



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:31 AM UTC

PDB ID : 3JRM / pdb_00003jrm
Title : Crystal structure of archaeal 20S proteasome in complex with mutated P26 activator
Authors : Stadtmueller, B.M.; Whitby, F.G.; Hill, C.P.
Deposited on : 2009-09-08
Resolution : 2.90 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
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

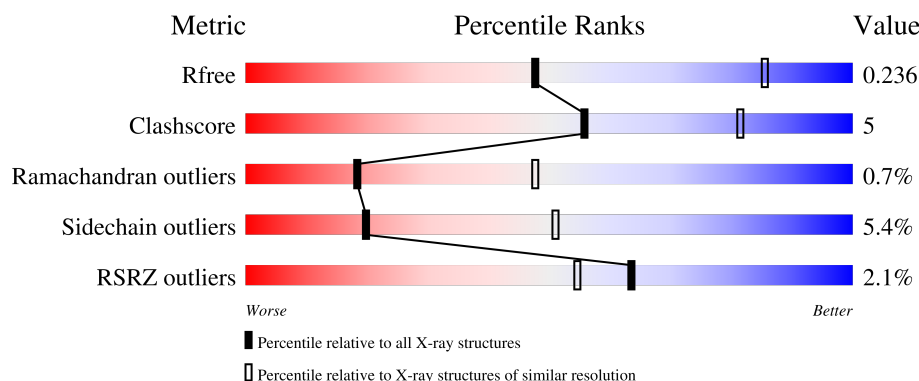
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	227	<div> <div>3%</div> <div>87%</div> <div>9%</div> <div>..</div> </div>
1	B	227	<div> <div>2%</div> <div>87%</div> <div>10%</div> <div>.</div> </div>
1	C	227	<div> <div>2%</div> <div>87%</div> <div>10%</div> <div>..</div> </div>
1	D	227	<div> <div>4%</div> <div>89%</div> <div>8%</div> <div>..</div> </div>
1	E	227	<div> <div>4%</div> <div>86%</div> <div>10%</div> <div>.</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	227	
1	G	227	
2	H	203	
2	I	203	
2	J	203	
2	K	203	
2	L	203	
2	M	203	
2	N	203	
3	O	228	
3	P	228	
3	Q	228	
3	R	228	
3	S	228	
3	T	228	
3	U	228	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 35035 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 Proteasome subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	B	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	C	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	D	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	E	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	F	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			
1	G	227	Total	C	N	O	S	0	0	0
			1768	1123	299	343	3			

- Molecule 2 is a protein called Proteasome subunit beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	I	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	J	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	K	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	L	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	M	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			
2	N	203	Total	C	N	O	S	0	0	0
			1557	985	264	297	11			

- Molecule 3 is a protein called Proteasome activator protein PA26.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	O	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	P	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	Q	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	R	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	S	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	T	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			
3	U	218	Total	C	N	O	S	0	0	0
			1680	1054	296	324	6			

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	49	VAL	THR	variant	UNP Q9U8G2
O	102	ALA	GLU	engineered mutation	UNP Q9U8G2
O	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2
P	49	VAL	THR	variant	UNP Q9U8G2
P	102	ALA	GLU	engineered mutation	UNP Q9U8G2
P	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2
Q	49	VAL	THR	variant	UNP Q9U8G2
Q	102	ALA	GLU	engineered mutation	UNP Q9U8G2
Q	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2
R	49	VAL	THR	variant	UNP Q9U8G2
R	102	ALA	GLU	engineered mutation	UNP Q9U8G2
R	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2
S	49	VAL	THR	variant	UNP Q9U8G2
S	102	ALA	GLU	engineered mutation	UNP Q9U8G2
S	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2
T	49	VAL	THR	variant	UNP Q9U8G2
T	102	ALA	GLU	engineered mutation	UNP Q9U8G2
T	230	TYR	VAL	engineered mutation	UNP Q9U8G2
O	226	THR	SER	engineered mutation	UNP Q9U8G2

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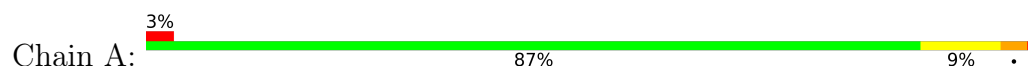
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Chain	Residue	Modelled	Actual	Comment	Reference
U	49	VAL	THR	variant	UNP Q9U8G2
U	102	ALA	GLU	engineered mutation	UNP Q9U8G2
U	230	TYR	VAL	engineered mutation	UNP Q9U8G2

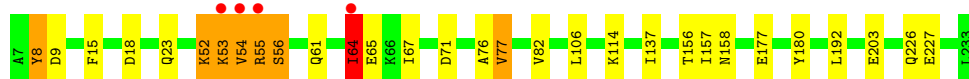
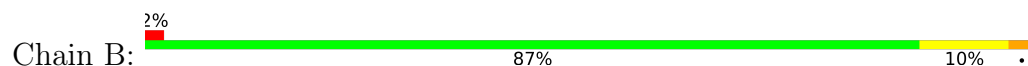
3 Residue-property plots [i](#)

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.

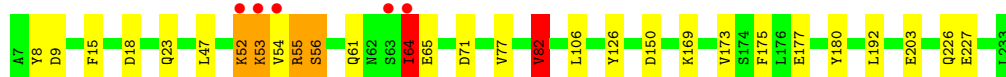
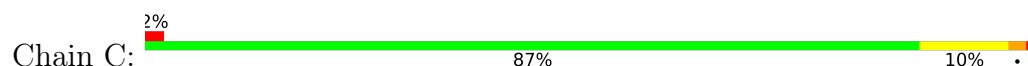
- Molecule 1: Proteasome subunit alpha



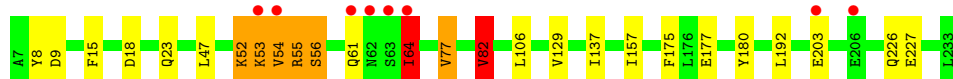
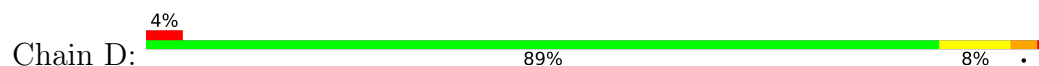
- Molecule 1: Proteasome subunit alpha



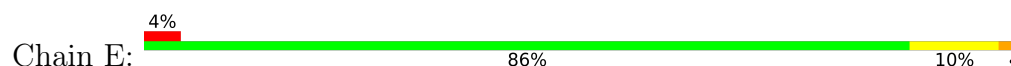
- Molecule 1: Proteasome subunit alpha



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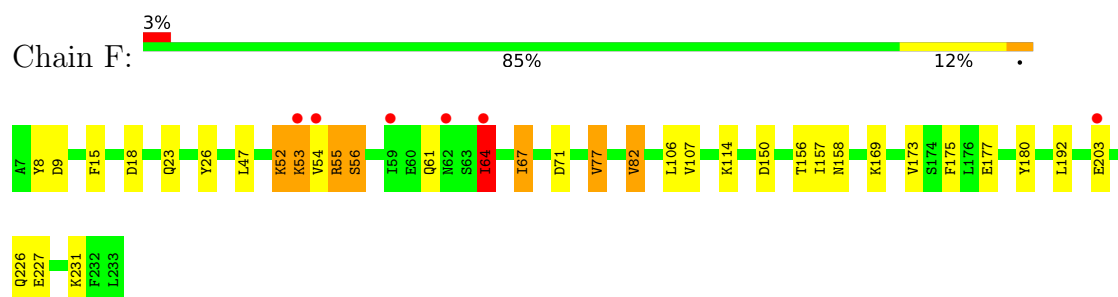


- Molecule 1: Proteasome subunit alpha

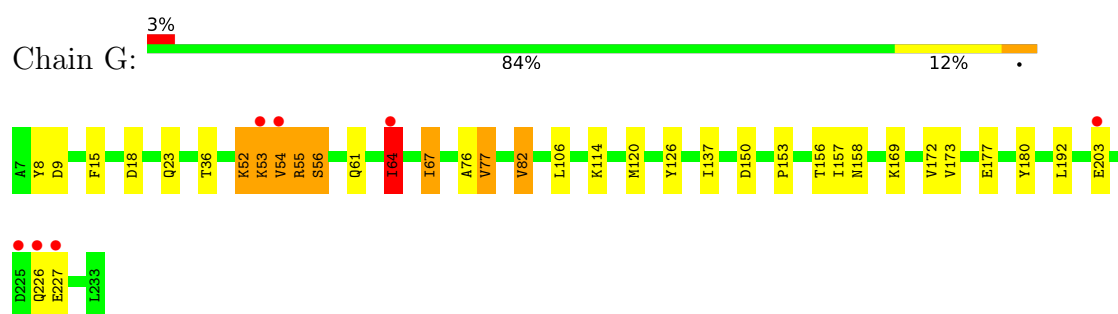




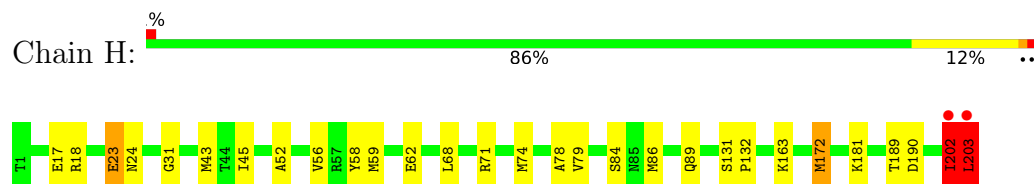
- Molecule 1: Proteasome subunit alpha



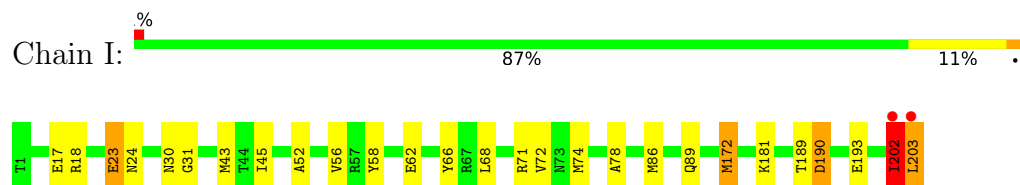
- Molecule 1: Proteasome subunit alpha



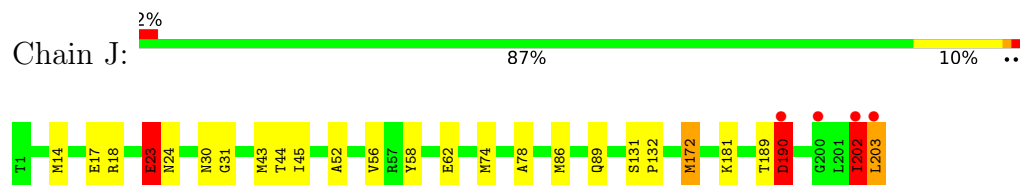
- Molecule 2: Proteasome subunit beta



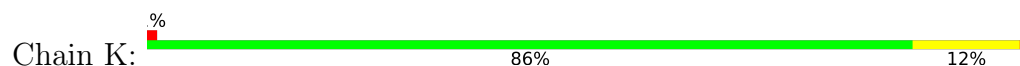
- Molecule 2: Proteasome subunit beta



- Molecule 2: Proteasome subunit beta

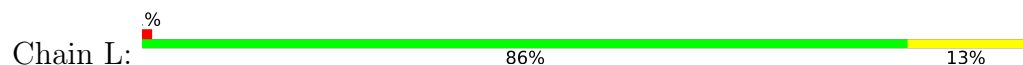


- Molecule 2: Proteasome subunit beta

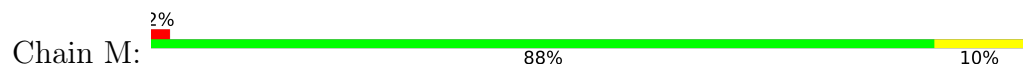




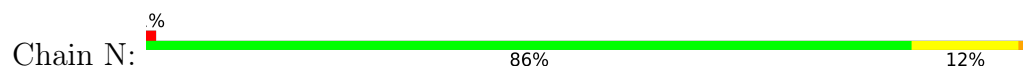
- Molecule 2: Proteasome subunit beta



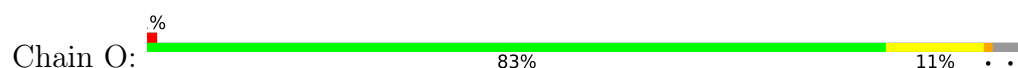
- Molecule 2: Proteasome subunit beta



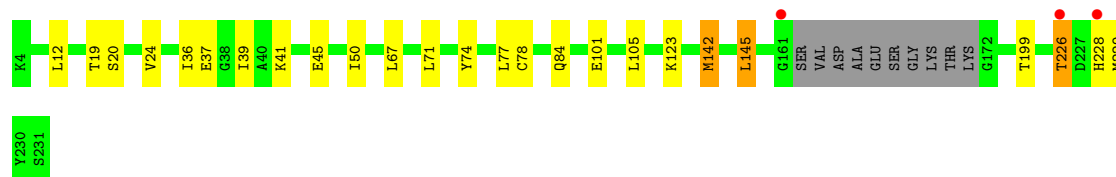
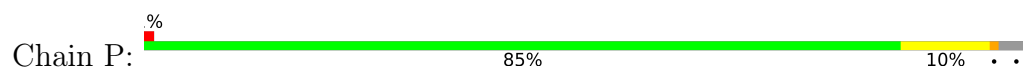
- Molecule 2: Proteasome subunit beta



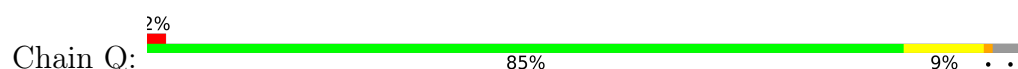
- Molecule 3: Proteasome activator protein PA26



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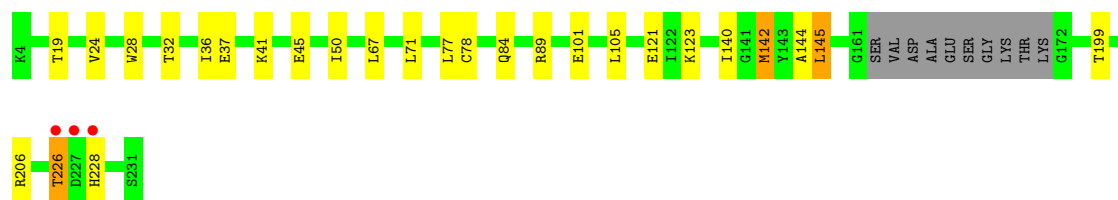
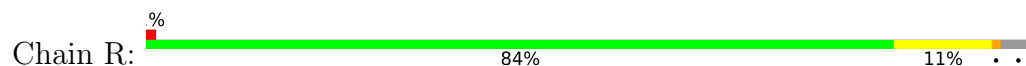


- Molecule 3: Proteasome activator protein PA26

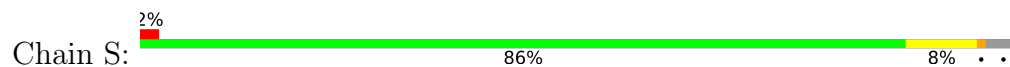




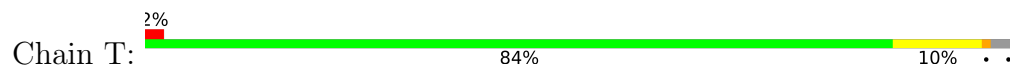
• Molecule 3: Proteasome activator protein PA26



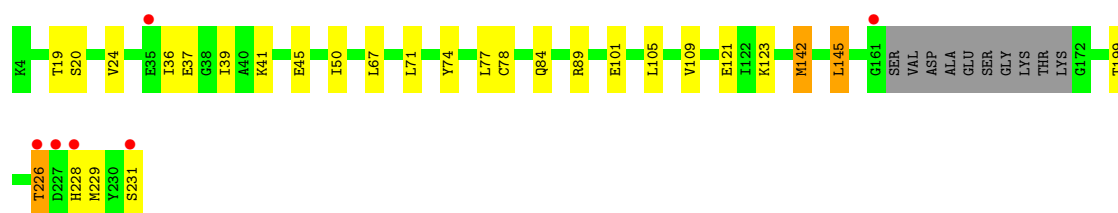
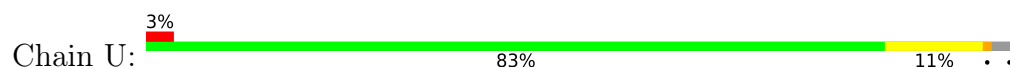
• Molecule 3: Proteasome activator protein PA26



• Molecule 3: Proteasome activator protein PA26



• Molecule 3: Proteasome activator protein PA26



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	255.07Å 126.36Å 180.78Å 90.00° 92.54° 90.00°	Depositor
Resolution (Å)	29.82 – 2.90 29.82 – 2.90	Depositor EDS
% Data completeness (in resolution range)	98.6 (29.82-2.90) 98.5 (29.82-2.90)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.82 (at 2.90Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.201 , 0.233 0.207 , 0.236	Depositor DCC
R_{free} test set	2516 reflections (1.98%)	wwPDB-VP
Wilson B-factor (Å ²)	46.3	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 18.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	0.000 for -h,-k,l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	35035	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.75% 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

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	0.89	2/1792 (0.1%)	0.89	1/2416 (0.0%)
1	B	0.91	2/1792 (0.1%)	0.89	0/2416
1	C	0.90	1/1792 (0.1%)	0.88	1/2416 (0.0%)
1	D	0.90	2/1792 (0.1%)	0.90	1/2416 (0.0%)
1	E	0.89	1/1792 (0.1%)	0.90	0/2416
1	F	0.88	1/1792 (0.1%)	0.89	0/2416
1	G	0.90	1/1792 (0.1%)	0.88	0/2416
2	H	0.95	4/1576 (0.3%)	0.88	0/2129
2	I	0.96	4/1576 (0.3%)	0.89	0/2129
2	J	0.96	4/1576 (0.3%)	0.87	1/2129 (0.0%)
2	K	0.94	5/1576 (0.3%)	0.88	0/2129
2	L	0.96	5/1576 (0.3%)	0.87	0/2129
2	M	0.96	5/1576 (0.3%)	0.91	1/2129 (0.0%)
2	N	0.96	4/1576 (0.3%)	0.88	0/2129
3	O	0.83	1/1704 (0.1%)	0.87	0/2304
3	P	0.80	1/1704 (0.1%)	0.86	0/2304
3	Q	0.81	1/1704 (0.1%)	0.86	0/2304
3	R	0.82	1/1704 (0.1%)	0.88	0/2304
3	S	0.85	1/1704 (0.1%)	0.86	0/2304
3	T	0.86	1/1704 (0.1%)	0.90	0/2304
3	U	0.83	1/1704 (0.1%)	0.89	0/2304
All	All	0.89	48/35504 (0.1%)	0.88	5/47943 (0.0%)

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	2
1	B	0	2
1	C	0	2
1	D	0	2

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	E	0	1
1	F	0	1
1	G	0	2
All	All	0	12

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	J	202	ILE	CA-C	8.73	1.63	1.52
2	I	202	ILE	CA-C	8.31	1.63	1.52
2	N	202	ILE	CA-C	8.18	1.63	1.52
2	K	202	ILE	CA-CB	8.13	1.65	1.54
2	I	202	ILE	CA-CB	8.04	1.65	1.54
2	H	202	ILE	CA-CB	8.02	1.65	1.54
2	M	202	ILE	CA-CB	7.96	1.65	1.54
2	L	202	ILE	CA-C	7.79	1.62	1.52
2	K	202	ILE	CA-C	7.75	1.62	1.52
2	H	202	ILE	CA-C	7.70	1.62	1.52
2	J	202	ILE	CA-CB	7.68	1.65	1.54
2	M	202	ILE	CA-C	7.62	1.62	1.52
2	L	202	ILE	CA-CB	7.47	1.64	1.54
2	N	202	ILE	CA-CB	7.35	1.64	1.54
3	O	226	THR	CA-CB	6.87	1.61	1.53
2	K	202	ILE	N-CA	6.61	1.54	1.46
2	L	201	LEU	CA-C	6.56	1.60	1.53
2	I	202	ILE	N-CA	6.51	1.54	1.46
2	J	202	ILE	N-CA	6.42	1.54	1.46
2	H	202	ILE	N-CA	6.24	1.54	1.46
2	M	202	ILE	N-CA	6.22	1.54	1.46
2	N	202	ILE	N-CA	6.15	1.54	1.46
1	G	54	VAL	CA-CB	6.11	1.62	1.54
2	L	202	ILE	N-CA	6.10	1.53	1.46
3	T	226	THR	CA-CB	5.93	1.60	1.52
1	B	64	ILE	CA-CB	5.92	1.62	1.54
2	K	203	LEU	N-CA	5.84	1.57	1.46
1	D	54	VAL	CA-CB	5.81	1.61	1.54
2	K	201	LEU	CA-C	5.74	1.59	1.53
2	H	203	LEU	N-CA	5.68	1.57	1.46
1	D	64	ILE	CA-CB	5.65	1.62	1.54
3	P	226	THR	CA-CB	5.65	1.60	1.52
2	L	203	LEU	N-CA	5.54	1.56	1.46
3	U	226	THR	CA-CB	5.54	1.60	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	Q	226	THR	CA-CB	5.53	1.60	1.53
2	I	203	LEU	N-CA	5.49	1.56	1.46
2	M	203	LEU	N-CA	5.38	1.56	1.46
2	M	201	LEU	CA-C	5.36	1.58	1.53
1	F	54	VAL	CA-CB	5.23	1.61	1.54
1	A	64	ILE	CA-CB	5.21	1.61	1.54
1	B	54	VAL	CA-CB	5.20	1.60	1.54
1	E	54	VAL	CA-CB	5.12	1.60	1.54
1	C	64	ILE	CA-CB	5.10	1.61	1.54
3	S	226	THR	CA-CB	5.08	1.59	1.52
3	R	226	THR	CA-CB	5.07	1.59	1.53
2	J	203	LEU	N-CA	5.05	1.55	1.46
1	A	54	VAL	CA-CB	5.03	1.60	1.54
2	N	203	LEU	N-CA	5.02	1.55	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	82	VAL	N-CA-C	5.59	115.79	110.42
1	D	82	VAL	N-CA-C	5.49	115.69	110.42
1	C	82	VAL	N-CA-C	5.31	115.51	110.42
2	M	190	ASP	N-CA-CB	5.20	117.69	109.94
2	J	190	ASP	N-CA-CB	5.12	117.57	109.94

There are no chirality outliers.

All (12) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	54	VAL	Peptide
1	A	8	TYR	Peptide
1	B	54	VAL	Peptide
1	B	8	TYR	Peptide
1	C	54	VAL	Peptide
1	C	8	TYR	Peptide
1	D	54	VAL	Peptide
1	D	8	TYR	Peptide
1	E	54	VAL	Peptide
1	F	8	TYR	Peptide
1	G	54	VAL	Peptide
1	G	8	TYR	Peptide

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	1768	0	1800	18	0
1	B	1768	0	1800	18	0
1	C	1768	0	1800	20	0
1	D	1768	0	1800	21	0
1	E	1768	0	1800	25	0
1	F	1768	0	1800	31	0
1	G	1768	0	1800	23	0
2	H	1557	0	1609	16	0
2	I	1557	0	1609	17	0
2	J	1557	0	1609	16	0
2	K	1557	0	1609	15	0
2	L	1557	0	1609	17	0
2	M	1557	0	1609	16	0
2	N	1557	0	1609	15	0
3	O	1680	0	1701	19	0
3	P	1680	0	1701	16	0
3	Q	1680	0	1701	14	0
3	R	1680	0	1701	15	0
3	S	1680	0	1701	14	0
3	T	1680	0	1701	23	0
3	U	1680	0	1701	19	0
All	All	35035	0	35770	331	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 5.

All (331) 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)
2:I:43:MET:HE3	2:I:56:VAL:HG22	1.63	0.79
2:L:43:MET:HE3	2:L:56:VAL:HG22	1.64	0.79
2:H:43:MET:HE3	2:H:56:VAL:HG22	1.65	0.79
3:R:50:ILE:HD11	3:R:67:LEU:HD21	1.64	0.77
3:Q:50:ILE:HD11	3:Q:67:LEU:HD21	1.67	0.77
2:I:43:MET:CE	2:I:56:VAL:HG22	2.15	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:S:50:ILE:HD11	3:S:67:LEU:HD21	1.67	0.76
3:O:50:ILE:HD11	3:O:67:LEU:HD21	1.69	0.75
2:N:43:MET:HE3	2:N:56:VAL:HG22	1.69	0.74
3:Q:226:THR:HG21	3:Q:228:HIS:CD2	2.22	0.74
2:J:43:MET:HE3	2:J:56:VAL:HG22	1.69	0.74
2:L:43:MET:HE1	2:L:56:VAL:HA	1.70	0.74
2:H:43:MET:HE1	2:H:56:VAL:HA	1.70	0.74
2:K:43:MET:HE3	2:K:56:VAL:HG22	1.70	0.73
3:O:226:THR:HG21	3:O:228:HIS:CD2	2.24	0.73
3:U:226:THR:HG21	3:U:228:HIS:CD2	2.23	0.73
3:P:226:THR:HG21	3:P:228:HIS:CD2	2.24	0.73
3:R:226:THR:HG21	3:R:228:HIS:CD2	2.25	0.71
3:T:50:ILE:HD11	3:T:67:LEU:HD21	1.72	0.71
3:S:226:THR:HG21	3:S:228:HIS:CD2	2.25	0.71
3:T:226:THR:HG21	3:T:228:HIS:CD2	2.25	0.71
2:L:43:MET:CE	2:L:56:VAL:HG22	2.21	0.70
2:N:43:MET:HE1	2:N:56:VAL:HA	1.73	0.70
3:P:50:ILE:HD11	3:P:67:LEU:HD21	1.74	0.69
2:J:43:MET:HE1	2:J:56:VAL:HA	1.74	0.69
2:N:43:MET:CE	2:N:56:VAL:HG22	2.23	0.69
2:I:43:MET:HE1	2:I:56:VAL:HA	1.75	0.67
2:K:43:MET:CE	2:K:56:VAL:HG22	2.23	0.67
3:U:50:ILE:HD11	3:U:67:LEU:HD21	1.77	0.67
2:H:43:MET:CE	2:H:56:VAL:HG22	2.25	0.66
2:K:43:MET:HE1	2:K:56:VAL:HA	1.78	0.65
2:M:43:MET:HE3	2:M:56:VAL:HG22	1.79	0.64
2:J:43:MET:CE	2:J:56:VAL:HG22	2.28	0.63
2:M:24:ASN:HD22	2:M:24:ASN:H	1.47	0.62
2:K:172:MET:HE3	2:K:189:THR:HG23	1.82	0.61
3:Q:226:THR:CG2	3:Q:228:HIS:CD2	2.85	0.60
1:E:82:VAL:HG22	3:U:229:MET:O	2.02	0.60
2:M:43:MET:HE1	2:M:56:VAL:HA	1.82	0.60
2:N:24:ASN:H	2:N:24:ASN:HD22	1.50	0.59
3:O:226:THR:CG2	3:O:228:HIS:CD2	2.85	0.59
3:T:226:THR:CG2	3:T:228:HIS:CD2	2.86	0.59
3:S:101:GLU:HG2	3:T:105:LEU:HD22	1.85	0.59
3:U:226:THR:CG2	3:U:228:HIS:CD2	2.86	0.58
3:P:226:THR:CG2	3:P:228:HIS:CD2	2.85	0.58
3:R:226:THR:CG2	3:R:228:HIS:CD2	2.85	0.58
1:F:107:VAL:HG11	2:M:72:VAL:HG21	1.85	0.58
2:J:24:ASN:HD22	2:J:24:ASN:H	1.49	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:M:43:MET:CE	2:M:56:VAL:HG22	2.34	0.57
3:O:105:LEU:HD22	3:U:101:GLU:HG2	1.86	0.57
2:L:24:ASN:H	2:L:24:ASN:HD22	1.52	0.57
3:S:226:THR:CG2	3:S:228:HIS:CD2	2.87	0.57
3:T:78:CYS:HB2	3:T:142:MET:HE3	1.85	0.57
2:K:24:ASN:HD22	2:K:24:ASN:H	1.53	0.56
3:O:78:CYS:HB2	3:O:142:MET:HE3	1.88	0.55
3:U:71:LEU:HB2	3:U:145:LEU:HD13	1.88	0.55
3:Q:78:CYS:HB2	3:Q:142:MET:HE3	1.88	0.55
2:H:172:MET:HE3	2:H:189:THR:HG23	1.89	0.55
1:B:15:PHE:N	1:C:23:GLN:OE1	2.40	0.55
1:E:15:PHE:N	1:F:23:GLN:OE1	2.40	0.54
1:A:9:ASP:O	1:A:23:GLN:NE2	2.41	0.54
2:L:172:MET:HE3	2:L:189:THR:HG23	1.88	0.54
3:S:78:CYS:HB2	3:S:142:MET:HE3	1.90	0.54
2:N:74:MET:HG2	2:N:78:ALA:HB3	1.90	0.54
1:E:17:PRO:HA	1:F:26:TYR:CG	2.44	0.53
1:G:9:ASP:O	1:G:23:GLN:NE2	2.42	0.53
3:R:78:CYS:HB2	3:R:142:MET:HE3	1.89	0.53
3:R:36:ILE:HG12	3:R:77:LEU:HD21	1.90	0.53
3:Q:101:GLU:HG2	3:R:105:LEU:HD22	1.91	0.53
3:U:78:CYS:HB2	3:U:142:MET:HE3	1.90	0.53
1:F:55:ARG:O	1:F:56:SER:CB	2.57	0.53
2:I:24:ASN:H	2:I:24:ASN:HD22	1.54	0.52
1:D:82:VAL:HG13	3:T:231:SER:CB	2.39	0.52
3:O:71:LEU:HB2	3:O:145:LEU:HD13	1.90	0.52
3:R:101:GLU:HG2	3:S:105:LEU:HD22	1.91	0.52
1:D:9:ASP:O	1:D:23:GLN:NE2	2.43	0.52
1:E:9:ASP:O	1:E:23:GLN:NE2	2.43	0.52
1:G:64:ILE:N	1:G:64:ILE:HD12	2.25	0.51
1:C:64:ILE:N	1:C:64:ILE:HD12	2.24	0.51
1:D:15:PHE:N	1:E:23:GLN:OE1	2.42	0.51
1:F:9:ASP:O	1:F:23:GLN:NE2	2.43	0.51
2:H:24:ASN:HD22	2:H:24:ASN:H	1.58	0.51
2:K:74:MET:HG2	2:K:78:ALA:HB3	1.92	0.51
2:L:74:MET:HG2	2:L:78:ALA:HB3	1.93	0.51
2:I:74:MET:HG2	2:I:78:ALA:HB3	1.92	0.51
1:F:15:PHE:N	1:G:23:GLN:OE1	2.42	0.51
3:Q:71:LEU:HB2	3:Q:145:LEU:HD13	1.92	0.51
1:F:55:ARG:O	1:F:56:SER:HB2	2.11	0.51
3:P:71:LEU:HB2	3:P:145:LEU:HD13	1.92	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:P:101:GLU:HG2	3:Q:105:LEU:HD22	1.94	0.50
2:H:74:MET:HG2	2:H:78:ALA:HB3	1.93	0.50
1:A:23:GLN:OE1	1:G:15:PHE:N	2.41	0.50
3:P:78:CYS:HB2	3:P:142:MET:HE3	1.93	0.50
3:T:101:GLU:HG2	3:U:105:LEU:HD22	1.91	0.50
3:U:71:LEU:CB	3:U:145:LEU:HD13	2.41	0.50
2:J:14:MET:HE2	2:J:44:THR:HG23	1.92	0.50
2:J:18:ARG:HD3	2:J:31:GLY:O	2.11	0.50
2:J:74:MET:HG2	2:J:78:ALA:HB3	1.93	0.50
1:F:53:LYS:O	1:F:55:ARG:HG2	2.12	0.50
1:F:64:ILE:HD12	1:F:64:ILE:N	2.27	0.50
1:F:82:VAL:HG22	3:O:229:MET:O	2.12	0.49
3:T:71:LEU:HB2	3:T:145:LEU:HD13	1.95	0.49
2:H:18:ARG:HD3	2:H:31:GLY:O	2.13	0.49
2:M:172:MET:CE	2:M:189:THR:HG23	2.43	0.49
2:L:172:MET:CE	2:L:189:THR:HG23	2.42	0.49
1:C:9:ASP:O	1:C:23:GLN:NE2	2.46	0.49
2:I:172:MET:HE3	2:I:189:THR:HG23	1.95	0.49
2:N:190:ASP:OD1	2:N:190:ASP:N	2.46	0.49
3:R:71:LEU:HB2	3:R:145:LEU:HD13	1.94	0.49
2:M:172:MET:HE3	2:M:189:THR:HG23	1.94	0.48
1:D:82:VAL:CG1	3:T:231:SER:HB2	2.43	0.48
1:D:82:VAL:CG1	3:T:231:SER:CB	2.91	0.48
1:E:158:ASN:HD22	1:F:64:ILE:HG12	1.79	0.48
1:E:82:VAL:CG1	3:U:231:SER:HB2	2.43	0.48
3:O:24:VAL:HG13	3:O:84:GLN:HB3	1.95	0.48
1:A:53:LYS:O	1:A:55:ARG:HG2	2.13	0.48
3:O:71:LEU:CB	3:O:145:LEU:HD13	2.44	0.48
1:C:15:PHE:N	1:D:23:GLN:OE1	2.41	0.48
1:A:64:ILE:HD12	1:A:64:ILE:N	2.29	0.48
3:U:50:ILE:HD11	3:U:67:LEU:HD11	1.96	0.48
1:F:156:THR:HG23	1:G:82:VAL:HG21	1.96	0.47
2:J:172:MET:CE	2:J:189:THR:HG23	2.44	0.47
3:Q:226:THR:HG22	3:Q:228:HIS:H	1.79	0.47
3:P:24:VAL:HG13	3:P:84:GLN:HB3	1.96	0.47
2:J:172:MET:HE3	2:J:189:THR:HG23	1.96	0.47
1:D:53:LYS:O	1:D:55:ARG:HG2	2.14	0.47
2:M:24:ASN:H	2:M:24:ASN:ND2	2.11	0.47
3:O:101:GLU:HG2	3:P:105:LEU:HD22	1.97	0.47
1:E:169:LYS:O	1:E:173:VAL:HG23	2.14	0.47
1:B:8:TYR:OH	1:C:9:ASP:OD2	2.22	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:55:ARG:O	1:E:56:SER:CB	2.62	0.47
3:P:71:LEU:CB	3:P:145:LEU:HD13	2.45	0.47
1:C:65:GLU:OE2	2:I:71:ARG:NH2	2.46	0.47
2:M:58:TYR:HD1	2:M:86:MET:HE1	1.80	0.47
1:E:156:THR:HG23	1:F:82:VAL:HG21	1.97	0.47
3:Q:71:LEU:CB	3:Q:145:LEU:HD13	2.45	0.47
2:H:172:MET:CE	2:H:189:THR:HG23	2.44	0.47
1:A:55:ARG:O	1:A:56:SER:CB	2.63	0.46
2:M:74:MET:HG2	2:M:78:ALA:HB3	1.96	0.46
3:S:226:THR:HG22	3:S:228:HIS:H	1.80	0.46
1:C:53:LYS:O	1:C:55:ARG:HG2	2.15	0.46
3:R:24:VAL:HG13	3:R:84:GLN:HB3	1.97	0.46
1:D:82:VAL:HG13	3:T:231:SER:HB2	1.97	0.46
1:F:67:ILE:HG12	1:F:77:VAL:CG1	2.45	0.46
2:N:58:TYR:HD1	2:N:86:MET:HE1	1.81	0.46
3:O:36:ILE:HG12	3:O:77:LEU:HD21	1.98	0.46
3:S:71:LEU:HB2	3:S:145:LEU:HD13	1.97	0.46
1:B:53:LYS:O	1:B:55:ARG:HG2	2.16	0.46
2:N:24:ASN:H	2:N:24:ASN:ND2	2.13	0.46
2:K:45:ILE:HB	2:K:52:ALA:HB1	1.97	0.46
2:L:18:ARG:HD3	2:L:31:GLY:O	2.16	0.46
1:E:55:ARG:O	1:E:56:SER:HB2	2.16	0.46
1:G:52:LYS:NZ	1:G:61:GLN:HG2	2.31	0.46
1:F:158:ASN:HA	1:G:64:ILE:HG12	1.98	0.46
1:A:55:ARG:O	1:A:56:SER:HB2	2.16	0.45
1:E:64:ILE:N	1:E:64:ILE:HD12	2.32	0.45
1:B:64:ILE:N	1:B:64:ILE:HD12	2.32	0.45
1:D:64:ILE:HD12	1:D:64:ILE:N	2.31	0.45
3:Q:36:ILE:HG12	3:Q:77:LEU:HD21	1.99	0.45
3:S:99:HIS:HB3	3:T:109:VAL:HG22	1.99	0.45
1:G:53:LYS:O	1:G:55:ARG:HG2	2.17	0.45
2:K:114:ASP:OD1	2:K:114:ASP:C	2.60	0.45
3:R:71:LEU:CB	3:R:145:LEU:HD13	2.47	0.45
3:S:24:VAL:HG13	3:S:84:GLN:HB3	1.98	0.45
1:A:65:GLU:OE2	2:N:71:ARG:NH2	2.47	0.45
1:B:180:TYR:HA	1:B:192:LEU:HD21	1.99	0.45
2:I:58:TYR:HD1	2:I:86:MET:HE1	1.81	0.45
3:U:24:VAL:HG13	3:U:84:GLN:HB3	1.97	0.45
1:B:156:THR:HG23	1:C:82:VAL:HG21	1.99	0.45
1:D:55:ARG:O	1:D:56:SER:CB	2.65	0.45
1:E:17:PRO:HB3	3:P:105:LEU:HD11	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:172:MET:CE	2:K:189:THR:HG23	2.45	0.45
3:P:226:THR:HG22	3:P:228:HIS:H	1.81	0.45
3:U:226:THR:HG22	3:U:228:HIS:H	1.80	0.45
1:A:67:ILE:HG12	1:A:77:VAL:CG1	2.46	0.45
1:B:55:ARG:O	1:B:56:SER:CB	2.64	0.45
2:J:24:ASN:H	2:J:24:ASN:ND2	2.14	0.45
2:M:18:ARG:HD3	2:M:31:GLY:O	2.17	0.45
1:F:52:LYS:NZ	1:F:61:GLN:HG2	2.32	0.45
1:B:65:GLU:OE2	2:H:71:ARG:NH2	2.50	0.44
1:E:53:LYS:O	1:E:55:ARG:HG2	2.16	0.44
1:E:82:VAL:CG1	3:U:231:SER:CB	2.95	0.44
1:F:82:VAL:CG1	3:O:231:SER:HB2	2.47	0.44
3:R:226:THR:HG22	3:R:228:HIS:H	1.82	0.44
1:C:52:LYS:NZ	1:C:61:GLN:HG2	2.32	0.44
1:C:150:ASP:OD1	1:C:150:ASP:C	2.60	0.44
2:K:18:ARG:HD3	2:K:31:GLY:O	2.17	0.44
3:P:36:ILE:HG12	3:P:77:LEU:HD21	1.99	0.44
1:C:47:LEU:C	1:C:47:LEU:HD12	2.42	0.44
1:G:67:ILE:HG12	1:G:77:VAL:CG1	2.47	0.44
3:T:36:ILE:HG12	3:T:77:LEU:HD21	2.00	0.44
2:I:18:ARG:HB3	2:I:30:ASN:HA	2.00	0.44
2:J:58:TYR:HD1	2:J:86:MET:HE1	1.83	0.44
1:F:55:ARG:O	1:F:55:ARG:NH1	2.51	0.44
3:T:78:CYS:CB	3:T:142:MET:HE3	2.47	0.44
1:B:77:VAL:HG23	1:B:137:ILE:HB	2.00	0.43
1:C:71:ASP:HA	2:I:68:LEU:HD11	2.00	0.43
1:C:126:TYR:CD1	1:D:129:VAL:HG12	2.53	0.43
2:I:190:ASP:OD1	2:I:190:ASP:N	2.49	0.43
3:T:226:THR:HG22	3:T:228:HIS:H	1.83	0.43
3:U:36:ILE:HG12	3:U:77:LEU:HD21	1.99	0.43
1:A:52:LYS:NZ	1:A:61:GLN:HG2	2.33	0.43
1:E:67:ILE:HG12	1:E:77:VAL:CG1	2.47	0.43
2:I:18:ARG:HD3	2:I:31:GLY:O	2.19	0.43
2:L:114:ASP:OD1	2:L:114:ASP:C	2.60	0.43
3:S:101:GLU:CG	3:T:105:LEU:HD22	2.48	0.43
3:T:99:HIS:HB3	3:U:109:VAL:HG22	1.99	0.43
1:C:55:ARG:O	1:C:56:SER:HB2	2.18	0.43
1:D:82:VAL:CG1	3:T:231:SER:HB3	2.49	0.43
1:G:77:VAL:HG23	1:G:137:ILE:HB	2.01	0.43
1:G:82:VAL:HG22	3:P:229:MET:O	2.17	0.43
1:D:77:VAL:HG23	1:D:137:ILE:HB	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:O:140:ILE:HG22	3:O:197:ALA:HB2	2.00	0.43
1:A:71:ASP:HA	2:N:68:LEU:HD11	2.01	0.43
1:A:129:VAL:HG12	1:G:126:TYR:CD1	2.54	0.43
1:B:55:ARG:O	1:B:56:SER:HB2	2.19	0.43
1:B:114:LYS:HA	1:B:157:ILE:HD11	1.99	0.43
1:G:169:LYS:O	1:G:173:VAL:HG23	2.18	0.43
1:G:180:TYR:HA	1:G:192:LEU:HD21	2.01	0.43
3:O:226:THR:HG22	3:O:228:HIS:H	1.84	0.43
3:T:71:LEU:CB	3:T:145:LEU:HD13	2.48	0.43
2:I:66:TYR:CD2	2:I:74:MET:HE2	2.53	0.43
3:R:140:ILE:HD11	3:R:144:ALA:HB1	2.01	0.43
3:T:24:VAL:HG13	3:T:84:GLN:HB3	2.00	0.43
1:G:114:LYS:HA	1:G:157:ILE:HD11	2.00	0.43
2:L:14:MET:HE2	2:L:44:THR:HG23	2.01	0.43
3:O:159:LEU:O	3:O:173:GLY:HA3	2.19	0.43
1:E:142:ASP:OD1	1:E:142:ASP:C	2.62	0.42
2:K:18:ARG:HB3	2:K:30:ASN:HA	2.01	0.42
1:D:52:LYS:NZ	1:D:61:GLN:HG2	2.34	0.42
1:B:158:ASN:HA	1:C:64:ILE:HG12	2.01	0.42
1:C:55:ARG:O	1:C:56:SER:CB	2.67	0.42
1:C:175:PHE:CD1	1:C:175:PHE:C	2.97	0.42
1:D:180:TYR:HA	1:D:192:LEU:HD21	2.01	0.42
1:D:55:ARG:O	1:D:56:SER:HB2	2.19	0.42
1:E:77:VAL:HG23	1:E:137:ILE:HB	2.00	0.42
1:A:157:ILE:HG21	1:A:157:ILE:HD13	1.84	0.42
1:C:55:ARG:HB2	1:C:55:ARG:CZ	2.50	0.42
1:D:55:ARG:O	1:D:55:ARG:NH1	2.52	0.42
1:E:152:ASP:HB2	1:E:153:PRO:HD2	2.01	0.42
1:A:180:TYR:HA	1:A:192:LEU:HD21	2.02	0.42
1:F:180:TYR:HA	1:F:192:LEU:HD21	2.02	0.42
1:G:55:ARG:O	1:G:56:SER:CB	2.67	0.42
3:P:39:ILE:HD13	3:P:74:TYR:HA	2.01	0.42
1:D:55:ARG:CZ	1:D:55:ARG:HB2	2.50	0.42
1:G:120:MET:HE2	1:G:153:PRO:HA	2.02	0.42
2:I:45:ILE:HB	2:I:52:ALA:HB1	2.01	0.42
1:B:9:ASP:O	1:B:23:GLN:NE2	2.52	0.42
2:H:23:GLU:HB3	2:H:24:ASN:H	1.69	0.42
3:P:50:ILE:HD11	3:P:67:LEU:HD11	2.00	0.42
3:U:89:ARG:HD3	3:U:121:GLU:OE2	2.19	0.42
1:F:169:LYS:O	1:F:173:VAL:HG23	2.19	0.42
3:P:12:LEU:HD22	3:Q:206:ARG:HD3	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:64:ILE:HG12	1:G:158:ASN:HA	2.02	0.42
1:C:180:TYR:HA	1:C:192:LEU:HD21	2.02	0.42
1:E:17:PRO:HA	1:F:26:TYR:CD2	2.54	0.42
2:H:58:TYR:HD1	2:H:86:MET:HE1	1.85	0.42
2:H:163:LYS:NZ	2:H:203:LEU:HB3	2.34	0.42
2:J:190:ASP:OD1	2:J:190:ASP:N	2.52	0.42
1:A:82:VAL:HG21	1:G:156:THR:HG23	2.01	0.41
1:C:169:LYS:O	1:C:173:VAL:HG23	2.20	0.41
2:K:14:MET:HE2	2:K:44:THR:HG23	2.02	0.41
3:Q:24:VAL:HG13	3:Q:84:GLN:HB3	2.01	0.41
1:A:47:LEU:C	1:A:47:LEU:HD12	2.45	0.41
1:B:67:ILE:HG12	1:B:77:VAL:CG1	2.49	0.41
1:F:107:VAL:HG11	2:M:72:VAL:CG2	2.50	0.41
2:L:45:ILE:HB	2:L:52:ALA:HB1	2.01	0.41
1:D:175:PHE:CD1	1:D:175:PHE:C	2.99	0.41
1:F:150:ASP:C	1:F:150:ASP:OD1	2.63	0.41
3:T:116:ILE:HG21	3:T:116:ILE:HD13	1.79	0.41
1:E:17:PRO:HA	1:F:26:TYR:CD1	2.55	0.41
2:H:45:ILE:HB	2:H:52:ALA:HB1	2.02	0.41
2:I:24:ASN:H	2:I:24:ASN:ND2	2.18	0.41
2:L:18:ARG:HB3	2:L:30:ASN:HA	2.03	0.41
2:M:63:LEU:CD2	2:M:74:MET:SD	3.09	0.41
2:M:114:ASP:OD1	2:M:114:ASP:C	2.63	0.41
2:N:4:VAL:HG12	2:N:159:ILE:HD11	2.02	0.41
3:O:116:ILE:HD13	3:O:116:ILE:HG21	1.86	0.41
1:D:47:LEU:C	1:D:47:LEU:HD12	2.46	0.41
2:J:45:ILE:HB	2:J:52:ALA:HB1	2.03	0.41
2:K:172:MET:HE2	2:K:193:GLU:HG3	2.02	0.41
2:N:45:ILE:HB	2:N:52:ALA:HB1	2.01	0.41
1:F:71:ASP:HA	2:L:68:LEU:HD11	2.03	0.41
2:L:58:TYR:HD1	2:L:86:MET:HE1	1.84	0.41
2:N:131:SER:N	2:N:132:PRO:CD	2.84	0.41
3:S:159:LEU:O	3:S:173:GLY:HA3	2.21	0.41
1:E:12:ILE:HD12	1:E:12:ILE:HA	1.93	0.41
1:F:67:ILE:HG12	1:F:77:VAL:HG13	2.02	0.41
1:F:114:LYS:HA	1:F:157:ILE:HD11	2.02	0.41
2:H:59:MET:CE	2:H:79:VAL:HG13	2.51	0.41
2:L:43:MET:CE	2:L:56:VAL:HA	2.47	0.41
3:O:105:LEU:HD22	3:U:101:GLU:CG	2.48	0.41
3:S:71:LEU:CB	3:S:145:LEU:HD13	2.50	0.41
1:F:175:PHE:CD1	1:F:175:PHE:C	2.98	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:150:ASP:C	1:G:150:ASP:OD1	2.64	0.41
2:H:131:SER:N	2:H:132:PRO:CD	2.84	0.41
3:O:50:ILE:HD11	3:O:67:LEU:HD11	2.02	0.41
1:E:180:TYR:HA	1:E:192:LEU:HD21	2.03	0.41
2:J:131:SER:N	2:J:132:PRO:CD	2.84	0.41
3:R:89:ARG:HD3	3:R:121:GLU:OE2	2.21	0.41
1:G:55:ARG:O	1:G:56:SER:HB2	2.20	0.41
2:L:24:ASN:H	2:L:24:ASN:ND2	2.18	0.41
1:E:52:LYS:NZ	1:E:61:GLN:HG2	2.35	0.40
1:E:158:ASN:HA	1:F:64:ILE:HG12	2.03	0.40
2:I:172:MET:CE	2:I:193:GLU:HG3	2.51	0.40
2:L:59:MET:CE	2:L:79:VAL:HG13	2.51	0.40
3:Q:12:LEU:HD22	3:R:206:ARG:HD3	2.02	0.40
3:T:226:THR:HG21	3:T:228:HIS:HD2	1.81	0.40
1:A:66:LYS:N	1:A:211:GLU:OE1	2.52	0.40
1:B:71:ASP:HA	2:H:68:LEU:HD11	2.03	0.40
1:F:107:VAL:CG1	2:M:72:VAL:HG21	2.49	0.40
2:J:18:ARG:HB3	2:J:30:ASN:HA	2.02	0.40
2:K:59:MET:CE	2:K:79:VAL:HG13	2.51	0.40
3:R:28:TRP:HA	3:R:32:THR:HB	2.02	0.40
1:A:15:PHE:N	1:B:23:GLN:OE1	2.52	0.40
1:B:76:ALA:HA	1:B:137:ILE:O	2.21	0.40
1:D:157:ILE:HD13	1:D:157:ILE:HG21	1.91	0.40
1:F:47:LEU:C	1:F:47:LEU:HD12	2.46	0.40
1:G:76:ALA:HA	1:G:137:ILE:O	2.22	0.40
2:J:23:GLU:HB3	2:J:24:ASN:H	1.71	0.40
2:K:86:MET:HE2	2:K:86:MET:HB3	1.98	0.40
2:M:131:SER:N	2:M:132:PRO:CD	2.85	0.40
2:N:172:MET:CE	2:N:189:THR:HG23	2.52	0.40
3:S:226:THR:HG21	3:S:228:HIS:HD2	1.82	0.40
3:U:39:ILE:HD13	3:U:74:TYR:HA	2.03	0.40
1:B:52:LYS:NZ	1:B:61:GLN:HG2	2.37	0.40
2:I:172:MET:CE	2:I:189:THR:HG23	2.52	0.40
2:N:18:ARG:HD3	2:N:31:GLY:O	2.21	0.40
3:O:39:ILE:HD13	3:O:74:TYR:HA	2.03	0.40
3:T:204:MET:O	3:T:208:VAL:HG23	2.22	0.40
1:G:36:THR:HG21	1:G:172:VAL:HG21	2.04	0.40
3:Q:65:GLU:HA	3:Q:68:LEU:HD12	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	225/227 (99%)	215 (96%)	7 (3%)	3 (1%)	9	32
1	B	225/227 (99%)	216 (96%)	6 (3%)	3 (1%)	9	32
1	C	225/227 (99%)	215 (96%)	7 (3%)	3 (1%)	9	32
1	D	225/227 (99%)	215 (96%)	7 (3%)	3 (1%)	9	32
1	E	225/227 (99%)	213 (95%)	9 (4%)	3 (1%)	9	32
1	F	225/227 (99%)	215 (96%)	6 (3%)	4 (2%)	6	25
1	G	225/227 (99%)	213 (95%)	9 (4%)	3 (1%)	9	32
2	H	201/203 (99%)	193 (96%)	7 (4%)	1 (0%)	24	54
2	I	201/203 (99%)	193 (96%)	6 (3%)	2 (1%)	12	39
2	J	201/203 (99%)	192 (96%)	7 (4%)	2 (1%)	12	39
2	K	201/203 (99%)	193 (96%)	7 (4%)	1 (0%)	24	54
2	L	201/203 (99%)	193 (96%)	7 (4%)	1 (0%)	24	54
2	M	201/203 (99%)	192 (96%)	8 (4%)	1 (0%)	24	54
2	N	201/203 (99%)	193 (96%)	6 (3%)	2 (1%)	12	39
3	O	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	P	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	Q	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	R	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	S	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	T	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
3	U	214/228 (94%)	210 (98%)	4 (2%)	0	100	100
All	All	4480/4606 (97%)	4321 (96%)	127 (3%)	32 (1%)	18	48

All (32) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	56	SER
1	B	56	SER
1	C	56	SER
1	D	56	SER
1	E	56	SER
1	F	56	SER
1	G	56	SER
1	A	53	LYS
1	B	53	LYS
1	C	53	LYS
1	D	53	LYS
1	G	53	LYS
1	E	53	LYS
1	F	53	LYS
1	F	64	ILE
1	B	64	ILE
1	G	64	ILE
2	H	202	ILE
2	I	23	GLU
2	J	202	ILE
2	K	202	ILE
2	L	202	ILE
1	A	64	ILE
1	D	64	ILE
1	F	231	LYS
2	I	202	ILE
2	J	23	GLU
2	M	202	ILE
2	N	23	GLU
2	N	202	ILE
1	C	64	ILE
1	E	64	ILE

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	188/188 (100%)	177 (94%)	11 (6%)	18	48
1	B	188/188 (100%)	177 (94%)	11 (6%)	18	48
1	C	188/188 (100%)	177 (94%)	11 (6%)	18	48
1	D	188/188 (100%)	177 (94%)	11 (6%)	18	48
1	E	188/188 (100%)	177 (94%)	11 (6%)	18	48
1	F	188/188 (100%)	176 (94%)	12 (6%)	16	44
1	G	188/188 (100%)	176 (94%)	12 (6%)	16	44
2	H	170/170 (100%)	160 (94%)	10 (6%)	18	48
2	I	170/170 (100%)	160 (94%)	10 (6%)	18	48
2	J	170/170 (100%)	161 (95%)	9 (5%)	20	52
2	K	170/170 (100%)	161 (95%)	9 (5%)	20	52
2	L	170/170 (100%)	161 (95%)	9 (5%)	20	52
2	M	170/170 (100%)	161 (95%)	9 (5%)	20	52
2	N	170/170 (100%)	159 (94%)	11 (6%)	15	44
3	O	178/186 (96%)	170 (96%)	8 (4%)	24	58
3	P	178/186 (96%)	169 (95%)	9 (5%)	21	53
3	Q	178/186 (96%)	170 (96%)	8 (4%)	24	58
3	R	178/186 (96%)	170 (96%)	8 (4%)	24	58
3	S	178/186 (96%)	170 (96%)	8 (4%)	24	58
3	T	178/186 (96%)	170 (96%)	8 (4%)	24	58
3	U	178/186 (96%)	169 (95%)	9 (5%)	21	53
All	All	3752/3808 (98%)	3548 (95%)	204 (5%)	20	51

All (204) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	ASP
1	A	52	LYS
1	A	55	ARG
1	A	64	ILE
1	A	77	VAL
1	A	82	VAL
1	A	106	LEU
1	A	177	GLU
1	A	203	GLU
1	A	226	GLN

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Mol	Chain	Res	Type
1	A	227	GLU
1	B	18	ASP
1	B	52	LYS
1	B	55	ARG
1	B	64	ILE
1	B	77	VAL
1	B	82	VAL
1	B	106	LEU
1	B	177	GLU
1	B	203	GLU
1	B	226	GLN
1	B	227	GLU
1	C	18	ASP
1	C	52	LYS
1	C	55	ARG
1	C	64	ILE
1	C	77	VAL
1	C	82	VAL
1	C	106	LEU
1	C	177	GLU
1	C	203	GLU
1	C	226	GLN
1	C	227	GLU
1	D	18	ASP
1	D	52	LYS
1	D	55	ARG
1	D	64	ILE
1	D	77	VAL
1	D	82	VAL
1	D	106	LEU
1	D	177	GLU
1	D	203	GLU
1	D	226	GLN
1	D	227	GLU
1	E	18	ASP
1	E	52	LYS
1	E	55	ARG
1	E	64	ILE
1	E	77	VAL
1	E	82	VAL
1	E	106	LEU
1	E	177	GLU

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Mol	Chain	Res	Type
1	E	203	GLU
1	E	226	GLN
1	E	227	GLU
1	F	18	ASP
1	F	52	LYS
1	F	55	ARG
1	F	64	ILE
1	F	67	ILE
1	F	77	VAL
1	F	82	VAL
1	F	106	LEU
1	F	177	GLU
1	F	203	GLU
1	F	226	GLN
1	F	227	GLU
1	G	18	ASP
1	G	52	LYS
1	G	55	ARG
1	G	64	ILE
1	G	67	ILE
1	G	77	VAL
1	G	82	VAL
1	G	106	LEU
1	G	177	GLU
1	G	203	GLU
1	G	226	GLN
1	G	227	GLU
2	H	17	GLU
2	H	23	GLU
2	H	62	GLU
2	H	84	SER
2	H	89	GLN
2	H	172	MET
2	H	181	LYS
2	H	190	ASP
2	H	202	ILE
2	H	203	LEU
2	I	17	GLU
2	I	23	GLU
2	I	62	GLU
2	I	72	VAL
2	I	89	GLN

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Mol	Chain	Res	Type
2	I	172	MET
2	I	181	LYS
2	I	190	ASP
2	I	202	ILE
2	I	203	LEU
2	J	17	GLU
2	J	23	GLU
2	J	62	GLU
2	J	89	GLN
2	J	172	MET
2	J	181	LYS
2	J	190	ASP
2	J	202	ILE
2	J	203	LEU
2	K	17	GLU
2	K	23	GLU
2	K	62	GLU
2	K	89	GLN
2	K	172	MET
2	K	181	LYS
2	K	190	ASP
2	K	202	ILE
2	K	203	LEU
2	L	17	GLU
2	L	23	GLU
2	L	62	GLU
2	L	89	GLN
2	L	172	MET
2	L	181	LYS
2	L	190	ASP
2	L	202	ILE
2	L	203	LEU
2	M	17	GLU
2	M	23	GLU
2	M	62	GLU
2	M	89	GLN
2	M	172	MET
2	M	181	LYS
2	M	190	ASP
2	M	202	ILE
2	M	203	LEU
2	N	17	GLU

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Mol	Chain	Res	Type
2	N	23	GLU
2	N	62	GLU
2	N	72	VAL
2	N	84	SER
2	N	89	GLN
2	N	172	MET
2	N	181	LYS
2	N	190	ASP
2	N	202	ILE
2	N	203	LEU
3	O	19	THR
3	O	37	GLU
3	O	41	LYS
3	O	45	GLU
3	O	123	LYS
3	O	142	MET
3	O	145	LEU
3	O	199	THR
3	P	19	THR
3	P	20	SER
3	P	37	GLU
3	P	41	LYS
3	P	45	GLU
3	P	123	LYS
3	P	142	MET
3	P	145	LEU
3	P	199	THR
3	Q	19	THR
3	Q	37	GLU
3	Q	41	LYS
3	Q	45	GLU
3	Q	123	LYS
3	Q	142	MET
3	Q	145	LEU
3	Q	199	THR
3	R	19	THR
3	R	37	GLU
3	R	41	LYS
3	R	45	GLU
3	R	123	LYS
3	R	142	MET
3	R	145	LEU

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Mol	Chain	Res	Type
3	R	199	THR
3	S	19	THR
3	S	37	GLU
3	S	41	LYS
3	S	45	GLU
3	S	123	LYS
3	S	142	MET
3	S	145	LEU
3	S	199	THR
3	T	19	THR
3	T	37	GLU
3	T	41	LYS
3	T	45	GLU
3	T	123	LYS
3	T	142	MET
3	T	145	LEU
3	T	199	THR
3	U	19	THR
3	U	20	SER
3	U	37	GLU
3	U	41	LYS
3	U	45	GLU
3	U	123	LYS
3	U	142	MET
3	U	145	LEU
3	U	199	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (38) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	61	GLN
1	C	226	GLN
1	E	158	ASN
2	H	24	ASN
2	H	141	GLN
2	H	191	GLN
2	I	24	ASN
2	I	36	GLN
2	I	141	GLN
2	I	191	GLN
2	J	24	ASN
2	J	191	GLN

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Mol	Chain	Res	Type
2	K	24	ASN
2	K	191	GLN
2	L	24	ASN
2	L	141	GLN
2	L	191	GLN
2	M	24	ASN
2	M	191	GLN
2	N	24	ASN
2	N	141	GLN
2	N	191	GLN
3	O	75	GLN
3	O	228	HIS
3	P	75	GLN
3	P	228	HIS
3	Q	75	GLN
3	Q	228	HIS
3	R	75	GLN
3	R	79	HIS
3	R	228	HIS
3	S	75	GLN
3	S	228	HIS
3	T	75	GLN
3	T	185	GLN
3	T	228	HIS
3	U	75	GLN
3	U	228	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	227/227 (100%)	-0.06	7 (3%)	51	42	26, 37, 61, 65	0
1	B	227/227 (100%)	-0.08	4 (1%)	67	59	26, 37, 61, 65	0
1	C	227/227 (100%)	-0.07	5 (2%)	62	53	26, 37, 61, 65	0
1	D	227/227 (100%)	-0.05	8 (3%)	47	38	26, 37, 61, 65	0
1	E	227/227 (100%)	0.01	10 (4%)	39	30	26, 37, 61, 65	0
1	F	227/227 (100%)	-0.03	6 (2%)	57	48	26, 37, 61, 65	0
1	G	227/227 (100%)	-0.04	7 (3%)	51	42	26, 37, 61, 65	0
2	H	203/203 (100%)	-0.30	2 (0%)	79	73	25, 33, 47, 61	0
2	I	203/203 (100%)	-0.30	2 (0%)	79	73	25, 33, 47, 61	0
2	J	203/203 (100%)	-0.27	4 (1%)	65	56	25, 33, 47, 61	0
2	K	203/203 (100%)	-0.30	2 (0%)	79	73	25, 33, 47, 61	0
2	L	203/203 (100%)	-0.29	2 (0%)	79	73	25, 33, 47, 61	0
2	M	203/203 (100%)	-0.19	5 (2%)	58	48	25, 33, 47, 61	0
2	N	203/203 (100%)	-0.28	3 (1%)	72	64	25, 33, 47, 61	0
3	O	218/228 (95%)	-0.03	3 (1%)	73	65	31, 40, 51, 60	0
3	P	218/228 (95%)	-0.09	3 (1%)	73	65	30, 40, 51, 60	0
3	Q	218/228 (95%)	-0.00	4 (1%)	67	59	31, 40, 51, 60	0
3	R	218/228 (95%)	-0.03	3 (1%)	73	65	30, 40, 51, 60	0
3	S	218/228 (95%)	0.01	4 (1%)	67	59	30, 40, 51, 60	0
3	T	218/228 (95%)	0.05	5 (2%)	61	52	30, 40, 51, 60	0
3	U	218/228 (95%)	0.07	6 (2%)	55	46	30, 40, 51, 60	0
All	All	4536/4606 (98%)	-0.10	95 (2%)	63	54	25, 37, 54, 65	0

All (95) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	I	202	ILE	6.9
2	K	203	LEU	6.8
2	L	203	LEU	6.8
2	M	203	LEU	6.6
2	H	203	LEU	6.1
2	K	202	ILE	5.8
2	I	203	LEU	5.7
2	L	202	ILE	5.3
2	N	203	LEU	5.2
2	J	202	ILE	5.2
2	M	202	ILE	4.8
2	H	202	ILE	4.7
1	F	54	VAL	4.5
1	B	64	ILE	4.5
2	J	203	LEU	4.4
2	N	202	ILE	4.4
1	D	64	ILE	4.2
1	G	54	VAL	4.0
1	A	54	VAL	3.9
1	A	64	ILE	3.9
3	U	228	HIS	3.7
3	U	226	THR	3.6
1	C	54	VAL	3.5
3	T	227	ASP	3.5
1	E	64	ILE	3.4
1	D	54	VAL	3.3
3	O	226	THR	3.3
1	B	54	VAL	3.2
1	D	62	ASN	3.1
1	C	64	ILE	3.1
3	P	226	THR	3.1
1	E	181	LYS	3.1
3	P	161	GLY	3.1
3	P	228	HIS	3.0
1	E	54	VAL	3.0
3	R	228	HIS	3.0
3	U	227	ASP	3.0
1	D	61	GLN	3.0
1	G	64	ILE	3.0
1	B	55	ARG	3.0
2	M	182	ASP	2.9
1	F	53	LYS	2.9
1	F	64	ILE	2.9

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Mol	Chain	Res	Type	RSRZ
3	U	231	SER	2.8
1	D	53	LYS	2.8
1	G	203	GLU	2.8
1	A	53	LYS	2.8
3	Q	228	HIS	2.7
3	T	228	HIS	2.7
1	E	226	GLN	2.7
2	M	181	LYS	2.7
3	R	227	ASP	2.7
1	F	62	ASN	2.7
3	T	226	THR	2.7
1	B	53	LYS	2.6
1	C	63	SER	2.6
3	O	228	HIS	2.6
1	F	203	GLU	2.6
3	S	226	THR	2.5
1	E	53	LYS	2.5
3	R	226	THR	2.5
3	O	161	GLY	2.5
1	A	203	GLU	2.4
1	G	53	LYS	2.4
1	E	62	ASN	2.4
3	S	228	HIS	2.4
3	S	227	ASP	2.4
2	J	200	GLY	2.3
1	G	226	GLN	2.3
1	A	61	GLN	2.3
1	A	65	GLU	2.2
3	Q	173	GLY	2.2
1	D	206	GLU	2.2
3	Q	227	ASP	2.2
3	S	231	SER	2.2
3	T	224	THR	2.2
3	T	231	SER	2.2
1	E	55	ARG	2.1
2	N	24	ASN	2.1
1	A	62	ASN	2.1
1	C	53	LYS	2.1
1	G	225	ASP	2.1
1	D	203	GLU	2.1
1	C	52	LYS	2.1
3	Q	226	THR	2.1

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Mol	Chain	Res	Type	RSRZ
3	U	35	GLU	2.1
1	E	61	GLN	2.1
2	J	190	ASP	2.1
1	G	227	GLU	2.1
1	F	59	ILE	2.0
1	E	209	ALA	2.0
1	E	203	GLU	2.0
1	D	63	SER	2.0
3	U	161	GLY	2.0
2	M	198	LYS	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 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.