



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 02:10 AM UTC

PDB ID : 9DQ5 / pdb_00009dq5
Title : Crystal structure of Anti-CTLA-4 Fab (9D9) in complex with mouse CTLA-4
Authors : Lee, P.S.; Diong, S.J.; Robison, B.
Deposited on : 2024-09-23
Resolution : 3.10 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

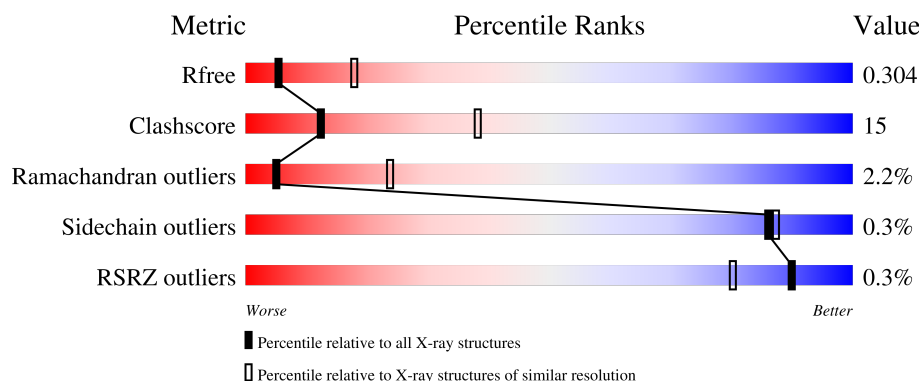
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION






The reported resolution of this entry is 3.10 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	1456 (3.10-3.10)
Clashscore	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)
RSRZ outliers	180081	1456 (3.10-3.10)

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	H	228	
1	I	228	
1	J	228	
2	L	219	
2	M	219	

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Mol	Chain	Length	Quality of chain
2	N	219	<div><div></div><div>71%27%</div><div></div></div>
3	C	135	<div><div>%</div><div><div></div><div>44%35%20%</div><div></div></div></div>
3	D	135	<div><div>%</div><div><div></div><div>42%38%19%</div><div></div></div></div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 11258 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 9D9 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	H	213	Total	C	N	O	S	0	0	0
			1504	950	243	304	7			
1	I	213	Total	C	N	O	S	0	0	0
			1608	1023	261	317	7			
1	J	215	Total	C	N	O	S	0	0	0
			1626	1035	263	321	7			

- Molecule 2 is a protein called 9D9 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	218	Total	C	N	O	S	0	0	0
			1603	1009	264	325	5			
2	M	218	Total	C	N	O	S	0	0	0
			1682	1057	283	337	5			
2	N	218	Total	C	N	O	S	0	0	0
			1682	1057	283	337	5			

- Molecule 3 is a protein called Cytotoxic T-lymphocyte protein 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	108	Total	C	N	O	S	0	0	0
			753	477	119	151	6			
3	D	110	Total	C	N	O	S	0	0	0
			800	505	130	159	6			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-18	HIS	-	expression tag	UNP P09793
C	-17	HIS	-	expression tag	UNP P09793
C	-16	HIS	-	expression tag	UNP P09793
C	-15	HIS	-	expression tag	UNP P09793

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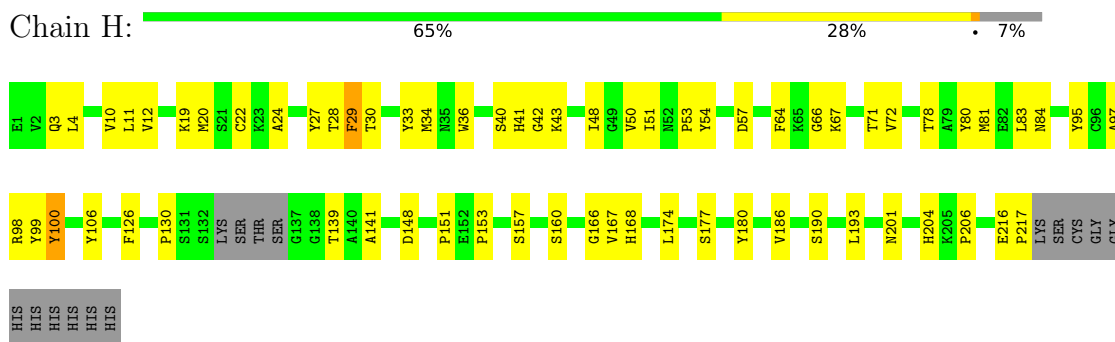
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Chain	Residue	Modelled	Actual	Comment	Reference
C	-14	HIS	-	expression tag	UNP P09793
C	-13	HIS	-	expression tag	UNP P09793
C	-12	GLY	-	expression tag	UNP P09793
C	-11	SER	-	expression tag	UNP P09793
C	-10	GLY	-	expression tag	UNP P09793
C	-9	SER	-	expression tag	UNP P09793
C	-8	GLU	-	expression tag	UNP P09793
C	-7	ASN	-	expression tag	UNP P09793
C	-6	LEU	-	expression tag	UNP P09793
C	-5	TYR	-	expression tag	UNP P09793
C	-4	PHE	-	expression tag	UNP P09793
C	-3	GLN	-	expression tag	UNP P09793
D	-18	HIS	-	expression tag	UNP P09793
D	-17	HIS	-	expression tag	UNP P09793
D	-16	HIS	-	expression tag	UNP P09793
D	-15	HIS	-	expression tag	UNP P09793
D	-14	HIS	-	expression tag	UNP P09793
D	-13	HIS	-	expression tag	UNP P09793
D	-12	GLY	-	expression tag	UNP P09793
D	-11	SER	-	expression tag	UNP P09793
D	-10	GLY	-	expression tag	UNP P09793
D	-9	SER	-	expression tag	UNP P09793
D	-8	GLU	-	expression tag	UNP P09793
D	-7	ASN	-	expression tag	UNP P09793
D	-6	LEU	-	expression tag	UNP P09793
D	-5	TYR	-	expression tag	UNP P09793
D	-4	PHE	-	expression tag	UNP P09793
D	-3	GLN	-	expression tag	UNP P09793

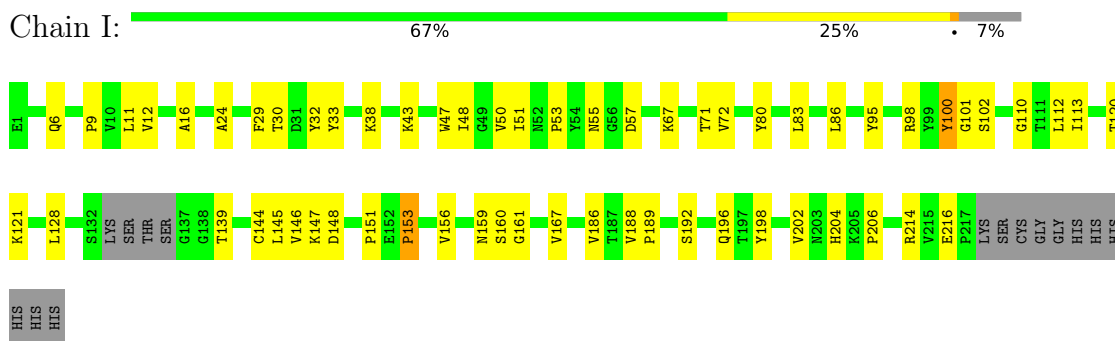
3 Residue-property plots

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.

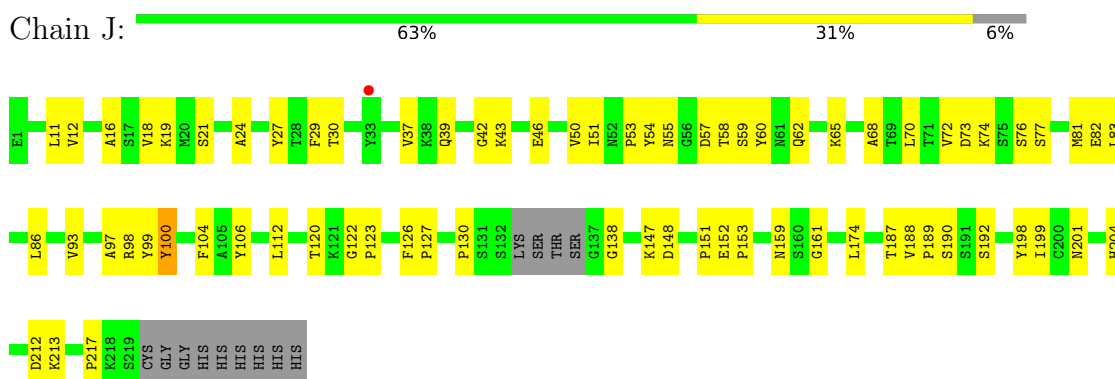
• Molecule 1: 9D9 heavy chain



• Molecule 1: 9D9 heavy chain



• Molecule 1: 9D9 heavy chain



A49	T50	T51	F52	V58	G59	F60	L61	S67	F70	T78	I79	Q80	G81	L82	T87	Y90	L91	C92	K93	V94	E95	L96	H97	Y98	P99	F100	P101	Y102	F103	V104	G105	N106	G107	N108	G109	T110	Q111	I112	Y113	V114	I115	ASP
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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	128.51Å 208.84Å 91.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	36.48 – 3.10 36.48 – 3.10	Depositor EDS
% Data completeness (in resolution range)	97.2 (36.48-3.10) 97.1 (36.48-3.10)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.08 (at 3.13Å)	Xtriage
Refinement program	PHENIX (???)	Depositor
R, R_{free}	0.238 , 0.301 0.238 , 0.304	Depositor DCC
R_{free} test set	2242 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	126.4	Xtriage
Anisotropy	0.223	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 72.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11258	wwPDB-VP
Average B, all atoms (Å ²)	116.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.78% 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	H	0.47	0/1546	0.72	0/2130
1	I	0.42	0/1650	0.66	1/2250 (0.0%)
1	J	0.41	0/1669	0.68	0/2276
2	L	0.46	1/1640 (0.1%)	0.69	0/2242
2	M	0.41	0/1719	0.65	0/2331
2	N	0.41	0/1719	0.65	0/2331
3	C	0.46	0/768	0.72	0/1057
3	D	0.35	0/816	0.58	0/1119
All	All	0.43	1/11527 (0.0%)	0.67	1/15736 (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
2	N	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	L	38	LEU	CG-CD2	5.29	1.70	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	101	GLY	CA-C-O	5.03	123.93	118.95

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	N	113	ARG	Sidechain

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	H	1504	0	1316	40	0
1	I	1608	0	1563	43	0
1	J	1626	0	1577	45	0
2	L	1603	0	1482	46	0
2	M	1682	0	1641	55	0
2	N	1682	0	1641	43	0
3	C	753	0	677	36	0
3	D	800	0	749	41	0
All	All	11258	0	10646	337	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 15.

All (337) 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:M:42:LEU:HD12	2:M:91:TYR:CZ	2.01	0.95
3:C:27:HIS:O	3:C:27:HIS:ND1	1.98	0.95
2:L:38:LEU:HD12	2:L:76:PHE:CD2	2.13	0.84
2:L:31:HIS:ND1	2:L:33:ASN:OD1	2.08	0.84
2:M:42:LEU:HD12	2:M:91:TYR:CE2	2.14	0.82
2:M:29:ILE:HD12	2:M:95:GLN:HG3	1.60	0.80
2:M:4:MET:HE2	2:M:95:GLN:HB2	1.62	0.80
1:J:112:LEU:HD12	1:J:153:PRO:HD3	1.65	0.79
3:D:50:THR:HG22	3:D:60:PHE:CE1	2.20	0.76
2:M:215:ASN:O	2:M:217:GLY:N	2.18	0.75
1:J:12:VAL:HG21	1:J:86:LEU:HD13	1.66	0.75
3:D:8:VAL:HG12	3:D:111:GLN:HB3	1.71	0.73
1:H:53:PRO:HA	1:H:72:VAL:HG21	1.70	0.72
3:C:67:SER:HB2	3:C:78:THR:HB	1.73	0.71
1:I:192:SER:HB3	1:I:196:GLN:HB2	1.73	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:M:125:PRO:HD3	2:M:137:VAL:HG22	1.73	0.71
3:D:35:THR:HG23	3:D:49:ALA:HB2	1.72	0.71
3:D:33:ARG:HB3	3:D:95:GLU:HB2	1.73	0.70
3:D:36:VAL:HB	3:D:47:VAL:HB	1.72	0.70
3:C:87:THR:HG23	3:C:113:TYR:HA	1.73	0.69
3:C:50:THR:HG21	3:C:59:GLY:HA3	1.75	0.69
2:N:156:ASP:OD2	2:N:194:HIS:HB3	1.93	0.69
1:J:24:ALA:HB1	1:J:27:TYR:HE1	1.57	0.68
3:D:67:SER:HB2	3:D:78:THR:HB	1.75	0.68
1:H:204:HIS:CD2	1:H:206:PRO:HD2	2.29	0.68
1:H:130:PRO:HG2	1:H:217:PRO:HG3	1.76	0.68
3:C:11:ALA:HB3	3:C:114:VAL:HA	1.75	0.68
1:J:201:ASN:ND2	1:J:212:ASP:OD1	2.28	0.67
3:C:35:THR:HG23	3:C:49:ALA:HB2	1.77	0.67
2:L:8:PRO:HG3	2:L:11:LEU:HD23	1.77	0.66
3:C:62:ASP:OD1	3:C:62:ASP:N	2.29	0.66
3:C:28:ASN:CG	3:C:99:PRO:HD2	2.21	0.66
2:N:169:THR:HG22	2:N:170:GLU:O	1.96	0.66
2:M:30:VAL:HA	2:M:36:THR:HG22	1.78	0.65
2:N:168:VAL:HG22	2:N:180:LEU:HD12	1.79	0.65
2:M:42:LEU:HD21	2:M:44:LYS:HG3	1.79	0.65
1:H:48:ILE:HG23	1:H:64:PHE:CD2	2.33	0.65
2:N:202:THR:HG22	2:N:209:PRO:HB3	1.79	0.65
3:D:5:GLN:HE22	3:D:91:LEU:HA	1.62	0.64
1:I:214:ARG:NH2	1:I:216:GLU:OE1	2.28	0.64
1:I:33:TYR:CE2	3:D:101:PRO:HD2	2.33	0.64
1:J:98:ARG:NH1	1:J:99:TYR:O	2.31	0.64
1:H:11:LEU:HD22	1:H:151:PRO:HD3	1.80	0.63
3:C:90:TYR:O	3:C:110:THR:N	2.32	0.63
2:M:37:TYR:OH	3:D:30:ASP:OD2	2.12	0.63
2:L:6:GLN:HE22	2:L:92:TYR:HA	1.62	0.63
1:J:138:GLY:O	1:J:190:SER:N	2.20	0.63
2:M:113:ARG:NH1	2:M:114:THR:O	2.33	0.62
1:H:10:VAL:HG12	1:H:12:VAL:HG13	1.82	0.62
2:N:42:LEU:HD12	2:N:43:GLN:H	1.65	0.62
1:H:174:LEU:HD13	1:H:180:TYR:CE1	2.34	0.62
1:H:126:PHE:HB3	2:L:126:SER:OG	2.00	0.62
1:H:98:ARG:NH1	1:H:99:TYR:O	2.32	0.61
2:M:117:ALA:HB1	2:M:206:LEU:HD21	1.82	0.61
2:L:6:GLN:O	2:L:7:THR:HG23	2.00	0.61
2:M:161:SER:O	2:M:163:ASN:N	2.33	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:11:LEU:HD23	1:J:120:THR:HG22	1.82	0.61
1:I:204:HIS:CD2	1:I:206:PRO:HD2	2.35	0.61
1:I:6:GLN:HE22	1:I:95:TYR:HA	1.65	0.61
1:I:6:GLN:OE1	1:I:110:GLY:N	2.34	0.61
3:D:27:HIS:O	3:D:28:ASN:HB2	1.98	0.61
3:D:5:GLN:HB3	3:D:110:THR:OG1	2.00	0.61
2:L:38:LEU:HD12	2:L:76:PHE:CG	2.35	0.61
2:M:55:LYS:O	2:M:57:SER:N	2.31	0.61
2:N:130:LEU:O	2:N:188:LYS:HD2	2.01	0.60
2:M:202:THR:HG22	2:M:209:PRO:HB3	1.83	0.60
2:M:158:ALA:O	2:M:160:GLN:NE2	2.34	0.60
3:C:52:PHE:CD2	3:C:70:PHE:HB2	2.36	0.60
2:N:125:PRO:HD3	2:N:137:VAL:HG22	1.84	0.60
2:M:8:PRO:HG3	2:M:11:LEU:HD23	1.83	0.60
3:D:16:VAL:HG22	3:D:80:GLN:HA	1.83	0.60
1:I:98:ARG:HH12	1:I:100:TYR:HD2	1.51	0.59
2:N:42:LEU:HD12	2:N:43:GLN:N	2.18	0.59
1:J:123:PRO:HD3	1:J:204:HIS:ND1	2.18	0.59
2:M:42:LEU:CD1	2:M:91:TYR:CZ	2.84	0.58
2:N:38:LEU:HB3	2:N:56:VAL:HG22	1.84	0.58
2:L:38:LEU:CD1	2:L:76:PHE:CG	2.87	0.58
1:J:188:VAL:HG22	1:J:189:PRO:HD2	1.86	0.58
3:C:6:PRO:HG2	3:C:19:PHE:HB2	1.85	0.58
3:C:52:PHE:HD2	3:C:70:PHE:HD2	1.52	0.57
2:M:125:PRO:HG3	2:M:135:ALA:HB1	1.85	0.57
3:D:28:ASN:OD1	3:D:99:PRO:HD2	2.04	0.57
3:D:82:LEU:O	3:D:114:VAL:HG11	2.04	0.57
3:D:50:THR:HG22	3:D:60:PHE:CD1	2.38	0.57
3:C:27:HIS:O	3:C:27:HIS:CG	2.58	0.57
3:C:97:MET:HE2	3:C:97:MET:H	1.69	0.57
2:L:53:ILE:CD1	2:L:59:ARG:HG3	2.34	0.56
1:J:19:LYS:HG3	1:J:82:GLU:HB2	1.87	0.56
3:C:88:GLY:O	3:C:111:GLN:HA	2.05	0.56
1:H:98:ARG:HH12	1:H:100:TYR:HB2	1.70	0.56
1:J:24:ALA:HB1	1:J:27:TYR:CE1	2.39	0.56
1:H:98:ARG:NH1	1:H:100:TYR:HB2	2.21	0.56
1:H:67:LYS:O	1:H:83:LEU:HD23	2.05	0.56
2:M:59:ARG:HD2	2:M:67:PHE:O	2.06	0.56
3:D:9:VAL:HG21	3:D:19:PHE:HB3	1.88	0.55
2:L:38:LEU:HD12	2:L:76:PHE:CE2	2.40	0.55
1:I:188:VAL:HG21	1:I:198:TYR:OH	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:62:GLN:HA	1:J:65:LYS:HD3	1.87	0.55
1:I:55:ASN:HB3	1:I:57:ASP:CG	2.31	0.55
2:L:170:GLU:HG3	2:L:171:GLN:H	1.71	0.55
2:M:17:ASP:O	2:M:83:VAL:HG23	2.07	0.55
2:L:118:PRO:HB3	2:L:144:PHE:HB3	1.87	0.55
3:C:104:VAL:HG22	3:C:105:GLY:H	1.71	0.54
2:M:191:TYR:HD1	2:M:197:TYR:HH	1.54	0.54
3:D:87:THR:HA	3:D:112:ILE:O	2.08	0.54
1:I:139:THR:HA	1:I:189:PRO:HA	1.89	0.54
3:D:33:ARG:HD3	3:D:95:GLU:OE1	2.07	0.54
1:I:128:LEU:HB3	2:M:123:PHE:CD2	2.43	0.53
2:N:113:ARG:HG3	2:N:114:THR:O	2.09	0.53
2:M:133:GLY:O	2:M:188:LYS:N	2.30	0.53
1:I:55:ASN:HB3	1:I:57:ASP:OD1	2.09	0.53
3:D:3:VAL:HB	3:D:106:MET:C	2.33	0.53
2:L:96:GLY:O	3:C:98:TYR:OH	2.24	0.53
1:H:3:GLN:O	1:H:4:LEU:HD23	2.09	0.53
2:N:29:ILE:HD12	2:N:95:GLN:HG3	1.90	0.53
2:L:189:ALA:O	2:L:193:LYS:HB2	2.08	0.53
1:I:100:TYR:C	1:I:102:SER:H	2.16	0.53
2:L:169:THR:HG22	2:L:170:GLU:O	2.09	0.52
2:L:59:ARG:HD2	2:L:67:PHE:O	2.09	0.52
2:M:96:GLY:O	3:D:98:TYR:OH	2.26	0.52
2:N:45:PRO:CG	2:N:170:GLU:HG2	2.39	0.52
2:L:113:ARG:HD2	2:L:176:SER:HB2	1.91	0.52
1:I:156:VAL:HG22	1:I:202:VAL:HG22	1.91	0.52
1:J:18:VAL:HG12	1:J:86:LEU:HD11	1.92	0.52
2:M:117:ALA:HB1	2:M:206:LEU:CD2	2.38	0.52
3:D:58:VAL:HG23	3:D:61:LEU:HD21	1.91	0.52
2:N:124:PRO:HB3	2:N:214:PHE:CE1	2.45	0.52
2:L:18:GLN:HG3	2:L:81:SER:HA	1.90	0.52
3:D:32:VAL:O	3:D:52:PHE:N	2.40	0.52
2:N:168:VAL:CG2	2:N:180:LEU:HD12	2.40	0.51
1:H:20:MET:HE3	1:H:81:MET:HE3	1.92	0.51
3:C:91:LEU:HD23	3:C:109:GLY:CA	2.40	0.51
2:N:199:CYS:O	2:N:211:THR:HA	2.10	0.51
1:I:51:ILE:HD13	1:I:72:VAL:HG13	1.92	0.51
1:J:174:LEU:HD12	1:J:174:LEU:H	1.76	0.51
2:L:36:THR:HG23	2:L:56:VAL:HG23	1.92	0.51
1:H:157:SER:OG	1:H:201:ASN:HB2	2.10	0.51
1:H:167:VAL:HG12	1:H:168:HIS:H	1.76	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:M:45:PRO:CG	2:M:170:GLU:HG2	2.41	0.51
2:N:113:ARG:HG3	2:N:113:ARG:HH11	1.74	0.51
2:M:188:LYS:O	2:M:192:GLU:HG2	2.10	0.51
3:D:33:ARG:HA	3:D:51:THR:HA	1.93	0.51
3:D:106:MET:HG3	3:D:107:GLY:N	2.26	0.50
2:N:218:GLU:N	2:N:218:GLU:OE1	2.44	0.50
1:H:166:GLY:O	1:H:186:VAL:HA	2.11	0.50
1:H:130:PRO:HB3	1:H:141:ALA:O	2.12	0.50
1:H:41:HIS:C	1:H:43:LYS:H	2.19	0.50
2:L:194:HIS:O	2:L:216:ARG:NH2	2.39	0.50
1:J:58:THR:HB	1:J:60:TYR:CE1	2.46	0.50
2:L:52:LEU:HA	2:L:63:VAL:HG21	1.93	0.50
1:I:47:TRP:HZ2	1:I:50:VAL:HG12	1.76	0.50
2:N:148:GLU:CD	2:N:148:GLU:H	2.20	0.50
3:C:91:LEU:HD23	3:C:109:GLY:HA2	1.93	0.49
3:D:6:PRO:HD2	3:D:19:PHE:HD2	1.77	0.49
3:C:48:CYS:HA	3:C:63:TYR:CD1	2.47	0.49
1:H:11:LEU:HB2	1:H:151:PRO:HG3	1.94	0.49
3:C:28:ASN:ND2	3:C:99:PRO:HD2	2.27	0.49
3:C:106:MET:HG3	3:C:107:GLY:N	2.26	0.49
1:H:54:TYR:CD1	3:C:103:PHE:HZ	2.30	0.49
2:M:31:HIS:CE1	2:M:33:ASN:HD22	2.30	0.49
1:J:60:TYR:OH	1:J:70:LEU:N	2.42	0.49
2:L:141:LEU:HD13	2:L:180:LEU:HD22	1.94	0.49
3:D:3:VAL:HG11	3:D:92:CYS:O	2.13	0.49
1:I:71:THR:OG1	1:I:80:TYR:HB2	2.13	0.48
2:M:124:PRO:HB3	2:M:214:PHE:CE1	2.48	0.48
2:M:203:HIS:CD2	2:M:204:GLN:H	2.30	0.48
2:M:130:LEU:HD21	2:M:191:TYR:CD2	2.48	0.48
2:L:29:ILE:HG21	2:L:38:LEU:HG	1.94	0.48
2:M:88:LEU:HD22	2:M:171:GLN:HB3	1.95	0.48
2:L:37:TYR:OH	3:C:30:ASP:OD2	2.28	0.48
2:L:203:HIS:C	2:L:205:GLY:H	2.22	0.48
2:N:124:PRO:HB3	2:N:214:PHE:CZ	2.49	0.48
1:H:33:TYR:CE2	3:C:101:PRO:HD2	2.48	0.48
2:L:203:HIS:O	2:L:205:GLY:N	2.47	0.48
2:M:128:GLU:H	2:M:128:GLU:CD	2.21	0.48
3:D:1:ILE:HG12	3:D:104:VAL:O	2.13	0.48
2:N:194:HIS:O	2:N:216:ARG:NH2	2.39	0.48
1:J:68:ALA:HA	1:J:83:LEU:HD23	1.96	0.48
1:I:67:LYS:O	1:I:83:LEU:HA	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:M:31:HIS:HB3	2:M:33:ASN:HB2	1.95	0.47
1:J:188:VAL:HG21	1:J:198:TYR:OH	2.13	0.47
2:N:18:GLN:HG3	2:N:81:SER:HA	1.97	0.47
1:I:33:TYR:HE2	3:D:101:PRO:HD2	1.77	0.47
3:C:33:ARG:HA	3:C:51:THR:HA	1.95	0.47
2:M:118:PRO:HB3	2:M:144:PHE:HB3	1.97	0.47
2:N:20:SER:HB2	2:N:79:LYS:HD2	1.96	0.47
1:J:11:LEU:HD23	1:J:120:THR:CG2	2.44	0.47
3:C:52:PHE:CE2	3:C:70:PHE:HB2	2.50	0.47
1:J:81:MET:HE3	1:J:83:LEU:HD11	1.96	0.47
2:L:6:GLN:C	2:L:7:THR:HG23	2.40	0.47
1:I:9:PRO:HB3	1:I:153:PRO:CD	2.45	0.47
1:I:24:ALA:HB3	1:I:29:PHE:HD2	1.79	0.47
1:I:11:LEU:HD13	1:I:151:PRO:HG3	1.96	0.47
1:I:32:TYR:HB2	1:I:98:ARG:HD2	1.96	0.47
3:D:15:GLY:O	3:D:81:GLY:N	2.48	0.47
2:M:128:GLU:OE2	2:M:128:GLU:N	2.38	0.46
2:N:20:SER:HA	2:N:78:LEU:O	2.15	0.46
1:I:145:LEU:HD12	1:I:146:VAL:H	1.81	0.46
2:M:124:PRO:HB3	2:M:214:PHE:CZ	2.50	0.46
1:H:66:GLY:O	1:H:84:ASN:ND2	2.38	0.46
3:C:5:GLN:OE1	3:C:92:CYS:N	2.48	0.46
1:J:159:ASN:C	1:J:161:GLY:H	2.24	0.46
1:J:187:THR:HG21	2:N:142:ASN:ND2	2.30	0.46
1:I:12:VAL:HG21	1:I:86:LEU:CD2	2.45	0.46
2:N:169:THR:HG22	2:N:170:GLU:N	2.31	0.46
1:H:34:MET:O	1:H:50:VAL:HA	2.16	0.46
2:M:59:ARG:NH2	2:M:65:ASP:OD1	2.49	0.46
3:D:96:LEU:HB2	3:D:103:PHE:HB3	1.98	0.46
2:L:39:GLU:OE1	2:L:41:TYR:OH	2.22	0.46
2:M:164:SER:HA	2:M:183:THR:O	2.15	0.46
2:M:191:TYR:HE1	2:M:197:TYR:CE2	2.34	0.46
1:H:190:SER:O	1:H:193:LEU:HG	2.16	0.45
3:C:30:ASP:O	3:C:53:THR:HA	2.16	0.45
1:J:130:PRO:HG2	1:J:217:PRO:HG3	1.98	0.45
1:H:24:ALA:HB1	1:H:27:TYR:CE1	2.51	0.45
3:C:5:GLN:HE21	3:C:5:GLN:HB3	1.54	0.45
3:C:90:TYR:CD2	3:C:112:ILE:HD12	2.52	0.45
1:I:112:LEU:C	1:I:112:LEU:HD23	2.41	0.45
1:I:112:LEU:HD23	1:I:113:ILE:N	2.32	0.45
3:D:3:VAL:HG13	3:D:21:CYS:SG	2.56	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:36:THR:HG23	2:L:56:VAL:CG2	2.46	0.45
2:M:68:SER:O	2:M:78:LEU:HD12	2.15	0.45
3:D:90:TYR:CD2	3:D:112:ILE:HD12	2.52	0.45
2:L:31:HIS:CG	2:L:32:SER:H	2.35	0.45
1:I:53:PRO:HA	1:I:72:VAL:HG21	1.99	0.45
2:M:13:VAL:HG11	2:M:83:VAL:HG21	1.99	0.45
1:I:147:LYS:HG2	1:I:148:ASP:OD2	2.17	0.45
3:C:70:PHE:HE1	3:C:72:GLU:H	1.64	0.45
2:N:191:TYR:C	2:N:193:LYS:H	2.25	0.45
2:L:75:ASP:C	2:L:76:PHE:CD1	2.95	0.45
3:D:37:LEU:CB	3:D:91:LEU:HB2	2.46	0.44
2:M:42:LEU:HB2	2:M:52:LEU:HD11	1.99	0.44
3:D:23:TYR:CD2	3:D:94:VAL:HG21	2.52	0.44
3:D:50:THR:HG21	3:D:60:PHE:H	1.82	0.44
1:J:122:GLY:HA2	1:J:204:HIS:ND1	2.32	0.44
1:J:147:LYS:HG2	1:J:148:ASP:OD2	2.16	0.44
1:H:71:THR:OG1	1:H:80:TYR:HB2	2.18	0.44
2:M:125:PRO:HB3	2:M:136:SER:H	1.81	0.44
2:N:202:THR:HG22	2:N:209:PRO:CB	2.47	0.44
1:I:159:ASN:O	1:I:161:GLY:N	2.51	0.44
2:M:8:PRO:HG2	2:M:11:LEU:HB2	2.00	0.44
1:I:38:LYS:HB2	1:I:48:ILE:HD11	2.00	0.44
2:N:118:PRO:HD3	2:N:203:HIS:ND1	2.32	0.44
3:C:95:GLU:HG2	3:C:104:VAL:HG23	1.99	0.44
1:J:37:VAL:HG13	1:J:46:GLU:O	2.18	0.44
2:L:118:PRO:HD3	2:L:203:HIS:ND1	2.33	0.44
1:I:9:PRO:CB	1:I:153:PRO:HD2	2.48	0.44
1:I:30:THR:HA	1:I:53:PRO:HB2	2.00	0.44
2:M:130:LEU:O	2:M:188:LYS:HD3	2.18	0.43
3:D:36:VAL:HG23	3:D:48:CYS:O	2.17	0.43
1:J:62:GLN:HA	1:J:65:LYS:CD	2.46	0.43
1:H:29:PHE:O	1:H:53:PRO:HG2	2.17	0.43
1:J:50:VAL:HG12	1:J:59:SER:HB2	2.00	0.43
1:J:51:ILE:HD13	1:J:72:VAL:HG13	2.01	0.43
1:J:152:GLU:HB3	1:J:153:PRO:HA	1.99	0.43
2:N:24:ARG:HA	2:N:74:THR:O	2.18	0.43
2:M:118:PRO:HD3	2:M:203:HIS:ND1	2.33	0.43
2:M:161:SER:C	2:M:163:ASN:H	2.25	0.43
2:M:191:TYR:CE1	2:M:197:TYR:CE2	3.05	0.43
1:J:54:TYR:HA	1:J:74:LYS:HE3	2.01	0.43
2:N:42:LEU:HB2	2:N:52:LEU:HD11	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:67:LYS:HB2	1:I:67:LYS:HE2	1.81	0.43
2:L:215:ASN:O	2:L:217:GLY:N	2.52	0.43
2:L:31:HIS:CG	2:L:32:SER:N	2.87	0.43
1:J:12:VAL:HG11	1:J:18:VAL:HB	2.01	0.43
2:N:161:SER:O	2:N:163:ASN:N	2.51	0.43
1:H:4:LEU:HD13	1:H:34:MET:HE1	2.00	0.43
2:L:99:VAL:HG22	2:L:101:TYR:CZ	2.53	0.43
3:C:87:THR:HG23	3:C:112:ILE:O	2.19	0.43
1:I:11:LEU:HD22	1:I:151:PRO:HD3	2.01	0.43
2:M:25:SER:HB2	2:M:29:ILE:HD11	2.01	0.43
1:H:174:LEU:HD12	1:H:174:LEU:HA	1.81	0.43
1:H:48:ILE:HG23	1:H:64:PHE:CG	2.53	0.42
1:I:167:VAL:HG22	1:I:186:VAL:CG2	2.48	0.42
1:J:73:ASP:OD2	1:J:76:SER:OG	2.30	0.42
1:J:39:GLN:NE2	1:J:43:LYS:HD3	2.34	0.42
1:J:97:ALA:HA	1:J:106:TYR:O	2.20	0.42
1:J:98:ARG:HH12	1:J:100:TYR:HD2	1.63	0.42
2:N:122:ILE:HD13	2:N:213:SER:HA	2.02	0.42
1:I:167:VAL:HG22	1:I:186:VAL:HB	2.00	0.42
1:H:22:CYS:O	1:H:78:THR:HA	2.19	0.42
2:L:170:GLU:HG3	2:L:171:GLN:N	2.35	0.42
3:D:91:LEU:HD23	3:D:109:GLY:HA2	2.02	0.42
2:N:119:SER:O	2:N:141:LEU:HA	2.20	0.42
2:N:188:LYS:O	2:N:192:GLU:HG2	2.20	0.42
3:D:50:THR:CG2	3:D:60:PHE:CD1	3.03	0.42
1:J:93:VAL:CG2	1:J:112:LEU:HD23	2.50	0.42
1:H:36:TRP:HA	1:H:95:TYR:O	2.19	0.42
2:N:166:GLU:HA	2:N:181:SER:O	2.19	0.42
3:D:52:PHE:CD2	3:D:70:PHE:HB3	2.55	0.42
2:N:164:SER:HA	2:N:183:THR:O	2.20	0.42
1:H:28:THR:O	1:H:30:THR:N	2.53	0.42
1:H:167:VAL:HG12	1:H:168:HIS:N	2.33	0.42
2:L:26:SER:C	2:L:27:GLN:HG3	2.44	0.42
2:L:38:LEU:HD23	2:L:38:LEU:HA	1.46	0.42
1:I:120:THR:HG22	1:I:121:LYS:H	1.84	0.42
2:M:148:GLU:CD	2:M:148:GLU:N	2.78	0.42
1:J:29:PHE:CD2	1:J:77:SER:HA	2.55	0.42
1:J:42:GLY:O	1:J:43:LYS:HB2	2.20	0.42
1:J:55:ASN:HB3	1:J:57:ASP:OD1	2.19	0.42
2:N:40:TRP:CZ3	2:N:93:CYS:HB3	2.54	0.42
2:N:52:LEU:O	2:N:63:VAL:HG21	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:21:ILE:HG12	2:L:107:THR:HG21	2.02	0.41
1:J:126:PHE:HA	1:J:127:PRO:HD3	1.85	0.41
2:N:118:PRO:HB3	2:N:144:PHE:HB3	2.02	0.41
1:H:216:GLU:HA	1:H:217:PRO:HD3	1.91	0.41
2:L:54:TYR:O	2:L:58:ASN:HB2	2.20	0.41
3:D:8:VAL:HA	3:D:111:GLN:O	2.20	0.41
1:J:189:PRO:HG2	1:J:192:SER:OG	2.20	0.41
1:H:10:VAL:CG1	1:H:12:VAL:HG13	2.49	0.41
2:L:94:PHE:CZ	2:L:101:TYR:HB3	2.56	0.41
3:C:32:VAL:HG11	3:C:70:PHE:HE2	1.86	0.41
1:J:30:THR:HA	1:J:53:PRO:HB2	2.01	0.41
1:J:199:ILE:HA	1:J:213:LYS:O	2.20	0.41
2:M:52:LEU:HA	2:M:63:VAL:HG21	2.02	0.41
2:N:202:THR:HG22	2:N:209:PRO:HG3	2.02	0.41
2:L:196:VAL:HG22	2:L:215:ASN:OD1	2.21	0.41
1:I:159:ASN:C	1:I:161:GLY:N	2.79	0.41
2:N:153:TRP:HZ2	2:N:182:SER:O	2.04	0.41
2:L:113:ARG:HG3	2:L:114:THR:O	2.20	0.41
2:L:140:LEU:HD12	2:L:180:LEU:O	2.21	0.41
2:M:83:VAL:HG12	2:M:84:GLU:N	2.36	0.41
3:C:32:VAL:HG22	3:C:96:LEU:HD22	2.02	0.41
1:J:104:PHE:O	2:N:41:TYR:HE2	2.04	0.41
1:H:51:ILE:HG13	1:H:57:ASP:O	2.22	0.40
2:L:66:ARG:HB3	2:L:81:SER:O	2.21	0.40
1:I:145:LEU:HD12	1:I:146:VAL:N	2.36	0.40
1:H:97:ALA:HA	1:H:106:TYR:O	2.21	0.40
2:L:51:LEU:HD23	2:L:60:PHE:CD1	2.56	0.40
2:N:25:SER:CB	2:N:29:ILE:HD11	2.52	0.40
1:H:19:LYS:HA	1:H:81:MET:O	2.20	0.40
1:I:120:THR:HG21	1:I:206:PRO:O	2.21	0.40
1:I:139:THR:HG22	1:I:189:PRO:HA	2.03	0.40
1:I:192:SER:O	1:I:196:GLN:HB2	2.22	0.40
2:M:13:VAL:HG22	2:M:17:ASP:HB2	2.04	0.40
2:M:67:PHE:CE1	2:M:80:ILE:HG12	2.57	0.40
3:D:50:THR:HG21	3:D:60:PHE:N	2.37	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	H	209/228 (92%)	175 (84%)	25 (12%)	9 (4%)	2	12
1	I	209/228 (92%)	189 (90%)	16 (8%)	4 (2%)	6	27
1	J	211/228 (92%)	185 (88%)	24 (11%)	2 (1%)	14	44
2	L	216/219 (99%)	193 (89%)	21 (10%)	2 (1%)	14	44
2	M	216/219 (99%)	190 (88%)	20 (9%)	6 (3%)	4	20
2	N	216/219 (99%)	198 (92%)	14 (6%)	4 (2%)	6	27
3	C	104/135 (77%)	86 (83%)	14 (14%)	4 (4%)	2	15
3	D	106/135 (78%)	91 (86%)	13 (12%)	2 (2%)	6	27
All	All	1487/1611 (92%)	1307 (88%)	147 (10%)	33 (2%)	5	24

All (33) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	L	204	GLN
2	L	216	ARG
1	I	43	LYS
1	I	160	SER
2	M	56	VAL
2	M	216	ARG
1	J	16	ALA
2	N	216	ARG
1	H	40	SER
1	H	100	TYR
1	H	148	ASP
1	H	160	SER
3	C	87	THR
3	C	102	TYR
1	I	16	ALA
2	M	162	GLY
2	M	193	LYS

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Mol	Chain	Res	Type
3	D	47	VAL
1	J	100	TYR
2	N	162	GLY
1	H	177	SER
1	I	100	TYR
3	C	7	SER
2	M	33	ASN
2	N	82	ARG
1	H	29	PHE
2	M	143	ASN
1	H	139	THR
3	D	28	ASN
2	N	56	VAL
3	C	24	SER
1	H	42	GLY
1	H	153	PRO

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	H	151/195 (77%)	151 (100%)	0	100	100
1	I	181/195 (93%)	179 (99%)	2 (1%)	65	78
1	J	183/195 (94%)	181 (99%)	2 (1%)	65	78
2	L	174/194 (90%)	174 (100%)	0	100	100
2	M	193/194 (100%)	193 (100%)	0	100	100
2	N	193/194 (100%)	193 (100%)	0	100	100
3	C	78/120 (65%)	78 (100%)	0	100	100
3	D	88/120 (73%)	88 (100%)	0	100	100
All	All	1241/1407 (88%)	1237 (100%)	4 (0%)	86	87

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	144	CYS
1	I	153	PRO
1	J	21	SER
1	J	151	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
2	L	6	GLN
2	L	142	ASN
2	L	203	HIS
3	C	56	ASN
3	C	71	ASN
1	I	39	GLN
1	I	41	HIS
2	M	43	GLN
2	M	58	ASN
2	M	204	GLN
3	D	14	HIS
1	J	39	GLN
2	N	43	GLN
2	N	129	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 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 [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	H	213/228 (93%)	-0.18	0 100 100	84, 108, 146, 153	0
1	I	213/228 (93%)	-0.27	0 100 100	82, 113, 145, 151	0
1	J	215/228 (94%)	-0.20	1 (0%) 87 73	76, 115, 160, 180	0
2	L	218/219 (99%)	-0.35	1 (0%) 87 73	79, 102, 145, 155	0
2	M	218/219 (99%)	-0.30	0 100 100	86, 106, 137, 172	0
2	N	218/219 (99%)	-0.29	0 100 100	75, 112, 160, 180	0
3	C	108/135 (80%)	0.08	1 (0%) 81 63	92, 124, 145, 148	0
3	D	110/135 (81%)	0.24	1 (0%) 81 63	114, 156, 177, 186	0
All	All	1513/1611 (93%)	-0.20	4 (0%) 90 80	75, 113, 158, 186	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	115	ILE	4.0
1	J	33	TYR	2.5
2	L	218	GLU	2.4
3	C	113	TYR	2.2

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.