:429:ILE:HG22	2:A:729:HOH:O	2.13	0.48
1:B:284:ASP:O	1:B:315:ARG:HD3	2.14	0.48
1:D:263:GLU:O	1:D:267:LEU:HD23	2.12	0.48
1:E:220:ASN:O	1:E:224:ASP:N	2.42	0.48
1:A:299:VAL:O	1:A:303:LYS:HG3	2.13	0.48
1:A:315:ARG:NH1	2:A:619:HOH:O	2.45	0.48
1:E:289:PRO:HA	1:E:315:ARG:HG3	1.95	0.48
1:D:249:ILE:O	1:D:253:ILE:HG13	2.13	0.48
1:D:270:LYS:HD2	1:D:277:PHE:CZ	2.48	0.48
1:E:87:LEU:HB2	1:E:158:TRP:CZ2	2.48	0.48
1:C:54:VAL:HG22	1:C:93:TYR:OH	2.13	0.48
1:D:245:ARG:O	1:D:249:ILE:HD12	2.14	0.48
1:B:266:TYR:CZ	1:B:308:VAL:HG12	2.49	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:182:ILE:O	1:C:186:ILE:HD12	2.13	0.48
1:E:468:LEU:HD23	1:E:469:PHE:N	2.29	0.48
1:D:35:MET:HE1	1:D:162:GLU:HB2	1.96	0.47
1:B:222:ARG:O	1:B:222:ARG:HG2	2.14	0.47
1:C:136:GLN:O	1:C:136:GLN:HG3	2.14	0.47
1:D:157:ILE:HA	1:D:160:ILE:HD12	1.96	0.47
1:A:286:THR:O	1:A:315:ARG:NE	2.47	0.47
1:B:263:GLU:OE1	1:B:305:ARG:HD3	2.15	0.47
1:B:375:PHE:CD1	1:B:375:PHE:C	2.92	0.47
1:C:266:TYR:HE1	1:C:270:LYS:HD3	1.76	0.47
1:C:384:TYR:CE2	1:C:388:ILE:CD1	2.97	0.47
1:C:226:LEU:O	1:C:230:GLU:HB2	2.13	0.47
1:D:392:ALA:HB2	1:D:399:TYR:CD1	2.48	0.47
1:A:264:LYS:NZ	2:A:602:HOH:O	2.44	0.47
1:A:375:PHE:CE1	1:A:499:LEU:HD13	2.50	0.47
1:C:338:ALA:HB2	1:C:370:HIS:CE1	2.49	0.47
1:D:215:VAL:HG12	1:D:219:LEU:HD12	1.97	0.47
1:D:282:SER:HA	1:D:313:ALA:HB3	1.96	0.47
1:E:456:SER:O	1:E:460:ALA:HB2	2.14	0.47
1:A:351:LYS:HD2	1:A:374:LEU:HD22	1.96	0.47
1:D:292:PRO:O	1:D:296:ILE:HD12	2.15	0.47
1:D:371:VAL:HG23	1:D:375:PHE:HB3	1.97	0.47
1:E:82:ARG:HA	1:E:158:TRP:CZ2	2.50	0.47
1:E:361:PHE:CE1	1:E:494:LYS:HE2	2.50	0.47
1:D:321:GLN:OE1	1:D:420:THR:HG22	2.15	0.47
1:E:20:ILE:N	1:E:20:ILE:HD12	2.30	0.47
1:E:79:ILE:HG13	1:E:79:ILE:O	2.14	0.47
1:C:96:TRP:CE2	1:C:166:GLU:HG2	2.50	0.47
1:D:390:VAL:HG22	1:D:487:GLN:HG3	1.98	0.46
1:E:244:ASP:OD2	1:E:247:SER:CB	2.62	0.46
1:B:37:LYS:HE3	1:B:42:GLY:HA2	1.97	0.46
1:C:55:THR:HG21	1:C:76:LYS:HB3	1.97	0.46
1:D:149:TRP:CE2	1:D:185:ALA:HB2	2.50	0.46
1:B:317:VAL:HG11	1:B:332:GLU:CD	2.40	0.46
1:D:33:PHE:CD2	1:D:94:LEU:HD21	2.50	0.46
1:D:101:VAL:HG21	1:D:276:PRO:HB2	1.97	0.46
1:E:216:PHE:CD2	1:E:249:ILE:HG22	2.50	0.46
1:E:275:ASN:HB3	1:E:276:PRO:HD2	1.97	0.46
1:D:32:ILE:O	1:D:48:VAL:HA	2.16	0.46
1:E:35:MET:SD	1:E:162:GLU:HB2	2.56	0.46
1:E:138:SER:HA	1:E:174:ASP:O	2.14	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:17:VAL:HG23	1:C:17:VAL:O	2.14	0.46
1:D:335:SER:O	1:D:339:GLU:HB2	2.16	0.46
1:B:122:VAL:HG11	1:B:165:TYR:HB2	1.97	0.46
1:C:144:ARG:HH12	1:C:417:TYR:HE1	1.64	0.46
1:D:326:TYR:CZ	1:D:333:LEU:HD22	2.51	0.46
1:B:198:SER:HA	1:B:201:VAL:HG23	1.97	0.46
1:C:312:LEU:HD21	1:C:314:LEU:HD21	1.97	0.46
1:D:9:TYR:HD2	1:D:9:TYR:C	2.24	0.46
1:B:3:ARG:H	1:B:3:ARG:HD2	1.80	0.45
1:C:216:PHE:CZ	1:C:249:ILE:HG13	2.51	0.45
1:C:118:THR:N	1:C:119:PRO:CD	2.79	0.45
1:C:437:LEU:O	1:C:440:LEU:HB2	2.16	0.45
1:E:394:PHE:HB3	1:E:480:HIS:CE1	2.50	0.45
1:A:99:PRO:HB2	1:A:191:THR:HG23	1.98	0.45
1:B:299:VAL:HG21	1:B:350:TYR:OH	2.17	0.45
1:D:87:LEU:CD2	1:D:91:ARG:HD2	2.47	0.45
1:D:112:ASP:CG	1:D:115:GLY:H	2.25	0.45
1:D:468:LEU:HD23	1:D:469:PHE:CE2	2.51	0.45
1:A:464:ASP:C	1:A:464:ASP:OD2	2.60	0.45
1:B:236:ILE:HG21	1:B:343:ILE:HA	1.99	0.45
1:E:197:PRO:HG3	1:E:262:VAL:HG23	1.98	0.45
1:B:282:SER:HA	1:B:313:ALA:HB3	1.97	0.45
1:B:352:LEU:HD12	1:B:371:VAL:HG11	1.98	0.45
1:D:7:GLU:HG2	1:D:20:ILE:HD12	1.98	0.45
1:D:62:TYR:CZ	1:D:78:LYS:HE3	2.52	0.45
1:D:217:PHE:CE1	1:D:221:GLU:HG3	2.51	0.45
1:D:91:ARG:HG2	1:D:97:LEU:O	2.16	0.45
1:D:112:ASP:O	1:D:147:ARG:NH2	2.50	0.45
1:E:136:GLN:NE2	1:E:378:LYS:HB3	2.32	0.45
1:E:138:SER:O	1:E:142:MET:HG3	2.17	0.45
1:E:475:LYS:O	1:E:479:GLU:HG3	2.17	0.45
1:B:221:GLU:OE2	1:B:221:GLU:HA	2.17	0.45
1:B:364:TYR:N	1:B:365:PRO:CD	2.80	0.45
1:C:273:ASN:ND2	1:C:277:PHE:HB3	2.32	0.45
1:D:320:TRP:CH2	1:D:367:PHE:CZ	3.03	0.45
1:A:282:SER:OG	1:A:284:ASP:OD1	2.35	0.45
1:B:27:ARG:HG3	1:B:32:ILE:HG13	1.98	0.45
1:C:374:LEU:HG	1:C:374:LEU:O	2.17	0.45
1:A:3:ARG:HG2	1:A:3:ARG:HH11	1.82	0.44
1:C:250:GLU:HA	1:C:253:ILE:CD1	2.47	0.44
1:D:7:GLU:HG3	1:D:20:ILE:HD12	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:8:GLY:O	1:E:11:LYS:HB3	2.18	0.44
1:E:22:PRO:O	1:E:25:VAL:HG12	2.17	0.44
1:C:216:PHE:CD1	1:C:216:PHE:C	2.95	0.44
1:D:51:SER:O	1:D:55:THR:HG23	2.16	0.44
1:A:102:CYS:HB2	1:A:131:PHE:CE1	2.52	0.44
1:B:9:TYR:OH	1:B:65:GLU:O	2.27	0.44
1:B:157:ILE:HA	1:B:160:ILE:HD12	1.99	0.44
1:C:27:ARG:NH1	1:C:27:ARG:HG3	2.32	0.44
1:C:108:PHE:HB3	1:C:125:PHE:HZ	1.82	0.44
1:E:443:GLU:HG2	1:E:444:PRO:HD2	2.00	0.44
1:E:34:PHE:HE1	1:E:49:ILE:HD11	1.82	0.44
1:E:399:TYR:O	1:E:402:ILE:HG12	2.17	0.44
1:B:176:VAL:HG13	1:B:181:ASP:HB2	1.98	0.44
1:C:68:LEU:HB3	1:C:71:SER:H	1.83	0.44
1:D:32:ILE:CG1	1:D:49:ILE:HB	2.47	0.44
1:D:118:THR:N	1:D:119:PRO:CD	2.80	0.44
1:D:134:LEU:HD12	1:D:169:PHE:HB2	2.00	0.44
1:A:112:ASP:CG	1:A:115:GLY:H	2.26	0.44
1:B:87:LEU:HB2	1:B:158:TRP:CZ2	2.52	0.44
1:C:106:SER:HA	1:C:351:LYS:HE3	1.99	0.44
1:C:371:VAL:HG22	1:C:371:VAL:O	2.18	0.44
1:E:296:ILE:HG23	1:E:347:LEU:HD11	1.99	0.44
1:A:27:ARG:HG3	1:A:32:ILE:CD1	2.48	0.44
1:C:33:PHE:HD1	1:C:48:VAL:HG22	1.83	0.44
1:A:72:LYS:HD3	1:A:72:LYS:HA	1.78	0.43
1:C:406:ALA:HB1	1:C:449:VAL:HG12	1.99	0.43
1:E:445:ASN:HD22	1:E:445:ASN:HA	1.35	0.43
1:C:134:LEU:HD12	1:C:160:ILE:HD11	2.00	0.43
1:D:62:TYR:CE1	1:D:76:LYS:HD2	2.53	0.43
1:D:96:TRP:CD1	1:D:166:GLU:HA	2.53	0.43
1:D:393:ARG:NH1	1:D:487:GLN:OE1	2.43	0.43
1:E:169:PHE:CD1	1:E:169:PHE:C	2.95	0.43
1:A:14:LEU:HG	1:A:63:VAL:HG13	1.99	0.43
1:B:65:GLU:HG2	1:B:76:LYS:HB3	2.00	0.43
1:B:299:VAL:HG11	1:B:347:LEU:HB3	2.00	0.43
1:D:320:TRP:HH2	1:D:367:PHE:CZ	2.35	0.43
1:E:113:ARG:HD3	1:E:454:TYR:CE1	2.54	0.43
1:B:87:LEU:HD13	1:B:158:TRP:CD2	2.53	0.43
1:B:266:TYR:CZ	1:B:270:LYS:HD3	2.53	0.43
1:C:139:VAL:HG21	1:C:176:VAL:HA	2.00	0.43
1:C:389:ARG:HG2	1:C:438:GLU:HG3	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:429:ILE:HA	1:C:432:ILE:HD12	2.00	0.43
1:C:468:LEU:HB3	1:C:469:PHE:CD2	2.53	0.43
1:B:91:ARG:HG2	1:B:97:LEU:O	2.19	0.43
1:C:428:ASP:OD1	1:C:430:SER:HB3	2.17	0.43
1:D:122:VAL:HG21	1:D:165:TYR:HB2	2.00	0.43
1:D:337:LEU:HB3	1:D:370:HIS:CD2	2.53	0.43
1:B:118:THR:N	1:B:119:PRO:CD	2.81	0.43
1:D:463:SER:C	1:D:465:GLY:N	2.75	0.43
1:E:384:TYR:CE2	1:E:454:TYR:HB3	2.54	0.43
1:B:72:LYS:H	1:B:72:LYS:HD2	1.83	0.43
1:B:412:LYS:HD2	1:B:412:LYS:HA	1.85	0.43
1:C:82:ARG:HH21	1:C:158:TRP:HB3	1.84	0.43
1:E:460:ALA:HB3	1:E:468:LEU:HD22	2.01	0.43
1:B:273:ASN:HD22	1:B:277:PHE:HD2	1.67	0.43
1:D:385:LEU:HD21	1:D:450:ILE:HB	2.01	0.43
1:E:91:ARG:HG2	1:E:97:LEU:O	2.18	0.43
1:E:128:LYS:HD3	1:E:501:VAL:HG22	2.01	0.43
1:E:219:LEU:CD2	1:E:256:GLY:HA3	2.49	0.43
1:A:429:ILE:HD11	1:A:437:LEU:HD22	2.01	0.43
1:A:429:ILE:HD13	1:A:440:LEU:HD11	2.01	0.43
1:B:112:ASP:CG	1:B:117:ALA:HB3	2.44	0.43
1:B:317:VAL:CG1	1:B:332:GLU:HG2	2.32	0.43
1:C:367:PHE:O	1:C:371:VAL:HG12	2.19	0.43
1:B:25:VAL:HA	1:B:34:PHE:HB3	2.01	0.42
1:C:230:GLU:HA	1:C:248:LEU:HD13	2.01	0.42
1:C:388:ILE:HD13	1:C:450:ILE:CG2	2.49	0.42
1:D:7:GLU:O	1:D:11:LYS:HB3	2.19	0.42
1:E:220:ASN:OD1	1:E:226:LEU:HB3	2.18	0.42
1:C:201:VAL:HG22	1:C:258:ALA:HB2	2.00	0.42
1:D:498:LEU:HD13	1:D:498:LEU:HA	1.92	0.42
1:E:250:GLU:O	1:E:253:ILE:HG12	2.19	0.42
1:D:175:HIS:CE1	1:D:285:GLU:OE2	2.72	0.42
1:E:20:ILE:HA	1:E:36:VAL:HG12	1.99	0.42
1:A:38:ASN:HB3	1:A:41:ASP:OD1	2.20	0.42
1:B:67:ALA:HA	1:B:74:LYS:HG3	2.00	0.42
1:C:9:TYR:HE2	1:C:13:ARG:HH21	1.68	0.42
1:E:279:LEU:HD23	1:E:280:GLU:N	2.35	0.42
1:E:417:TYR:CE1	1:E:452:ILE:HG23	2.54	0.42
1:C:256:GLY:O	1:C:260:ASP:OD2	2.38	0.42
1:D:220:ASN:HD21	1:D:224:ASP:HA	1.83	0.42
1:A:99:PRO:HB2	1:A:191:THR:CG2	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:65:GLU:HA	1:B:76:LYS:HA	2.02	0.42
1:D:179:LEU:HA	1:D:182:ILE:HD12	2.01	0.42
1:E:384:TYR:CE2	1:E:388:ILE:HD12	2.55	0.42
1:B:125:PHE:HE1	1:B:130:CYS:HB3	1.85	0.42
1:B:366:TYR:HA	1:B:369:LYS:HG2	2.00	0.42
1:D:90:LEU:HD23	1:D:90:LEU:O	2.19	0.42
1:B:338:ALA:HB2	1:B:370:HIS:CE1	2.55	0.42
1:D:197:PRO:HD2	1:D:282:SER:O	2.20	0.42
1:D:386:GLU:OE2	1:D:491:HIS:ND1	2.53	0.42
1:C:1:HIS:N	1:C:27:ARG:HH21	2.17	0.42
1:C:53:ASP:OD1	1:C:54:VAL:N	2.52	0.42
1:D:120:ALA:HB2	1:D:485:TYR:HA	2.01	0.42
1:E:58:PHE:CE1	1:E:89:VAL:HG23	2.55	0.42
1:E:348:GLY:HA2	1:E:349:PRO:HD3	1.90	0.42
1:E:422:ASP:HB3	1:E:425:LYS:HE3	2.00	0.42
1:E:284:ASP:OD1	1:E:284:ASP:N	2.53	0.41
1:E:467:TYR:CZ	1:E:470:ARG:HD2	2.55	0.41
1:D:84:HIS:NE2	1:D:88:LEU:HD11	2.35	0.41
1:E:142:MET:HB3	1:E:147:ARG:O	2.20	0.41
1:E:446:THR:HA	1:E:449:VAL:HG12	2.02	0.41
1:A:456:SER:O	1:A:460:ALA:HB2	2.20	0.41
1:B:417:TYR:HE1	1:B:452:ILE:HG23	1.86	0.41
1:C:94:LEU:HD22	1:C:96:TRP:CH2	2.55	0.41
1:C:179:LEU:O	1:C:180:GLU:C	2.63	0.41
1:D:101:VAL:HA	1:D:278:GLU:OE2	2.20	0.41
1:D:194:THR:O	1:D:194:THR:OG1	2.36	0.41
1:A:27:ARG:HG3	1:A:32:ILE:HD11	2.02	0.41
1:B:295:HIS:NE2	1:B:350:TYR:OH	2.52	0.41
1:E:325:ASP:OD1	1:E:325:ASP:C	2.60	0.41
1:E:413:ASP:HB2	1:E:453:THR:HG22	2.03	0.41
1:E:331:LYS:HA	1:E:334:ASP:CB	2.51	0.41
1:E:398:LEU:O	1:E:402:ILE:HG23	2.21	0.41
1:E:447:ARG:O	1:E:451:HIS:HB2	2.21	0.41
1:C:351:LYS:HG2	1:C:374:LEU:HD12	2.03	0.41
1:C:364:TYR:N	1:C:365:PRO:CD	2.81	0.41
1:D:123:LYS:HE3	1:D:123:LYS:HB2	1.57	0.41
1:E:343:ILE:O	1:E:347:LEU:HB2	2.20	0.41
1:E:467:TYR:CE2	1:E:470:ARG:HD2	2.55	0.41
1:A:437:LEU:HD23	1:A:437:LEU:HA	1.89	0.41
1:B:174:ASP:HA	1:B:194:THR:HB	2.03	0.41
1:C:35:MET:HE3	1:C:35:MET:HB2	1.87	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:176:VAL:HG22	1:D:194:THR:O	2.21	0.41
1:E:63:VAL:HG13	1:E:77:VAL:HG13	2.03	0.41
1:E:63:VAL:HG12	1:E:77:VAL:O	2.21	0.41
1:E:87:LEU:HD13	1:E:158:TRP:CZ2	2.55	0.41
1:E:390:VAL:HG21	1:E:484:HIS:HA	2.02	0.41
1:E:432:ILE:HA	1:E:433:PRO:HD3	1.87	0.41
1:E:491:HIS:CD2	1:E:491:HIS:C	2.99	0.41
1:C:28:LYS:HG3	1:C:29:GLU:H	1.86	0.41
1:E:82:ARG:HB2	1:E:158:TRP:CE2	2.56	0.41
1:C:155:ASP:CG	2:C:602:HOH:O	2.64	0.40
1:A:427:PRO:HG2	1:A:440:LEU:CD2	2.50	0.40
1:B:62:TYR:CE2	1:B:76:LYS:HD2	2.57	0.40
1:B:171:ALA:H	1:B:191:THR:HB	1.86	0.40
1:C:236:ILE:CG2	1:C:343:ILE:HA	2.51	0.40
1:C:292:PRO:O	1:C:295:HIS:HB3	2.20	0.40
1:D:325:ASP:OD1	1:D:326:TYR:N	2.48	0.40
1:B:9:TYR:C	1:B:9:TYR:CD1	2.99	0.40
1:B:325:ASP:OD1	1:B:326:TYR:N	2.43	0.40
1:D:52:ALA:O	1:D:56:GLU:N	2.52	0.40
1:E:135:ALA:O	1:E:171:ALA:HA	2.21	0.40
1:E:214:HIS:O	1:E:217:PHE:HB3	2.21	0.40
1:B:142:MET:HB3	1:B:147:ARG:O	2.22	0.40
1:B:337:LEU:HD23	1:B:337:LEU:HA	1.91	0.40
1:A:71:SER:OG	1:A:72:LYS:N	2.54	0.40
1:C:266:TYR:OH	1:C:308:VAL:HG22	2.22	0.40
1:E:147:ARG:NH1	1:E:152:VAL:HG12	2.37	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	498/507 (98%)	482 (97%)	16 (3%)	0	100	100
1	B	497/507 (98%)	479 (96%)	18 (4%)	0	100	100
1	C	498/507 (98%)	477 (96%)	21 (4%)	0	100	100
1	D	492/507 (97%)	470 (96%)	22 (4%)	0	100	100
1	E	478/507 (94%)	458 (96%)	20 (4%)	0	100	100
All	All	2463/2535 (97%)	2366 (96%)	97 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	434/441 (98%)	425 (98%)	9 (2%)	48	66
1	B	425/441 (96%)	398 (94%)	27 (6%)	14	19
1	C	426/441 (97%)	399 (94%)	27 (6%)	15	19
1	D	412/441 (93%)	378 (92%)	34 (8%)	9	12
1	E	396/441 (90%)	335 (85%)	61 (15%)	2	1
All	All	2093/2205 (95%)	1935 (92%)	158 (8%)	11	15

All (158) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	GLU
1	A	29	GLU
1	A	94	LEU
1	A	202	LEU
1	A	279	LEU
1	A	345	GLU
1	A	351	LYS
1	A	371	VAL
1	A	374	LEU
1	B	3	ARG

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Mol	Chain	Res	Type
1	B	9	TYR
1	B	14	LEU
1	B	28	LYS
1	B	30	ASP
1	B	41	ASP
1	B	56	GLU
1	B	63	VAL
1	B	72	LYS
1	B	101	VAL
1	B	180	GLU
1	B	183	LYS
1	B	191	THR
1	B	269	LEU
1	B	285	GLU
1	B	291	THR
1	B	347	LEU
1	B	391	VAL
1	B	393	ARG
1	B	397	GLU
1	B	404	GLU
1	B	411	GLU
1	B	416	SER
1	B	441	LEU
1	B	466	SER
1	B	472	GLU
1	B	475	LYS
1	C	28	LYS
1	C	40	GLU
1	C	63	VAL
1	C	66	ILE
1	C	68	LEU
1	C	71	SER
1	C	75	SER
1	C	76	LYS
1	C	89	VAL
1	C	176	VAL
1	C	180	GLU
1	C	187	ASP
1	C	205	SER
1	C	207	ILE
1	C	219	LEU
1	C	230	GLU

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Mol	Chain	Res	Type
1	C	233	VAL
1	C	253	ILE
1	C	296	ILE
1	C	330	LEU
1	C	336	THR
1	C	346	VAL
1	C	347	LEU
1	C	411	GLU
1	C	430	SER
1	C	452	ILE
1	C	501	VAL
1	D	14	LEU
1	D	40	GLU
1	D	51	SER
1	D	54	VAL
1	D	56	GLU
1	D	63	VAL
1	D	66	ILE
1	D	68	LEU
1	D	75	SER
1	D	110	THR
1	D	122	VAL
1	D	123	LYS
1	D	125	PHE
1	D	138	SER
1	D	142	MET
1	D	143	SER
1	D	145	THR
1	D	219	LEU
1	D	221	GLU
1	D	233	VAL
1	D	246	ASP
1	D	253	ILE
1	D	279	LEU
1	D	287	SER
1	D	317	VAL
1	D	371	VAL
1	D	373	ASN
1	D	379	THR
1	D	382	THR
1	D	423	LEU
1	D	435	SER

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Mol	Chain	Res	Type
1	D	449	VAL
1	D	459	THR
1	D	498	LEU
1	E	3	ARG
1	E	11	LYS
1	E	17	VAL
1	E	18	LEU
1	E	26	LYS
1	E	29	GLU
1	E	40	GLU
1	E	41	ASP
1	E	56	GLU
1	E	87	LEU
1	E	104	LYS
1	E	107	SER
1	E	128	LYS
1	E	136	GLN
1	E	180	GLU
1	E	182	ILE
1	E	201	VAL
1	E	219	LEU
1	E	222	ARG
1	E	226	LEU
1	E	233	VAL
1	E	242	THR
1	E	244	ASP
1	E	249	ILE
1	E	253	ILE
1	E	257	LYS
1	E	263	GLU
1	E	282	SER
1	E	286	THR
1	E	290	THR
1	E	310	THR
1	E	314	LEU
1	E	325	ASP
1	E	331	LYS
1	E	345	GLU
1	E	346	VAL
1	E	371	VAL
1	E	378	LYS
1	E	388	ILE

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Mol	Chain	Res	Type
1	E	398	LEU
1	E	402	ILE
1	E	404	GLU
1	E	416	SER
1	E	417	TYR
1	E	419	VAL
1	E	423	LEU
1	E	425	LYS
1	E	429	ILE
1	E	432	ILE
1	E	437	LEU
1	E	438	GLU
1	E	445	ASN
1	E	450	ILE
1	E	456	SER
1	E	459	THR
1	E	464	ASP
1	E	472	GLU
1	E	473	LEU
1	E	475	LYS
1	E	477	LEU
1	E	481	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	408	GLN
1	A	436	GLN
1	A	462	ASN
1	B	408	GLN
1	C	200	HIS
1	C	321	GLN
1	C	355	HIS
1	C	480	HIS
1	D	175	HIS
1	D	223	HIS
1	D	408	GLN
1	D	436	GLN
1	E	38	ASN
1	E	136	GLN
1	E	436	GLN
1	E	442	ASN

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Mol	Chain	Res	Type
1	E	495	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 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	SEP	A	358	1	8,9,10	0.75	0	8,12,14	0.67	0
1	SEP	D	358	1	8,9,10	0.73	0	8,12,14	0.83	0
1	SEP	B	358	1	8,9,10	0.73	0	8,12,14	0.65	0
1	SEP	C	358	1	8,9,10	0.75	0	8,12,14	0.65	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	SEP	A	358	1	-	3/5/8/10	-
1	SEP	D	358	1	-	1/5/8/10	-
1	SEP	B	358	1	-	0/5/8/10	-
1	SEP	C	358	1	-	4/5/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	358	SEP	CB-OG-P-O2P
1	A	358	SEP	CB-OG-P-O3P
1	C	358	SEP	N-CA-CB-OG
1	C	358	SEP	CB-OG-P-O2P
1	C	358	SEP	CB-OG-P-O3P
1	D	358	SEP	N-CA-CB-OG
1	A	358	SEP	CB-OG-P-O1P
1	C	358	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	500/507 (98%)	-0.34	3 (0%) 85 88	31, 50, 85, 183	0
1	B	499/507 (98%)	0.21	12 (2%) 59 64	41, 72, 118, 170	0
1	C	500/507 (98%)	0.50	27 (5%) 32 36	51, 87, 127, 191	0
1	D	496/507 (97%)	0.71	39 (7%) 20 23	60, 98, 135, 170	0
1	E	486/507 (95%)	1.26	116 (23%) 2 3	48, 120, 158, 192	0
All	All	2481/2535 (97%)	0.46	197 (7%) 20 23	31, 84, 141, 192	0

All (197) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	367	PHE	6.4
1	E	441	LEU	5.4
1	E	488	VAL	5.3
1	D	171	ALA	5.0
1	E	492	ILE	5.0
1	E	134	LEU	4.4
1	E	440	LEU	4.3
1	C	363	ALA	4.1
1	E	97	LEU	4.0
1	E	25	VAL	3.9
1	E	54	VAL	3.9
1	E	337	LEU	3.9
1	C	282	SER	3.9
1	E	169	PHE	3.9
1	E	379	THR	3.8
1	E	446	THR	3.8
1	E	429	ILE	3.7
1	C	241	TYR	3.6
1	E	388	ILE	3.6
1	D	352	LEU	3.5

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Mol	Chain	Res	Type	RSRZ
1	E	367	PHE	3.5
1	D	279	LEU	3.5
1	E	437	LEU	3.5
1	E	457	VAL	3.4
1	E	385	LEU	3.4
1	C	236	ILE	3.4
1	E	114	LEU	3.4
1	E	99	PRO	3.4
1	E	283	VAL	3.2
1	E	22	PRO	3.2
1	D	32	ILE	3.2
1	B	347	LEU	3.2
1	C	25	VAL	3.2
1	C	62	TYR	3.2
1	E	248	LEU	3.2
1	E	498	LEU	3.2
1	C	68	LEU	3.1
1	E	352	LEU	3.1
1	D	371	VAL	3.1
1	D	25	VAL	3.1
1	D	349	PRO	3.1
1	E	125	PHE	3.1
1	C	202	LEU	3.1
1	C	234	TYR	3.1
1	D	216	PHE	3.1
1	E	249	ILE	3.1
1	E	48	VAL	3.1
1	D	286	THR	3.1
1	E	432	ILE	3.0
1	D	181	ASP	3.0
1	E	251	THR	3.0
1	E	113	ARG	3.0
1	E	484	HIS	3.0
1	E	314	LEU	3.0
1	E	111	GLY	3.0
1	E	110	THR	3.0
1	E	135	ALA	2.9
1	E	392	ALA	2.9
1	E	108	PHE	2.9
1	E	133	PHE	2.9
1	E	117	ALA	2.9
1	E	126	GLU	2.9

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Mol	Chain	Res	Type	RSRZ
1	C	283	VAL	2.9
1	D	314	LEU	2.9
1	D	333	LEU	2.9
1	D	316	PHE	2.8
1	E	34	PHE	2.8
1	E	496	LEU	2.8
1	E	101	VAL	2.8
1	E	124	ALA	2.8
1	C	375	PHE	2.8
1	E	193	PHE	2.7
1	E	234	TYR	2.7
1	D	135	ALA	2.7
1	E	439	ASP	2.7
1	E	161	PHE	2.7
1	B	73	ALA	2.7
1	E	380	ALA	2.7
1	E	473	LEU	2.7
1	B	239	ARG	2.7
1	C	284	ASP	2.7
1	E	286	THR	2.7
1	E	377	VAL	2.6
1	E	121	HIS	2.6
1	E	160	ILE	2.6
1	B	367	PHE	2.6
1	E	96	TRP	2.6
1	E	10	LEU	2.6
1	E	156	ALA	2.6
1	E	127	GLY	2.6
1	E	89	VAL	2.6
1	D	72	LYS	2.6
1	D	234	TYR	2.6
1	E	42	GLY	2.6
1	D	375	PHE	2.6
1	E	277	PHE	2.6
1	E	349	PRO	2.6
1	E	9	TYR	2.6
1	E	116	ILE	2.6
1	D	337	LEU	2.5
1	E	458	LEU	2.5
1	B	375	PHE	2.5
1	C	216	PHE	2.5
1	E	158	TRP	2.5

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Mol	Chain	Res	Type	RSRZ
1	E	91	ARG	2.5
1	D	297	PHE	2.5
1	B	357	GLY	2.5
1	D	170	GLY	2.5
1	D	248	LEU	2.5
1	E	90	LEU	2.5
1	E	191	THR	2.5
1	E	41	ASP	2.5
1	C	350	TYR	2.4
1	E	58	PHE	2.4
1	E	202	LEU	2.4
1	C	176	VAL	2.4
1	D	122	VAL	2.4
1	E	391	VAL	2.4
1	E	378	LYS	2.4
1	A	371	VAL	2.4
1	D	17	VAL	2.4
1	D	379	THR	2.4
1	C	225	PHE	2.4
1	D	361	PHE	2.4
1	E	366	TYR	2.4
1	E	171	ALA	2.4
1	E	311	ASN	2.3
1	E	23	ALA	2.3
1	E	403	HIS	2.3
1	E	316	PHE	2.3
1	E	119	PRO	2.3
1	C	279	LEU	2.3
1	C	302	LEU	2.3
1	D	68	LEU	2.3
1	A	375	PHE	2.3
1	E	39	ARG	2.3
1	D	298	ILE	2.3
1	D	134	LEU	2.3
1	B	70	LYS	2.3
1	E	123	LYS	2.3
1	B	30	ASP	2.3
1	B	40	GLU	2.3
1	C	255	TYR	2.3
1	E	499	LEU	2.2
1	D	391	VAL	2.2
1	E	168	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
1	E	415	ALA	2.2
1	D	39	ARG	2.2
1	D	396	PRO	2.2
1	C	404	GLU	2.2
1	E	302	LEU	2.2
1	E	381	GLY	2.2
1	D	236	ILE	2.2
1	D	241	TYR	2.2
1	E	489	ALA	2.2
1	E	330	LEU	2.2
1	E	398	LEU	2.2
1	C	206	THR	2.2
1	E	216	PHE	2.2
1	E	430	SER	2.2
1	E	402	ILE	2.2
1	D	299	VAL	2.2
1	E	454	TYR	2.1
1	D	315	ARG	2.1
1	E	132	PRO	2.1
1	B	379	THR	2.1
1	B	56	GLU	2.1
1	E	79	ILE	2.1
1	E	279	LEU	2.1
1	E	159	GLY	2.1
1	E	348	GLY	2.1
1	E	324	ILE	2.1
1	E	419	VAL	2.1
1	E	31	ALA	2.1
1	E	52	ALA	2.1
1	E	350	TYR	2.1
1	D	257	LYS	2.1
1	E	431	LYS	2.1
1	C	299	VAL	2.0
1	E	77	VAL	2.0
1	B	39	ARG	2.0
1	E	364	TYR	2.0
1	D	378	LYS	2.0
1	E	33	PHE	2.0
1	E	351	LYS	2.0
1	A	1	HIS	2.0
1	C	298	ILE	2.0
1	E	35	MET	2.0

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Mol	Chain	Res	Type	RSRZ
1	C	172	ASP	2.0
1	E	87	LEU	2.0
1	E	109	GLY	2.0
1	C	177	LYS	2.0
1	C	351	LYS	2.0
1	E	365	PRO	2.0
1	E	444	PRO	2.0
1	C	367	PHE	2.0
1	D	169	PHE	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	SEP	D	358	10/11	0.81	0.12	83,97,103,107	0
1	SEP	A	358	10/11	0.85	0.12	43,47,51,57	0
1	SEP	C	358	10/11	0.88	0.12	67,74,82,82	0
1	SEP	B	358	10/11	0.90	0.11	68,71,88,98	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.