



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 2, 2025 – 01:15 AM JST

PDB ID : 9IY2 / pdb\_00009iy2  
Title : Immune complex of HEV-E2s, nAb 8C11 and nAb 8H3  
Authors : Minghua, Z.; Lizhi, Z.; Ying, G.; Shaowei, L.  
Deposited on : 2024-07-29  
Resolution : 3.48 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](mailto: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>.

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

MolProbity : 4-5-2 with Phenix2.0rc1  
Xtrriage (Phenix) : 2.0rc1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.006 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.45.1

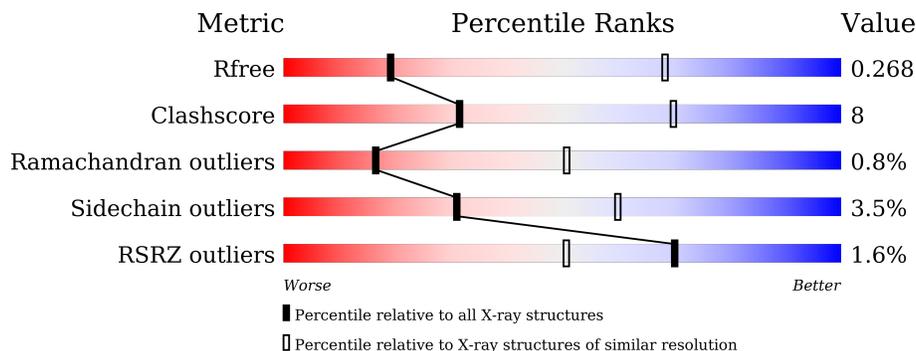
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.48 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.



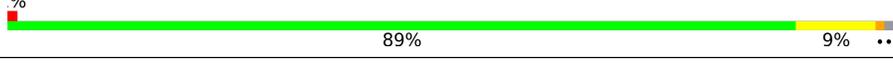
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	1099 (3.54-3.42)
Clashscore	180529	1048 (3.52-3.44)
Ramachandran outliers	177936	1033 (3.52-3.44)
Sidechain outliers	177891	1034 (3.52-3.44)
RSRZ outliers	164620	1098 (3.54-3.42)

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  $\geq 3$ , 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	214	
1	B	214	
2	D	230	
2	H	230	
3	C	214	
3	L	214	

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Mol	Chain	Length	Quality of chain
4	E	221	 % 76% 20% ...
4	G	221	 7% 84% 13% ...
5	F	219	 83% 15% ..
5	I	219	 % 89% 9% ..

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 15430 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 Secreted protein ORF2.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	146	1096	697	185	214	0	0	0
1	B	145	1090	694	184	212	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	393	MET	-	initiating methionine	UNP P33426
A	532	HIS	TYR	conflict	UNP P33426
A	604	PRO	-	expression tag	UNP P33426
A	605	PRO	-	expression tag	UNP P33426
A	606	ARG	-	expression tag	UNP P33426
B	393	MET	-	initiating methionine	UNP P33426
B	532	HIS	TYR	conflict	UNP P33426
B	604	PRO	-	expression tag	UNP P33426
B	605	PRO	-	expression tag	UNP P33426
B	606	ARG	-	expression tag	UNP P33426

- Molecule 2 is a protein called Heavy Chain of mAb 8C11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	218	1637	1044	267	320	6	0	0	0
2	D	218	1637	1044	267	320	6	0	0	0

- Molecule 3 is a protein called Light Chain of mAb 8C11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	L	213	1656	1034	278	338	6	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	213	1656	1034	278	338	6	0	0	0

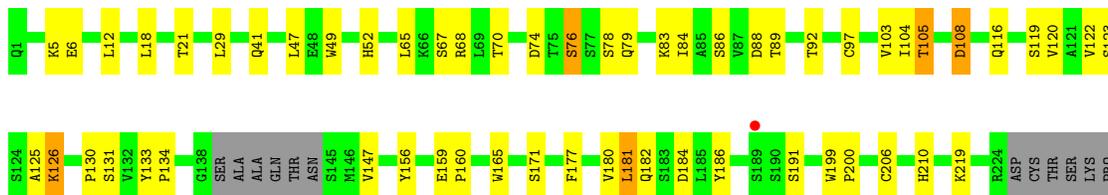
- Molecule 4 is a protein called Heavy Chain of mAb 8H3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	E	219	1644	1040	271	325	8	0	0	0
4	G	219	1644	1040	271	325	8	0	0	0

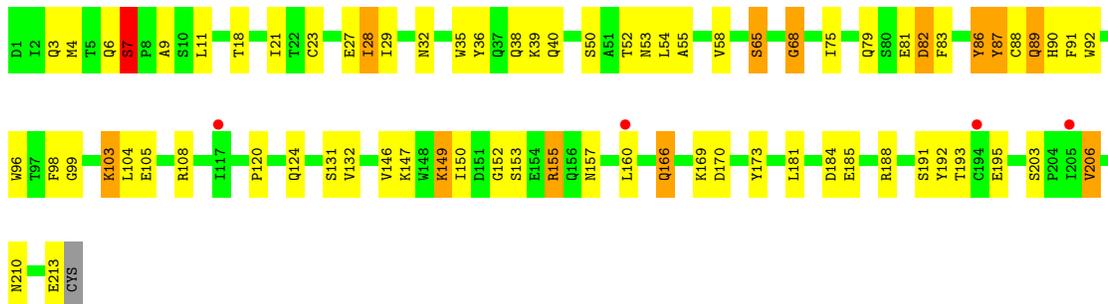
- Molecule 5 is a protein called Light Chain of mAb 8H3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	F	217	1685	1051	282	344	8	0	0	0
5	I	217	1685	1051	282	344	8	0	0	0

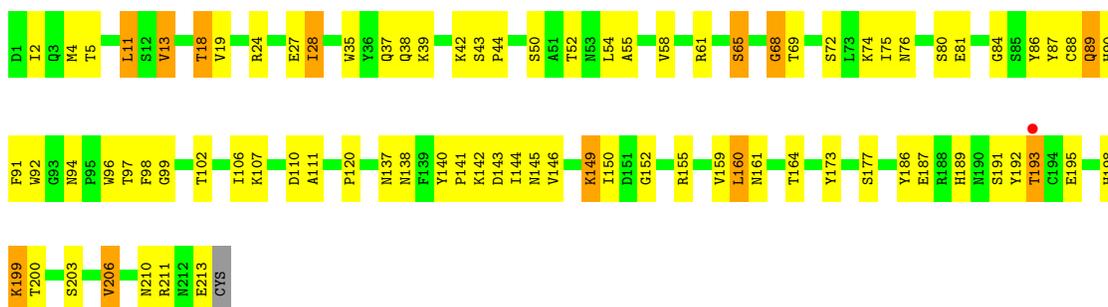




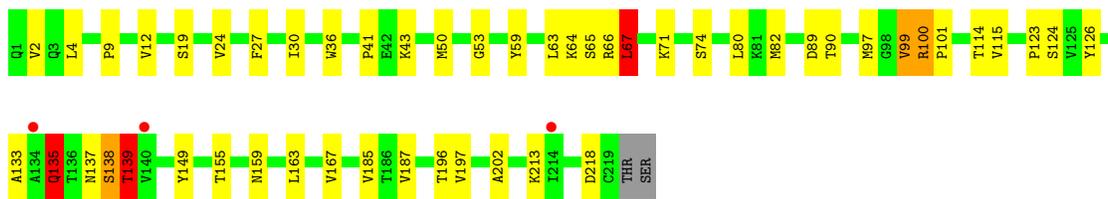
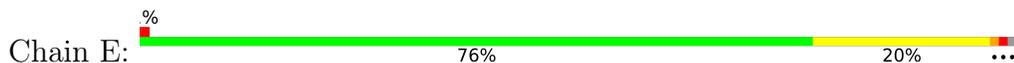
● Molecule 3: Light Chain of mAb 8C11



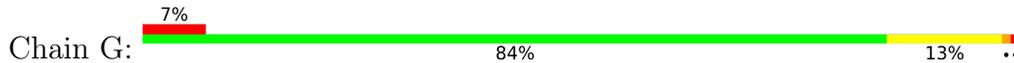
● Molecule 3: Light Chain of mAb 8C11

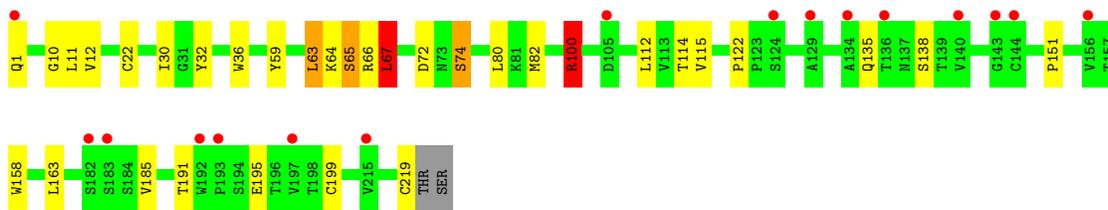


● Molecule 4: Heavy Chain of mAb 8H3

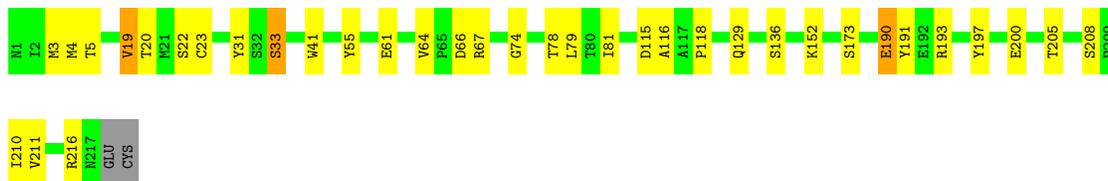
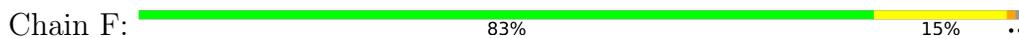


● Molecule 4: Heavy Chain of mAb 8H3

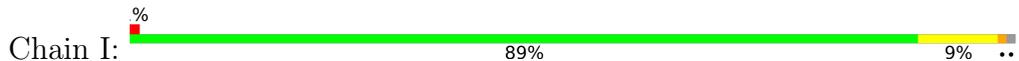




● Molecule 5: Light Chain of mAb 8H3



● Molecule 5: Light Chain of mAb 8H3



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	71.47Å 248.94Å 76.84Å 90.00° 94.07° 90.00°	Depositor
Resolution (Å)	36.65 – 3.48 36.65 – 3.48	Depositor EDS
% Data completeness (in resolution range)	93.4 (36.65-3.48) 93.3 (36.65-3.48)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.63 (at 3.48Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.223 , 0.269 0.229 , 0.268	Depositor DCC
$R_{free}$ test set	1542 reflections (4.49%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	72.4	Xtrriage
Anisotropy	0.692	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 46.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	15430	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	88.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.88% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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 i

### 5.1 Standard geometry i

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	0.62	0/1122	1.14	7/1540 (0.5%)
1	B	0.68	0/1116	1.16	6/1532 (0.4%)
2	D	0.52	0/1680	0.91	3/2299 (0.1%)
2	H	0.53	0/1680	0.93	0/2299
3	C	0.64	0/1695	1.44	31/2302 (1.3%)
3	L	0.57	0/1695	1.29	24/2302 (1.0%)
4	E	0.69	1/1687 (0.1%)	1.22	8/2311 (0.3%)
4	G	0.59	0/1687	1.06	9/2311 (0.4%)
5	F	0.57	0/1723	1.01	3/2338 (0.1%)
5	I	0.54	0/1723	0.97	3/2338 (0.1%)
All	All	0.59	1/15808 (0.0%)	1.12	94/21572 (0.4%)

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

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	137	ASN	N-CA	5.17	1.54	1.46

All (94) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	138	SER	N-CA-C	-14.15	89.51	110.46
3	L	75	ILE	N-CA-C	9.15	121.27	106.72
3	C	203	SER	CA-C-N	-9.06	110.44	119.78
3	C	203	SER	C-N-CA	-9.06	110.44	119.78
3	C	206	VAL	N-CA-C	8.80	120.57	107.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	75	ILE	N-CA-C	8.80	120.71	106.72
4	E	139	THR	N-CA-C	-8.67	96.22	110.17
3	L	149	LYS	N-CA-C	8.15	122.53	109.24
3	C	80	SER	N-CA-C	8.13	120.14	111.28
3	C	2	ILE	N-CA-C	-8.12	96.74	108.11
3	C	98	PHE	N-CA-C	7.77	119.97	110.41
3	C	58	VAL	CA-C-N	7.72	127.78	119.90
3	C	58	VAL	C-N-CA	7.72	127.78	119.90
1	A	602	ALA	CA-C-N	7.43	125.01	119.66
1	A	602	ALA	C-N-CA	7.43	125.01	119.66
3	C	28	ILE	N-CA-C	-7.36	99.20	109.21
3	C	58	VAL	N-CA-C	7.32	115.86	107.89
5	I	45	LYS	N-CA-C	-7.27	100.61	110.36
3	L	98	PHE	N-CA-C	7.23	119.30	110.41
3	L	58	VAL	N-CA-C	7.16	115.69	107.89
3	L	206	VAL	N-CA-C	7.15	118.17	107.80
4	E	218	ASP	N-CA-C	7.04	120.34	108.23
1	B	498	VAL	N-CA-C	7.04	118.94	108.46
3	C	193	THR	N-CA-C	7.03	119.93	108.26
3	C	86	TYR	N-CA-C	7.02	120.68	109.24
3	C	192	TYR	N-CA-C	-6.90	97.11	108.76
3	L	99	GLY	N-CA-C	-6.88	101.77	112.85
4	E	137	ASN	N-CA-CB	6.76	121.91	111.84
3	L	7	SER	N-CA-C	6.68	118.98	108.55
1	A	493	TYR	N-CA-C	-6.62	98.41	109.07
1	A	504	ALA	N-CA-C	6.53	118.20	111.14
3	C	18	THR	N-CA-C	-6.45	101.84	110.55
3	C	102	THR	CA-C-N	-6.41	112.55	122.87
3	C	102	THR	C-N-CA	-6.41	112.55	122.87
3	C	87	TYR	N-CA-C	6.37	118.91	108.52
4	E	133	ALA	N-CA-C	-6.31	101.61	110.50
3	C	13	VAL	N-CA-C	6.29	117.77	108.45
1	B	493	TYR	N-CA-C	-6.27	98.97	109.07
2	D	171	SER	N-CA-C	6.15	120.39	113.01
3	L	9	ALA	N-CA-C	-6.02	104.78	111.71
3	C	89	GLN	N-CA-C	6.02	118.85	109.52
3	L	149	LYS	CA-C-N	-6.00	115.28	123.14
3	L	149	LYS	C-N-CA	-6.00	115.28	123.14
3	L	55	ALA	N-CA-C	-5.96	100.78	110.20
4	E	135	GLN	N-CA-C	-5.96	102.09	110.50
3	L	203	SER	N-CA-C	-5.96	102.14	109.65
5	I	190	GLU	N-CA-CB	5.94	118.62	110.01

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	146	VAL	N-CA-C	5.86	116.30	107.80
4	G	65	SER	N-CA-C	-5.85	105.43	113.56
4	E	99	VAL	N-CA-C	-5.81	100.04	108.87
3	C	159	VAL	N-CA-C	5.79	116.21	108.11
2	D	210	HIS	CA-C-N	5.71	124.90	118.97
2	D	210	HIS	C-N-CA	5.71	124.90	118.97
3	L	58	VAL	CA-C-N	5.69	125.70	119.90
3	L	58	VAL	C-N-CA	5.69	125.70	119.90
4	G	67	LEU	N-CA-C	5.69	118.51	109.24
5	F	64	VAL	N-CA-C	5.67	114.29	109.02
3	C	86	TYR	CA-C-N	5.66	130.97	123.05
3	C	86	TYR	C-N-CA	5.66	130.97	123.05
5	F	67	ARG	N-CA-C	5.65	119.44	112.54
4	G	63	LEU	CA-C-N	5.62	132.28	121.54
4	G	63	LEU	C-N-CA	5.62	132.28	121.54
3	C	146	VAL	N-CA-C	5.62	116.04	108.17
1	A	537	PHE	N-CA-C	-5.60	102.19	110.48
3	C	75	ILE	CB-CA-C	-5.58	104.56	111.32
3	C	149	LYS	N-CA-C	5.58	118.34	109.24
1	B	462	PHE	N-CA-C	5.55	117.01	111.07
3	L	75	ILE	CB-CA-C	-5.49	104.67	111.32
3	L	87	TYR	N-CA-C	5.49	117.47	108.52
3	L	28	ILE	N-CA-C	-5.41	101.86	109.21
1	A	516	TRP	N-CA-C	5.40	119.13	112.54
4	G	1	GLN	CA-C-N	5.34	129.03	121.66
4	G	1	GLN	C-N-CA	5.34	129.03	121.66
5	F	190	GLU	N-CA-CB	5.33	117.74	110.01
3	L	86	TYR	N-CA-C	5.33	117.92	109.24
3	L	3	GLN	N-CA-C	5.30	117.54	108.90
3	C	84	GLY	N-CA-C	-5.28	103.62	110.38
4	E	67	LEU	N-CA-C	5.28	117.84	109.24
3	C	74	LYS	CA-C-N	-5.27	115.93	123.10
3	C	74	LYS	C-N-CA	-5.27	115.93	123.10
1	B	603	PRO	O-C-N	5.27	123.63	121.15
4	G	122	PRO	O-C-N	5.25	123.62	121.15
3	L	89	GLN	N-CA-C	5.25	117.66	109.52
3	L	18	THR	N-CA-C	-5.23	103.49	110.55
1	A	498	VAL	N-CA-C	5.18	116.18	108.46
4	G	100	ARG	CA-C-N	5.16	139.37	127.00
4	G	100	ARG	C-N-CA	5.16	139.37	127.00
3	C	55	ALA	N-CA-C	-5.14	102.08	110.20
1	B	550	ALA	N-CA-C	5.11	117.75	110.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	I	164	VAL	N-CA-C	5.10	115.66	108.36
1	B	511	ALA	N-CA-C	5.09	117.22	111.11
3	C	42	LYS	N-CA-C	5.08	117.40	109.52
3	L	82	ASP	N-CA-C	5.08	119.51	112.45
3	L	166	GLN	N-CA-C	-5.05	102.57	110.10

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	482	GLN	Sidechain

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1096	0	1085	21	0
1	B	1090	0	1080	15	0
2	D	1637	0	1630	35	0
2	H	1637	0	1630	36	0
3	C	1656	0	1576	43	0
3	L	1656	0	1576	42	0
4	E	1644	0	1618	33	0
4	G	1644	0	1618	24	0
5	F	1685	0	1617	18	0
5	I	1685	0	1617	9	0
All	All	15430	0	15047	243	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 8.

All (243) 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)
3:C:38:GLN:HE22	2:D:41:GLN:HE22	1.13	0.88

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:529:ILE:HD12	4:G:30:ILE:HD12	1.55	0.88
3:C:195:GLU:HG2	3:C:206:VAL:HG22	1.54	0.87
1:A:552:THR:HB	4:E:100:ARG:HB2	1.57	0.84
3:L:195:GLU:HG2	3:L:206:VAL:HG22	1.64	0.80
1:A:541:LEU:HD11	1:A:569:LEU:HG	1.64	0.79
3:L:147:LYS:NZ	3:L:195:GLU:OE1	2.13	0.76
3:C:52:THR:HG22	3:C:65:SER:HA	1.68	0.76
2:H:73:LYS:NZ	2:H:74:ASP:O	2.13	0.75
2:D:74:ASP:OD1	2:D:76:SER:OG	2.08	0.72
3:L:210:ASN:HB2	3:L:213:GLU:HG3	1.73	0.71
3:C:210:ASN:HB2	3:C:213:GLU:HG2	1.73	0.71
2:H:18:LEU:HD23	2:H:84:ILE:HD12	1.72	0.70
3:C:89:GLN:HG2	3:C:90:HIS:H	1.55	0.70
3:L:181:LEU:HD22	3:L:185:GLU:HB3	1.74	0.69
2:D:18:LEU:HD23	2:D:84:ILE:HD12	1.72	0.69
3:C:191:SER:OG	3:C:210:ASN:ND2	2.26	0.68
4:G:59:TYR:CD1	4:G:67:LEU:HD23	2.29	0.68
2:H:163:VAL:HG22	2:H:208:VAL:HG22	1.76	0.67
2:D:126:LYS:H	2:D:126:LYS:HD3	1.60	0.67
3:L:90:HIS:HD2	3:L:92:TRP:H	1.41	0.66
4:G:63:LEU:O	4:G:65:SER:N	2.29	0.66
4:G:135:GLN:O	4:G:138:SER:OG	2.08	0.65
2:H:52:HIS:CE1	2:H:60:ARG:HB2	2.31	0.65
1:A:529:ILE:CD1	4:G:30:ILE:HD12	2.26	0.65
3:C:11:LEU:HD22	3:C:13:VAL:HG13	1.78	0.65
4:G:163:LEU:HD13	4:G:185:VAL:HG21	1.79	0.65
3:L:4:MET:HE3	3:L:23:CYS:SG	2.36	0.65
3:C:90:HIS:HD2	3:C:92:TRP:H	1.44	0.64
3:C:89:GLN:HG2	3:C:90:HIS:N	2.12	0.63
2:H:210:HIS:ND1	2:H:213:SER:OG	2.22	0.63
4:E:63:LEU:O	4:E:65:SER:N	2.33	0.62
1:A:591:GLY:HA2	1:A:593:VAL:HG12	1.81	0.61
5:F:152:LYS:HB2	5:F:200:GLU:HB3	1.82	0.61
3:L:149:LYS:HE3	3:L:152:GLY:O	2.00	0.61
3:C:50:SER:OG	2:D:108:ASP:OD2	2.09	0.60
1:B:496:ASP:HB3	1:B:578:ARG:HG2	1.84	0.60
4:E:36:TRP:CE2	4:E:80:LEU:HB2	2.37	0.60
1:B:529:ILE:CD1	4:E:30:ILE:HD12	2.32	0.60
4:G:36:TRP:CE2	4:G:80:LEU:HB2	2.37	0.59
3:C:142:LYS:HB3	3:C:173:TYR:CE1	2.38	0.59
3:L:7:SER:O	3:L:21:ILE:HG23	2.02	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:108:ASP:OD2	3:L:50:SER:OG	2.15	0.58
2:D:67:SER:HG	5:I:82:ASN:HD22	1.52	0.58
2:H:41:GLN:HE22	3:L:38:GLN:HE22	1.51	0.58
3:C:90:HIS:CE1	3:C:97:THR:H	2.21	0.58
3:L:6:GLN:NE2	3:L:86:TYR:O	2.35	0.57
2:H:41:GLN:HB2	2:H:47:LEU:HD23	1.86	0.57
3:C:189:HIS:O	3:C:211:ARG:NH1	2.28	0.57
1:B:529:ILE:HD12	4:E:30:ILE:HD12	1.86	0.57
3:C:89:GLN:HE21	3:C:96:TRP:HB3	1.70	0.57
2:D:41:GLN:HB2	2:D:47:LEU:HD23	1.86	0.57
1:A:543:GLY:HA2	1:B:555:ALA:HB2	1.87	0.56
4:G:72:ASP:OD1	4:G:74:SER:OG	2.21	0.56
1:A:553:THR:H	4:E:100:ARG:HA	1.70	0.56
2:H:53:ILE:HG13	2:H:59:LYS:HG2	1.87	0.56
2:D:5:LYS:NZ	2:D:6:GLU:O	2.31	0.56
2:H:40:ARG:HB3	2:H:50:LEU:HD11	1.87	0.56
2:H:123:SER:OG	2:H:184:ASP:HB3	2.04	0.56
2:H:29:LEU:HD12	2:H:73:LYS:HD3	1.88	0.56
5:F:200:GLU:HG3	5:F:211:VAL:HG22	1.88	0.56
4:G:59:TYR:HD1	4:G:67:LEU:HD23	1.69	0.55
2:D:88:ASP:O	2:D:122:VAL:HG21	2.06	0.55
3:L:89:GLN:HG2	3:L:90:HIS:H	1.72	0.55
3:L:28:ILE:HG13	3:L:68:GLY:HA2	1.88	0.54
3:C:35:TRP:CZ3	3:C:88:CYS:HB3	2.42	0.54
1:B:501:VAL:HG22	1:B:508:GLN:HB2	1.89	0.54
4:E:41:PRO:O	4:E:43:LYS:HE2	2.08	0.54
5:F:190:GLU:HG2	5:F:193:ARG:NH1	2.22	0.54
3:C:4:MET:HB2	3:C:99:GLY:HA2	1.90	0.54
2:H:89:THR:HA	2:H:122:VAL:HG23	1.90	0.54
4:E:59:TYR:CD1	4:E:67:LEU:HD23	2.44	0.53
3:L:52:THR:HG22	3:L:65:SER:HA	1.89	0.53
4:E:196:THR:HG23	4:E:213:LYS:HE3	1.90	0.53
3:C:137:ASN:HB3	3:C:138:ASN:ND2	2.24	0.53
2:D:70:THR:HB	2:D:83:LYS:HB2	1.91	0.53
4:G:67:LEU:HD12	4:G:82:MET:HG3	1.90	0.53
2:D:89:THR:HA	2:D:122:VAL:HG23	1.89	0.53
3:L:83:PHE:HB3	3:L:104:LEU:O	2.09	0.52
3:C:142:LYS:HB3	3:C:173:TYR:CZ	2.44	0.52
3:C:198:HIS:HD2	3:C:200:THR:OG1	1.93	0.52
3:L:120:PRO:HD3	3:L:132:VAL:HG22	1.91	0.52
4:E:163:LEU:HD13	4:E:185:VAL:HG21	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:209:ALA:HB2	2:H:216:LYS:HG3	1.92	0.52
1:A:512:ARG:NH1	3:L:32:ASN:OD1	2.38	0.52
1:B:552:THR:HB	4:G:100:ARG:HB2	1.91	0.52
1:B:539:LEU:HB2	1:B:569:LEU:HB2	1.92	0.52
5:I:66:ASP:OD2	5:I:66:ASP:N	2.43	0.52
3:L:108:ARG:NH1	3:L:170:ASP:O	2.43	0.51
4:E:139:THR:HG22	4:E:187:VAL:C	2.35	0.51
2:H:182:GLN:HB2	3:L:160:LEU:HD21	1.92	0.51
2:D:6:GLU:HG3	2:D:97:CYS:SG	2.51	0.51
5:F:116:ALA:C	5:F:205:THR:HG21	2.35	0.51
3:L:35:TRP:CZ3	3:L:88:CYS:HB3	2.45	0.51
3:L:166:GLN:HB2	3:L:173:TYR:CE2	2.45	0.51
2:D:199:TRP:CG	2:D:200:PRO:HA	2.46	0.51
3:C:91:PHE:HA	3:C:96:TRP:CD1	2.45	0.51
3:L:29:ILE:HG22	3:L:92:TRP:HB3	1.92	0.51
2:D:130:PRO:HB3	2:D:156:TYR:HB3	1.92	0.51
3:L:91:PHE:HA	3:L:96:TRP:CD1	2.46	0.51
3:C:150:ILE:HD12	3:C:155:ARG:HE	1.76	0.50
3:C:144:ILE:HG12	3:C:145:ASN:H	1.76	0.50
5:F:20:THR:HG23	5:F:78:THR:HG23	1.93	0.50
3:C:141:PRO:HD2	3:C:199:LYS:HG2	1.92	0.50
5:F:31:TYR:CE2	5:F:33:SER:HB2	2.45	0.50
3:L:155:ARG:NE	3:L:157:ASN:O	2.43	0.50
3:C:28:ILE:HG23	3:C:68:GLY:HA2	1.94	0.50
2:H:52:HIS:HE1	2:H:60:ARG:HB2	1.73	0.50
4:E:67:LEU:HD12	4:E:82:MET:HG3	1.94	0.50
2:H:12:LEU:HG	2:H:122:VAL:HG12	1.93	0.50
3:C:61:ARG:NH2	3:C:81:GLU:OE2	2.44	0.50
3:L:89:GLN:HG2	3:L:90:HIS:N	2.27	0.50
2:D:92:THR:HG23	2:D:120:VAL:O	2.12	0.50
4:E:167:VAL:HG22	4:E:185:VAL:HG23	1.93	0.49
3:L:90:HIS:HD2	3:L:92:TRP:N	2.11	0.49
4:G:10:GLY:HA2	4:G:112:LEU:O	2.12	0.49
4:E:100:ARG:N	4:E:101:PRO:HA	2.28	0.48
2:D:159:GLU:OE1	2:D:160:PRO:HA	2.13	0.48
4:G:66:ARG:NH2	4:G:82:MET:HE2	2.28	0.48
2:H:14:PRO:O	2:H:15:SER:OG	2.30	0.48
2:D:199:TRP:CD1	2:D:200:PRO:HA	2.48	0.48
5:F:3:MET:HE2	5:F:5:THR:HG22	1.95	0.48
1:A:543:GLY:HA2	1:B:555:ALA:CB	2.43	0.48
2:H:56:ASP:OD1	2:H:56:ASP:N	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:155:ARG:HD2	3:L:157:ASN:H	1.78	0.48
3:C:164:THR:HG23	2:D:177:PHE:CD2	2.49	0.48
3:C:161:ASN:HD22	3:C:177:SER:HA	1.78	0.48
4:E:12:VAL:O	4:E:115:VAL:HA	2.14	0.47
5:I:152:LYS:HB2	5:I:200:GLU:HB3	1.95	0.47
2:H:60:ARG:HG3	2:H:60:ARG:HH11	1.79	0.47
3:L:103:LYS:HG2	3:L:105:GLU:OE2	2.15	0.47
3:C:140:TYR:CG	3:C:141:PRO:HA	2.49	0.47
4:E:4:LEU:HD22	4:E:24:VAL:HG12	1.96	0.47
2:D:67:SER:OG	5:I:82:ASN:ND2	2.38	0.47
2:D:134:PRO:HD3	2:D:219:LYS:HG2	1.96	0.47
5:I:95:HIS:HE1	5:I:101:TYR:HB3	1.79	0.47
3:L:50:SER:HB2	3:L:53:ASN:HD22	1.80	0.47
2:H:74:ASP:C	2:H:76:SER:H	2.23	0.47
1:A:576:GLY:O	1:A:577:HIS:C	2.57	0.46
2:H:73:LYS:HD2	2:H:74:ASP:H	1.80	0.46
3:C:37:GLN:O	3:C:44:PRO:HA	2.14	0.46
5:F:115:ASP:HB3	5:F:205:THR:HG22	1.96	0.46
2:H:106:THR:OG1	2:H:108:ASP:OD1	2.20	0.46
3:C:149:LYS:HE3	3:C:152:GLY:HA2	1.98	0.46
4:E:53:GLY:O	4:E:71:LYS:NZ	2.34	0.46
5:F:66:ASP:N	5:F:66:ASP:OD2	2.47	0.46
1:B:568:GLN:HE22	4:E:30:ILE:HB	1.81	0.46
1:A:553:THR:OG1	4:E:100:ARG:HA	2.16	0.46
3:C:111:ALA:C	3:C:200:THR:HG21	2.41	0.46
4:G:191:THR:O	4:G:195:GLU:HB2	2.16	0.46
1:A:531:GLN:NE2	4:G:30:ILE:HD11	2.30	0.46
3:C:160:LEU:HD21	2:D:182:GLN:HB3	1.98	0.46
3:L:124:GLN:HE22	3:L:131:SER:CB	2.29	0.46
5:F:191:TYR:O	5:F:197:TYR:OH	2.33	0.46
2:H:47:LEU:HD12	3:L:87:TYR:CD1	2.51	0.45
3:C:28:ILE:HG12	3:C:69:THR:HG23	1.98	0.45
5:F:41:TRP:CE2	5:F:79:LEU:HB2	2.51	0.45
2:H:74:ASP:O	2:H:76:SER:N	2.49	0.45
1:A:566:SER:N	4:G:32:TYR:OH	2.35	0.45
3:L:210:ASN:HB2	3:L:213:GLU:CG	2.45	0.45
3:L:150:ILE:HD12	3:L:192:TYR:CD1	2.51	0.45
2:H:6:GLU:HG3	2:H:97:CYS:SG	2.56	0.45
3:L:36:TYR:HB2	3:L:87:TYR:HB2	1.99	0.45
3:L:191:SER:HA	3:L:210:ASN:ND2	2.31	0.45
1:A:499:THR:HG22	1:A:510:VAL:HG22	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:G:11:LEU:HD12	4:G:114:THR:O	2.17	0.45
4:E:9:PRO:HD3	4:E:19:SER:O	2.16	0.45
4:E:90:THR:HG23	4:E:114:THR:HA	1.98	0.45
4:G:11:LEU:HB2	4:G:151:PRO:HG3	1.99	0.44
3:C:141:PRO:O	3:C:198:HIS:HE1	2.00	0.44
1:B:576:GLY:O	1:B:577:HIS:C	2.60	0.44
4:E:100:ARG:NH2	5:F:55:TYR:CZ	2.81	0.44
1:A:532:HIS:H	4:G:74:SER:HB3	1.83	0.44
3:L:39:LYS:NZ	3:L:81:GLU:O	2.36	0.44
1:B:524:ARG:NH1	1:B:525:PRO:O	2.50	0.44
3:C:43:SER:OG	2:D:116:GLN:HA	2.18	0.44
4:E:123:PRO:HB3	4:E:149:TYR:HB3	1.98	0.44
2:D:131:SER:HB3	2:D:133:TYR:CZ	2.53	0.44
4:E:135:GLN:O	4:E:138:SER:OG	2.29	0.44
5:F:4:MET:HE3	5:F:23:CYS:SG	2.58	0.44
2:H:73:LYS:HD2	2:H:74:ASP:N	2.33	0.44
2:D:104:ILE:O	2:D:105:THR:HB	2.18	0.44
2:D:123:SER:OG	2:D:184:ASP:HB3	2.18	0.44
3:C:199:LYS:HG3	3:C:200:THR:N	2.32	0.43
5:F:129:GLN:CD	5:F:136:SER:H	2.25	0.43
1:A:467:ALA:O	1:A:468:ASN:HB2	2.18	0.43
2:H:112:ASP:OD1	2:H:112:ASP:N	2.51	0.43
4:E:50:MET:HE3	4:E:50:MET:HB2	1.97	0.43
5:F:22:SER:OG	5:F:23:CYS:N	2.52	0.43
3:L:79:GLN:O	3:L:82:ASP:HB2	2.19	0.43
4:G:12:VAL:O	4:G:115:VAL:HA	2.18	0.43
5:I:19:VAL:HG12	5:I:81:ILE:HB	2.01	0.43
1:A:542:ARG:HD3	1:B:548:TRP:NE1	2.34	0.43
2:H:39:ILE:HD12	2:H:114:TRP:CH2	2.54	0.43
5:F:19:VAL:HG12	5:F:81:ILE:HB	2.00	0.43
2:D:180:VAL:O	2:D:186:TYR:HD2	2.02	0.42
4:E:124:SER:HB3	4:E:126:TYR:CZ	2.54	0.42
4:G:22:CYS:HB2	4:G:36:TRP:CH2	2.54	0.42
3:C:18:THR:HG23	3:C:76:ASN:HA	2.00	0.42
3:L:184:ASP:O	3:L:188:ARG:HG3	2.18	0.42
2:D:165:TRP:CZ3	2:D:206:CYS:HB2	2.54	0.42
5:I:43:GLN:HB2	5:I:53:LEU:HD11	2.02	0.42
1:B:553:THR:H	4:G:100:ARG:HA	1.83	0.42
4:E:159:ASN:OD1	4:E:197:VAL:HA	2.19	0.42
3:C:189:HIS:O	3:C:211:ARG:HD3	2.20	0.42
2:D:49:TRP:HE1	2:D:52:HIS:CD2	2.38	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:18:THR:HG22	3:C:19:VAL:N	2.35	0.42
3:L:150:ILE:O	3:L:153:SER:N	2.49	0.42
2:D:12:LEU:O	2:D:122:VAL:HA	2.19	0.42
4:E:155:THR:OG1	4:E:202:ALA:HB3	2.20	0.42
1:A:540:PRO:O	1:A:541:LEU:HD23	2.20	0.42
1:A:542:ARG:NH1	1:B:552:THR:O	2.53	0.42
2:H:104:ILE:C	2:H:106:THR:H	2.28	0.42
5:F:55:TYR:HE1	5:F:61:GLU:HA	1.85	0.42
2:D:68:ARG:NH2	2:D:86:SER:O	2.45	0.41
2:H:44:GLY:C	2:H:45:LYS:HE2	2.45	0.41
2:H:31:THR:HB	2:H:34:MET:HG3	2.02	0.41
3:L:54:LEU:HA	3:L:54:LEU:HD12	1.71	0.41
3:L:166:GLN:HB2	3:L:173:TYR:CZ	2.56	0.41
3:C:5:THR:HB	3:C:24:ARG:HB3	2.03	0.41
2:D:180:VAL:HG22	2:D:181:LEU:H	1.85	0.41
4:E:2:VAL:HG13	4:E:27:PHE:CD2	2.56	0.41
5:F:118:PRO:HG2	5:F:210:ILE:HD12	2.03	0.41
3:C:37:GLN:NE2	3:C:39:LYS:HE3	2.35	0.41
4:E:27:PHE:CE1	4:E:97:MET:HE3	2.55	0.41
1:A:555:ALA:HB2	1:B:543:GLY:HA2	2.02	0.41
2:H:131:SER:HB3	2:H:133:TYR:CZ	2.55	0.41
4:E:43:LYS:HA	4:E:43:LYS:HD3	1.96	0.41
1:A:496:ASP:HB3	1:A:578:ARG:HG2	2.03	0.41
2:H:16:GLN:O	2:H:87:VAL:HG22	2.21	0.41
2:D:6:GLU:HA	2:D:21:THR:O	2.21	0.41
2:D:21:THR:HG21	2:D:79:GLN:HE21	1.86	0.41
4:G:100:ARG:NH2	5:I:55:TYR:CZ	2.89	0.41
2:H:182:GLN:NE2	3:L:160:LEU:HD11	2.35	0.41
4:E:99:VAL:C	4:E:101:PRO:HA	2.46	0.40
3:C:54:LEU:HD12	3:C:54:LEU:HA	1.74	0.40
3:C:120:PRO:HD2	3:C:186:TYR:OH	2.20	0.40
2:D:123:SER:C	2:D:125:ALA:H	2.28	0.40
2:H:222:VAL:HA	2:H:223:PRO:HD3	1.85	0.40
2:D:65:LEU:O	2:D:67:SER:N	2.54	0.40
4:E:66:ARG:NH2	4:E:89:ASP:OD2	2.54	0.40
5:I:29:VAL:HG11	5:I:96:GLN:HB2	2.03	0.40
4:G:158:TRP:CZ3	4:G:199:CYS:HB3	2.56	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	144/214 (67%)	138 (96%)	5 (4%)	1 (1%)	19	53
1	B	143/214 (67%)	137 (96%)	5 (4%)	1 (1%)	19	53
2	D	214/230 (93%)	195 (91%)	16 (8%)	3 (1%)	9	40
2	H	214/230 (93%)	192 (90%)	19 (9%)	3 (1%)	9	40
3	C	211/214 (99%)	205 (97%)	5 (2%)	1 (0%)	25	59
3	L	211/214 (99%)	203 (96%)	7 (3%)	1 (0%)	25	59
4	E	217/221 (98%)	213 (98%)	2 (1%)	2 (1%)	14	48
4	G	217/221 (98%)	213 (98%)	2 (1%)	2 (1%)	14	48
5	F	215/219 (98%)	206 (96%)	8 (4%)	1 (0%)	25	59
5	I	215/219 (98%)	206 (96%)	8 (4%)	1 (0%)	25	59
All	All	2001/2196 (91%)	1908 (95%)	77 (4%)	16 (1%)	16	51

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	75	THR
2	H	182	GLN
4	E	64	LYS
4	E	100	ARG
4	G	64	LYS
4	G	100	ARG
2	H	77	SER
3	L	68	GLY
3	C	68	GLY
5	F	74	GLY
5	I	74	GLY
2	D	78	SER
2	D	108	ASP
2	D	76	SER

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Mol	Chain	Res	Type
1	A	490	GLY
1	B	490	GLY

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	119/180 (66%)	116 (98%)	3 (2%)	42	68
1	B	118/180 (66%)	117 (99%)	1 (1%)	79	87
2	D	189/199 (95%)	181 (96%)	8 (4%)	25	54
2	H	189/199 (95%)	180 (95%)	9 (5%)	21	51
3	C	188/189 (100%)	175 (93%)	13 (7%)	13	39
3	L	188/189 (100%)	179 (95%)	9 (5%)	21	51
4	E	190/192 (99%)	186 (98%)	4 (2%)	48	71
4	G	190/192 (99%)	187 (98%)	3 (2%)	58	76
5	F	193/195 (99%)	188 (97%)	5 (3%)	41	66
5	I	193/195 (99%)	187 (97%)	6 (3%)	35	63
All	All	1757/1910 (92%)	1696 (96%)	61 (4%)	31	60

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	470	VAL
1	A	508	GLN
1	A	593	VAL
2	H	29	LEU
2	H	30	SER
2	H	39	ILE
2	H	60	ARG
2	H	65	LEU
2	H	73	LYS
2	H	103	VAL
2	H	162	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	H	191	SER
3	L	7	SER
3	L	11	LEU
3	L	27	GLU
3	L	40	GLN
3	L	65	SER
3	L	103	LYS
3	L	155	ARG
3	L	169	LYS
3	L	193	THR
1	B	508	GLN
3	C	11	LEU
3	C	27	GLU
3	C	65	SER
3	C	72	SER
3	C	94	ASN
3	C	106	ILE
3	C	107	LYS
3	C	110	ASP
3	C	143	ASP
3	C	160	LEU
3	C	187	GLU
3	C	193	THR
3	C	199	LYS
2	D	29	LEU
2	D	103	VAL
2	D	105	THR
2	D	119	SER
2	D	126	LYS
2	D	147	VAL
2	D	181	LEU
2	D	191	SER
4	E	67	LEU
4	E	74	SER
4	E	135	GLN
4	E	139	THR
5	F	19	VAL
5	F	33	SER
5	F	173	SER
5	F	208	SER
5	F	216	ARG
4	G	67	LEU

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Mol	Chain	Res	Type
4	G	74	SER
4	G	219	CYS
5	I	19	VAL
5	I	29	VAL
5	I	31	TYR
5	I	173	SER
5	I	208	SER
5	I	216	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (44) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	568	GLN
2	H	41	GLN
2	H	52	HIS
2	H	182	GLN
3	L	3	GLN
3	L	37	GLN
3	L	53	ASN
3	L	76	ASN
3	L	89	GLN
3	L	90	HIS
3	L	94	ASN
3	L	124	GLN
3	L	138	ASN
3	L	161	ASN
3	L	198	HIS
3	L	210	ASN
1	B	482	GLN
1	B	508	GLN
1	B	560	ASN
3	C	3	GLN
3	C	37	GLN
3	C	38	GLN
3	C	40	GLN
3	C	76	ASN
3	C	89	GLN
3	C	90	HIS
3	C	94	ASN
3	C	138	ASN
3	C	161	ASN
3	C	189	HIS

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Mol	Chain	Res	Type
3	C	198	HIS
3	C	210	ASN
2	D	13	GLN
2	D	79	GLN
2	D	116	GLN
4	E	39	GLN
5	F	35	GLN
5	F	37	ASN
5	F	44	GLN
5	F	95	HIS
5	F	150	ASN
4	G	168	HIS
5	I	37	ASN
5	I	95	HIS

### 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

### 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	146/214 (68%)	-0.06	1 (0%) 84 69	47, 59, 74, 87	0
1	B	145/214 (67%)	-0.21	0 100 100	45, 57, 68, 77	0
2	D	218/230 (94%)	0.00	1 (0%) 87 76	50, 67, 116, 130	0
2	H	218/230 (94%)	0.06	3 (1%) 73 53	51, 66, 122, 134	0
3	C	213/214 (99%)	0.11	1 (0%) 87 76	53, 83, 114, 122	0
3	L	213/214 (99%)	0.11	4 (1%) 66 47	57, 97, 151, 162	0
4	E	219/221 (99%)	0.25	3 (1%) 73 53	53, 78, 136, 162	0
4	G	219/221 (99%)	0.46	16 (7%) 22 18	57, 79, 179, 208	0
5	F	217/219 (99%)	0.15	0 100 100	54, 82, 162, 173	0
5	I	217/219 (99%)	0.29	3 (1%) 73 53	51, 92, 212, 251	0
All	All	2025/2196 (92%)	0.13	32 (1%) 70 51	45, 74, 163, 251	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
5	I	137	VAL	4.2
3	L	194	CYS	3.4
4	G	129	ALA	3.3
4	G	182	SER	3.2
4	G	136	THR	3.0
4	E	140	VAL	2.9
4	G	192	TRP	2.9
4	G	143	GLY	2.8
5	I	138	VAL	2.7
4	G	197	VAL	2.6
4	G	215	VAL	2.6
4	G	134	ALA	2.6
4	G	183	SER	2.6

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Mol	Chain	Res	Type	RSRZ
4	G	124	SER	2.6
4	G	144	CYS	2.5
4	G	156	VAL	2.4
3	L	205	ILE	2.4
3	C	193	THR	2.4
2	H	138	GLY	2.3
3	L	160	LEU	2.3
2	H	105	THR	2.3
4	E	134	ALA	2.2
3	L	117	ILE	2.2
4	G	105	ASP	2.2
4	G	140	VAL	2.2
4	E	214	ILE	2.1
5	I	124	PRO	2.1
4	G	1	GLN	2.0
4	G	193	PRO	2.0
1	A	531	GLN	2.0
2	H	145	SER	2.0
2	D	189	SER	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.