



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 09:00 PM UTC

PDB ID : 2WR5 / pdb_00002wr5
Title : structure of influenza H2 duck Ontario hemagglutinin
Authors : Liu, J.; Stevens, D.J.; Haire, L.F.; Walker, P.A.; Coombs, P.J.; Russell, R.J.;
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Deposited on : 2009-08-29
Resolution : 2.65 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

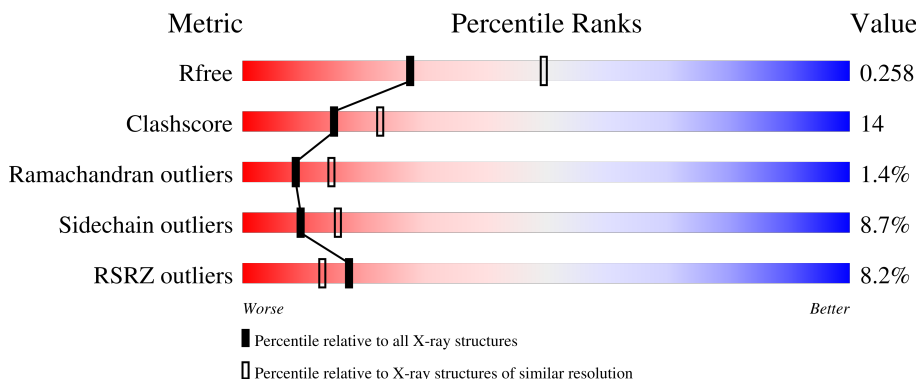
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.65 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	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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

Mol	Chain	Length	Quality of chain
1	A	507	8% 69% 21% 5%
1	B	507	7% 71% 21%
1	C	507	8% 64% 27%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 11604 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 HEMAGGLUTININ.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	485	Total	C	N	O	S	0	0	0
			3814	2396	654	742	22			
1	B	485	Total	C	N	O	S	0	0	0
			3814	2396	654	742	22			
1	C	485	Total	C	N	O	S	0	0	0
			3814	2396	654	742	22			

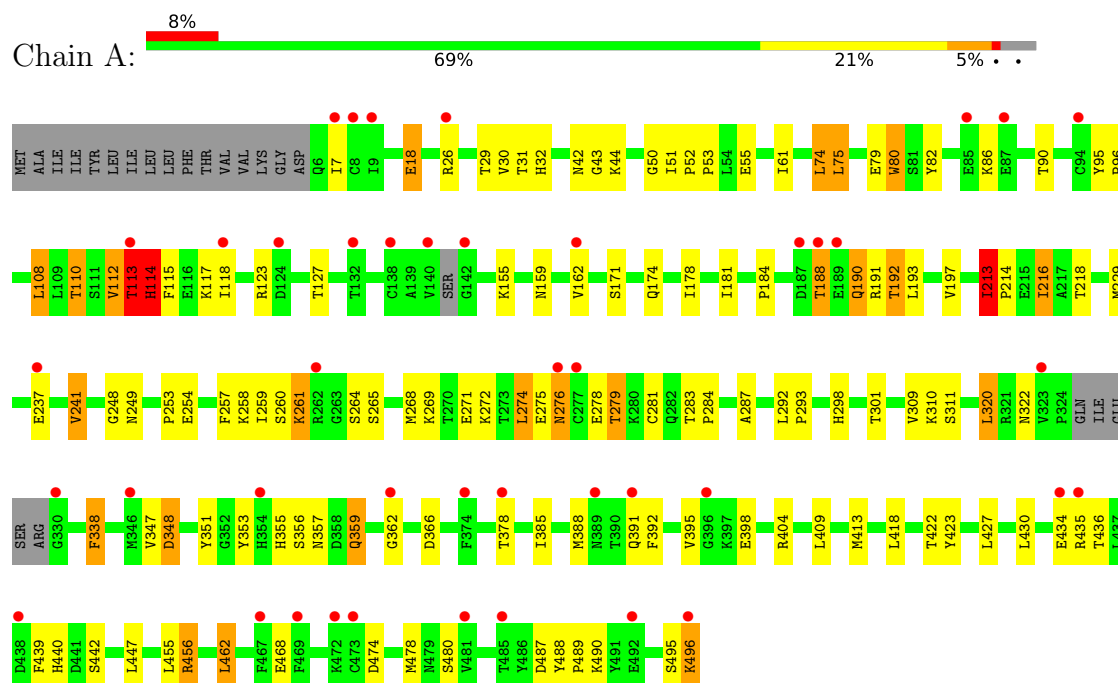
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	51	Total	O	0	0
			51	51		
2	B	61	Total	O	0	0
			61	61		
2	C	50	Total	O	0	0
			50	50		

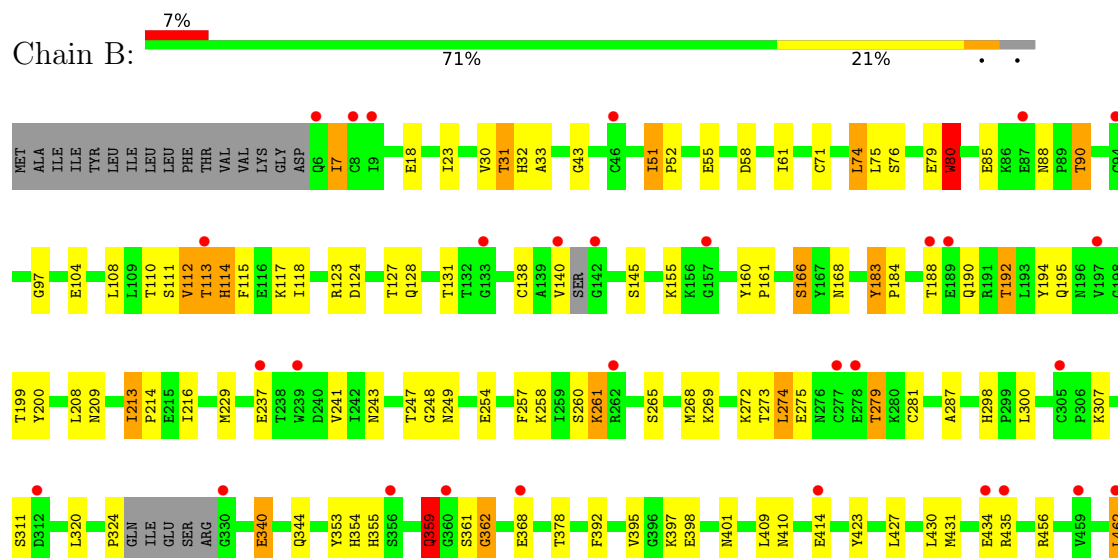
3 Residue-property plots

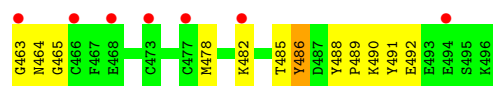
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: HEMAGGLUTININ

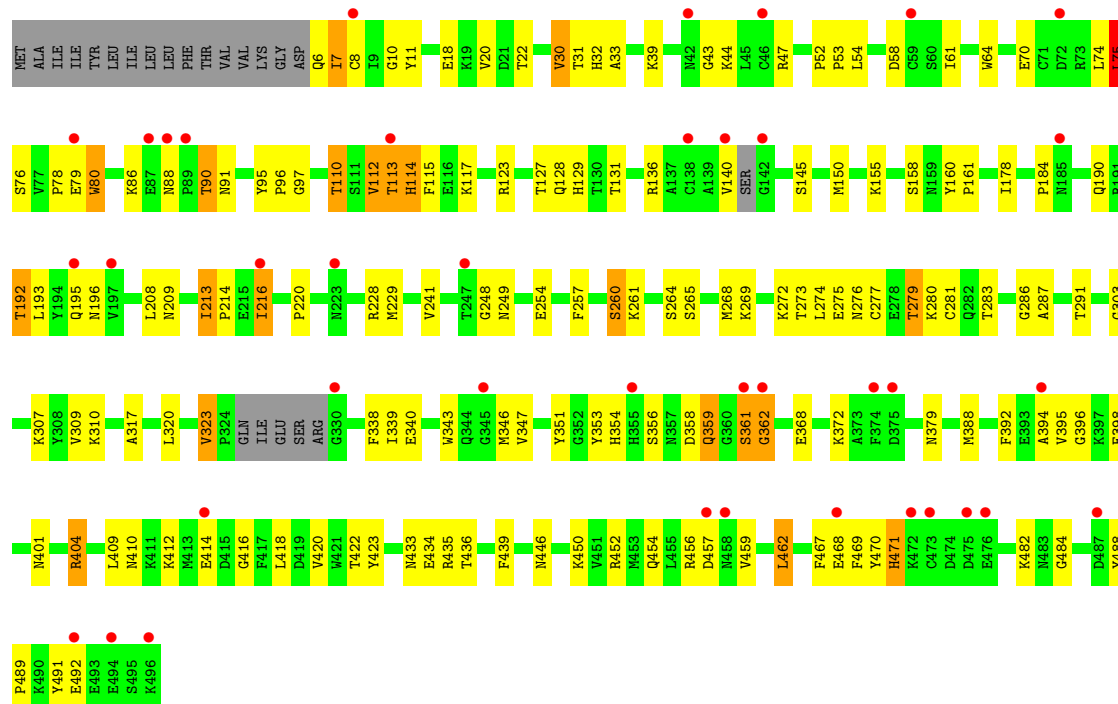


• Molecule 1: HEMAGGLUTININ





● Molecule 1: HEMAGGLUTININ



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	86.98Å 150.88Å 195.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.86 – 2.65 29.86 – 2.65	Depositor EDS
% Data completeness (in resolution range)	91.5 (29.86-2.65) 91.5 (29.86-2.65)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.26 (at 2.64Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.227 , 0.261 0.223 , 0.258	Depositor DCC
R_{free} test set	3442 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	71.1	Xtriage
Anisotropy	0.011	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 59.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11604	wwPDB-VP
Average B, all atoms (Å ²)	82.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.46% 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 [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	0.51	0/3899	0.88	5/5284 (0.1%)
1	B	0.54	0/3899	0.90	10/5284 (0.2%)
1	C	0.50	0/3899	0.85	4/5284 (0.1%)
All	All	0.52	0/11697	0.88	19/15852 (0.1%)

There are no bond length outliers.

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	113	THR	CA-C-N	7.52	135.24	121.70
1	A	113	THR	C-N-CA	7.52	135.24	121.70
1	B	113	THR	CA-C-N	7.43	135.07	121.70
1	B	113	THR	C-N-CA	7.43	135.07	121.70
1	C	113	THR	CA-C-N	7.02	134.34	121.70
1	C	113	THR	C-N-CA	7.02	134.34	121.70
1	B	114	HIS	N-CA-C	6.95	130.45	111.00
1	A	213	ILE	CA-C-N	6.79	126.75	119.76
1	A	213	ILE	C-N-CA	6.79	126.75	119.76
1	A	114	HIS	N-CA-C	6.53	129.29	111.00
1	B	183	TYR	CA-C-N	6.29	126.25	120.21
1	B	183	TYR	C-N-CA	6.29	126.25	120.21
1	C	114	HIS	N-CA-C	6.14	128.19	111.00
1	B	456	ARG	CB-CA-C	-6.09	109.57	116.63
1	B	51	ILE	CA-C-N	5.73	126.28	120.38
1	B	51	ILE	C-N-CA	5.73	126.28	120.38
1	B	88	ASN	CA-C-N	5.17	124.93	119.76
1	B	88	ASN	C-N-CA	5.17	124.93	119.76
1	C	280	LYS	N-CA-C	-5.05	107.15	113.72

There are no chirality outliers.

There are no planarity outliers.

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	3814	0	3639	95	0
1	B	3814	0	3639	94	0
1	C	3814	0	3639	126	0
2	A	51	0	0	1	0
2	B	61	0	0	4	0
2	C	50	0	0	7	0
All	All	11604	0	10917	307	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 14.

All (307) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:279:THR:HG21	1:A:287:ALA:HB1	1.34	1.07
1:A:261:LYS:HZ3	1:A:261:LYS:HB2	1.29	0.97
1:A:113:THR:OG1	1:A:260:SER:HB2	1.71	0.90
1:B:279:THR:HG21	1:B:287:ALA:HB1	1.55	0.87
1:B:113:THR:OG1	1:B:260:SER:HB2	1.75	0.87
1:B:112:VAL:HG11	1:B:115:PHE:HB2	1.58	0.86
1:B:261:LYS:HB2	1:B:261:LYS:HZ3	1.41	0.85
1:B:118:ILE:HD11	1:B:258:LYS:HD2	1.57	0.84
1:B:359:GLN:H	1:B:359:GLN:HE21	1.25	0.83
1:C:155:LYS:NZ	1:C:195:GLN:HE21	1.77	0.82
1:A:112:VAL:HG11	1:A:115:PHE:HB2	1.59	0.80
1:A:178:ILE:O	1:A:253:PRO:HG3	1.80	0.79
1:A:123:ARG:HG3	1:A:254:GLU:OE2	1.83	0.78
1:A:79:GLU:HG3	1:A:113:THR:O	1.84	0.78
1:C:79:GLU:HG3	1:C:113:THR:O	1.83	0.78
1:C:155:LYS:HZ2	1:C:195:GLN:HE21	1.28	0.78
1:A:7:ILE:HD11	1:A:353:TYR:HB3	1.66	0.76
1:C:359:GLN:N	1:C:359:GLN:HE21	1.84	0.76
1:A:118:ILE:HD11	1:A:258:LYS:HD3	1.67	0.75
1:A:279:THR:CG2	1:A:287:ALA:HB1	2.16	0.75
1:C:7:ILE:HB	1:C:469:PHE:HE1	1.52	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:457:ASP:HB2	1:C:488:TYR:OH	1.88	0.74
1:A:216:ILE:HD12	1:A:216:ILE:H	1.52	0.74
1:A:275:GLU:O	1:A:276:ASN:HB3	1.87	0.74
1:C:155:LYS:HD3	1:C:195:GLN:HG2	1.70	0.73
1:A:110:THR:CG2	1:A:265:SER:H	2.01	0.73
1:C:110:THR:HG21	1:C:265:SER:H	1.54	0.72
1:B:324:PRO:HB3	1:B:344:GLN:NE2	2.05	0.71
1:C:279:THR:HG22	1:C:281:CYS:H	1.56	0.71
1:C:358:ASP:HB2	2:C:2034:HOH:O	1.91	0.71
1:A:31:THR:HG22	1:A:32:HIS:CG	2.27	0.70
1:A:171:SER:HB2	1:A:258:LYS:HD2	1.73	0.70
1:C:184:PRO:HG2	1:C:190:GLN:NE2	2.06	0.69
1:C:96:PRO:HB2	1:C:228:ARG:HD3	1.74	0.69
1:B:359:GLN:HE21	1:B:359:GLN:N	1.89	0.69
1:C:110:THR:CG2	1:C:265:SER:H	2.04	0.69
1:B:188:THR:O	1:B:192:THR:HG22	1.93	0.69
1:A:118:ILE:HD11	1:A:258:LYS:CD	2.23	0.68
1:B:355:HIS:HB2	1:B:478:MET:HE3	1.75	0.68
1:A:52:PRO:O	1:A:80:TRP:HA	1.94	0.67
1:A:309:VAL:HG13	1:A:422:THR:HA	1.77	0.67
1:B:279:THR:CG2	1:B:287:ALA:HB1	2.25	0.67
1:B:208:LEU:HG	1:B:209:ASN:N	2.11	0.66
1:A:455:LEU:O	1:A:456:ARG:HB2	1.94	0.66
1:A:108:LEU:HD23	1:A:261:LYS:HE3	1.77	0.66
1:C:6:GLN:HB3	1:C:356:SER:HB2	1.79	0.65
1:B:261:LYS:HB2	1:B:261:LYS:NZ	2.11	0.65
1:A:357:ASN:HD21	1:A:474:ASP:HA	1.60	0.65
1:C:269:LYS:HE2	1:C:398:GLU:OE1	1.96	0.65
1:C:128:GLN:HB3	1:C:161:PRO:HG2	1.79	0.65
1:C:248:GLY:O	1:C:249:ASN:HB2	1.96	0.65
1:C:310:LYS:HG3	1:C:418:LEU:HD21	1.79	0.65
1:C:261:LYS:HZ3	1:C:261:LYS:HB2	1.62	0.64
1:B:184:PRO:HG2	1:B:190:GLN:NE2	2.13	0.64
1:C:470:TYR:O	1:C:471:HIS:HB3	1.96	0.64
1:A:388:MET:HE2	1:C:423:TYR:CE1	2.33	0.64
1:A:188:THR:O	1:A:192:THR:HG22	1.98	0.63
1:C:7:ILE:HG22	1:C:467:PHE:HB2	1.81	0.62
1:B:18:GLU:HG2	1:B:33:ALA:HB3	1.80	0.62
1:B:128:GLN:HB3	1:B:161:PRO:HG2	1.81	0.62
1:A:43:GLY:O	1:A:272:LYS:HE2	2.00	0.62
1:A:184:PRO:HG2	1:A:190:GLN:HE21	1.65	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:LEU:HG	1:A:75:LEU:O	1.99	0.61
1:C:184:PRO:HG2	1:C:190:GLN:HE21	1.65	0.61
1:A:184:PRO:HG2	1:A:190:GLN:NE2	2.16	0.61
1:C:136:ARG:HD3	2:C:2016:HOH:O	2.00	0.61
1:C:18:GLU:HG2	1:C:33:ALA:HB3	1.83	0.61
1:B:155:LYS:HD2	1:B:195:GLN:HG2	1.82	0.60
1:C:274:LEU:HD23	1:C:275:GLU:N	2.16	0.60
1:A:359:GLN:N	1:A:359:GLN:HE21	1.99	0.60
1:B:423:TYR:CE1	1:C:388:MET:HE2	2.37	0.60
1:C:117:LYS:HG3	1:C:257:PHE:CE2	2.37	0.60
1:B:79:GLU:HG3	1:B:113:THR:O	2.02	0.60
1:B:74:LEU:O	1:B:75:LEU:HB3	2.01	0.59
1:A:248:GLY:C	1:A:249:ASN:HD22	2.09	0.59
1:A:110:THR:HG21	1:A:265:SER:H	1.67	0.59
1:B:261:LYS:HZ3	1:B:261:LYS:CB	2.15	0.59
1:C:471:HIS:CE1	1:C:491:TYR:CD1	2.91	0.59
1:A:261:LYS:HB2	1:A:261:LYS:NZ	2.10	0.59
1:C:454:GLN:HB2	2:C:2047:HOH:O	2.03	0.58
1:A:276:ASN:CG	1:A:276:ASN:O	2.46	0.58
1:B:110:THR:CG2	1:B:265:SER:H	2.15	0.58
1:C:95:TYR:CD2	1:C:96:PRO:HD2	2.39	0.58
1:C:155:LYS:HE2	1:C:192:THR:O	2.03	0.58
1:B:31:THR:HG22	1:B:32:HIS:ND1	2.18	0.58
1:B:166:SER:HB3	1:B:243:ASN:OD1	2.03	0.58
1:C:274:LEU:HD23	1:C:275:GLU:H	1.68	0.58
1:B:168:ASN:ND2	2:B:2029:HOH:O	2.33	0.58
1:B:353:TYR:CD1	1:B:482:LYS:HG2	2.38	0.58
1:C:279:THR:CG2	1:C:287:ALA:HB1	2.34	0.58
1:B:43:GLY:O	1:B:272:LYS:HE2	2.03	0.57
1:B:117:LYS:HG3	1:B:257:PHE:CE2	2.38	0.57
1:C:248:GLY:C	1:C:249:ASN:HD22	2.12	0.57
1:B:492:GLU:OE1	1:B:492:GLU:HA	2.04	0.57
1:A:279:THR:HB	1:A:281:CYS:H	1.70	0.56
1:B:492:GLU:CD	2:B:2060:HOH:O	2.48	0.56
1:B:359:GLN:H	1:B:359:GLN:NE2	1.99	0.56
1:C:64:TRP:CD1	1:C:74:LEU:HD12	2.40	0.56
1:C:44:LYS:O	1:C:286:GLY:HA2	2.05	0.56
1:C:462:LEU:HD21	1:C:468:GLU:HB2	1.87	0.56
1:A:26:ARG:NE	2:A:2004:HOH:O	2.39	0.56
1:B:188:THR:O	1:B:192:THR:CG2	2.53	0.56
1:A:488:TYR:HB3	1:A:489:PRO:HD3	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:75:LEU:O	1:B:75:LEU:HG	2.07	0.55
1:C:279:THR:HG21	1:C:281:CYS:O	2.06	0.55
1:B:58:ASP:HB2	1:B:90:THR:HG23	1.89	0.55
1:B:491:TYR:C	2:B:2060:HOH:O	2.48	0.55
1:C:216:ILE:HD12	1:C:216:ILE:H	1.71	0.55
1:A:53:PRO:HG3	1:A:82:TYR:CZ	2.42	0.55
1:C:43:GLY:O	1:C:272:LYS:HE2	2.07	0.55
1:B:112:VAL:CG1	1:B:115:PHE:HB2	2.35	0.54
1:B:118:ILE:HD11	1:B:258:LYS:CD	2.33	0.54
1:A:74:LEU:O	1:A:75:LEU:HB3	2.07	0.54
1:B:488:TYR:HB3	1:B:489:PRO:HD3	1.89	0.54
1:B:112:VAL:HG11	1:B:115:PHE:CB	2.35	0.54
1:B:216:ILE:HD12	1:B:216:ILE:H	1.72	0.54
1:B:71:CYS:O	1:B:74:LEU:HB2	2.07	0.54
1:B:269:LYS:HE2	1:B:398:GLU:OE1	2.07	0.54
1:B:160:TYR:CZ	1:B:248:GLY:HA2	2.43	0.54
1:B:183:TYR:CE1	1:B:214:PRO:HA	2.42	0.54
1:C:53:PRO:HD2	1:C:274:LEU:HD12	1.90	0.54
1:C:457:ASP:O	1:C:470:TYR:HD1	1.91	0.53
1:C:303:GLY:HA2	1:C:392:PHE:CD1	2.43	0.53
1:B:279:THR:HB	1:B:281:CYS:H	1.74	0.53
1:A:435:ARG:NH2	1:C:434:GLU:OE1	2.32	0.52
1:B:123:ARG:HG3	1:B:254:GLU:OE2	2.09	0.52
1:B:110:THR:HG23	1:B:265:SER:H	1.73	0.52
1:B:213:ILE:HD13	1:B:213:ILE:H	1.75	0.52
1:B:85:GLU:O	1:B:269:LYS:HA	2.10	0.52
1:A:31:THR:HG22	1:A:32:HIS:ND1	2.24	0.52
1:A:462:LEU:HD21	1:A:468:GLU:HB2	1.91	0.52
1:C:31:THR:CG2	2:C:2033:HOH:O	2.58	0.52
1:C:54:LEU:HB2	1:C:80:TRP:CG	2.44	0.52
1:C:97:GLY:HA3	1:C:229:MET:O	2.10	0.51
1:B:124:ASP:OD2	1:B:124:ASP:N	2.42	0.51
1:B:52:PRO:O	1:B:80:TRP:HA	2.11	0.51
1:C:279:THR:HG23	1:C:287:ALA:HB1	1.91	0.51
1:A:191:ARG:NH1	1:A:197:VAL:HG21	2.25	0.51
1:B:354:HIS:HA	1:B:362:GLY:O	2.11	0.51
1:A:455:LEU:O	1:A:456:ARG:CB	2.59	0.51
1:C:47:ARG:HB2	1:C:52:PRO:HA	1.93	0.50
1:B:184:PRO:HG2	1:B:190:GLN:HE21	1.75	0.50
1:C:86:LYS:C	1:C:88:ASN:H	2.20	0.50
1:C:208:LEU:HG	1:C:209:ASN:N	2.26	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:64:TRP:HD1	1:C:74:LEU:HD12	1.75	0.50
1:B:200:TYR:CE2	1:B:247:THR:HG23	2.46	0.50
1:B:298:HIS:CE1	1:B:300:LEU:HB2	2.46	0.50
1:C:75:LEU:HG	1:C:75:LEU:O	2.11	0.50
1:C:353:TYR:CD1	1:C:482:LYS:HG2	2.46	0.50
1:A:355:HIS:HB2	1:A:478:MET:HE3	1.93	0.50
1:C:112:VAL:HG11	1:C:115:PHE:CB	2.42	0.50
1:B:168:ASN:OD1	1:B:168:ASN:C	2.55	0.50
1:A:86:LYS:HE2	1:A:271:GLU:HG2	1.92	0.50
1:A:112:VAL:CG1	1:A:115:PHE:HB2	2.38	0.50
1:B:392:PHE:C	1:B:392:PHE:CD2	2.90	0.50
1:C:459:VAL:HA	1:C:468:GLU:O	2.12	0.50
1:A:7:ILE:HD13	1:A:355:HIS:HB3	1.94	0.50
1:A:155:LYS:HE2	1:A:192:THR:O	2.12	0.50
1:C:338:PHE:CE1	1:C:339:ILE:HG13	2.46	0.49
1:B:31:THR:CG2	1:B:32:HIS:ND1	2.76	0.49
1:C:470:TYR:O	1:C:471:HIS:CB	2.60	0.49
1:A:117:LYS:HG3	1:A:257:PHE:CE2	2.48	0.49
1:A:261:LYS:HZ3	1:A:261:LYS:CB	2.03	0.49
1:A:95:TYR:CD2	1:A:96:PRO:HD2	2.47	0.48
1:A:241:VAL:HG13	1:C:220:PRO:HG3	1.94	0.48
1:C:7:ILE:HB	1:C:469:PHE:CE1	2.41	0.48
1:B:55:GLU:CD	1:B:274:LEU:HB2	2.38	0.48
1:A:413:MET:HE1	1:C:412:LYS:HG2	1.94	0.48
1:C:74:LEU:HD23	1:C:74:LEU:HA	1.69	0.48
1:A:366:ASP:OD1	1:A:447:LEU:HD11	2.14	0.48
1:B:248:GLY:O	1:B:249:ASN:HB2	2.12	0.48
1:B:97:GLY:HA3	1:B:229:MET:O	2.13	0.48
1:B:490:LYS:HD2	1:B:491:TYR:CE2	2.49	0.48
1:C:268:MET:HE3	1:C:268:MET:HB2	1.75	0.48
1:C:274:LEU:CD2	1:C:276:ASN:H	2.27	0.48
1:C:115:PHE:CD1	1:C:115:PHE:C	2.91	0.48
1:C:123:ARG:NH1	1:C:254:GLU:OE1	2.47	0.48
1:B:194:TYR:O	1:B:195:GLN:HB2	2.14	0.47
1:A:436:THR:O	1:A:439:PHE:HB3	2.14	0.47
1:C:54:LEU:HD22	1:C:80:TRP:CZ2	2.49	0.47
1:C:112:VAL:HG11	1:C:115:PHE:HB2	1.95	0.47
1:B:140:VAL:HG23	1:B:140:VAL:O	2.15	0.47
1:B:113:THR:HG23	1:B:260:SER:O	2.15	0.47
1:B:485:THR:O	1:B:486:TYR:C	2.57	0.47
1:C:8:CYS:O	1:C:353:TYR:HA	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:110:THR:HG23	1:A:265:SER:H	1.80	0.46
1:A:284:PRO:HG2	1:A:298:HIS:CE1	2.49	0.46
1:C:484:GLY:HA2	2:C:2046:HOH:O	2.14	0.46
1:A:404:ARG:HB2	1:B:104:GLU:OE1	2.15	0.46
1:C:113:THR:OG1	1:C:260:SER:HB2	2.14	0.46
1:C:404:ARG:HA	1:C:404:ARG:HD2	1.64	0.46
1:B:74:LEU:O	1:B:74:LEU:HD13	2.15	0.46
1:C:54:LEU:HD22	1:C:80:TRP:CE2	2.51	0.46
1:C:86:LYS:C	1:C:88:ASN:N	2.72	0.46
1:A:338:PHE:CD1	1:A:338:PHE:C	2.93	0.46
1:C:58:ASP:HB2	1:C:90:THR:HG23	1.98	0.46
1:C:436:THR:O	1:C:439:PHE:HB3	2.16	0.46
1:A:112:VAL:HG13	1:A:114:HIS:O	2.16	0.46
1:A:50:GLY:N	1:A:278:GLU:OE1	2.45	0.46
1:C:110:THR:CG2	1:C:265:SER:N	2.77	0.46
1:A:213:ILE:HA	1:A:214:PRO:HD3	1.80	0.45
1:B:7:ILE:HD11	1:B:353:TYR:HB3	1.99	0.45
1:B:274:LEU:HD23	1:B:275:GLU:H	1.79	0.45
1:C:31:THR:HG21	2:C:2033:HOH:O	2.14	0.45
1:A:293:PRO:HG3	1:A:385:ILE:HA	1.98	0.45
1:A:423:TYR:CE2	1:A:427:LEU:HD22	2.52	0.45
1:A:31:THR:CG2	1:A:32:HIS:CE1	3.00	0.45
1:A:309:VAL:HG12	1:A:311:SER:H	1.81	0.45
1:A:29:THR:HG22	1:A:322:ASN:HB3	1.98	0.45
1:C:273:THR:O	1:C:274:LEU:C	2.59	0.45
1:A:248:GLY:O	1:A:249:ASN:HB2	2.17	0.45
1:A:487:ASP:OD1	1:A:490:LYS:HB2	2.17	0.45
1:B:463:GLY:O	1:B:465:GLY:N	2.50	0.45
1:C:31:THR:HG22	1:C:32:HIS:CD2	2.51	0.45
1:A:110:THR:HG23	1:A:265:SER:HB3	1.98	0.45
1:A:174:GLN:HG3	1:A:237:GLU:OE2	2.17	0.45
1:C:446:ASN:O	1:C:450:LYS:HB2	2.17	0.45
1:C:394:ALA:O	1:C:396:GLY:N	2.50	0.44
1:C:309:VAL:HG13	1:C:422:THR:HA	2.00	0.44
1:C:372:LYS:O	1:C:372:LYS:HG2	2.17	0.44
1:C:54:LEU:HB2	1:C:80:TRP:CD2	2.52	0.44
1:A:348:ASP:OD1	1:A:348:ASP:N	2.50	0.44
1:B:113:THR:HG21	1:B:260:SER:HB3	1.97	0.44
1:C:8:CYS:N	1:C:354:HIS:O	2.50	0.44
1:C:488:TYR:N	1:C:489:PRO:HD2	2.32	0.44
1:C:52:PRO:O	1:C:80:TRP:HA	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:74:LEU:O	1:C:75:LEU:HB3	2.18	0.44
1:C:155:LYS:CD	1:C:195:GLN:HG2	2.43	0.44
1:C:488:TYR:HB3	1:C:489:PRO:HD3	1.99	0.44
1:A:268:MET:HE3	1:A:268:MET:HB2	1.91	0.44
1:B:199:THR:OG1	1:B:249:ASN:ND2	2.51	0.44
1:C:32:HIS:CE1	2:C:2033:HOH:O	2.71	0.43
1:C:113:THR:HG21	1:C:260:SER:HB2	2.00	0.43
1:C:10:GLY:HA3	1:C:343:TRP:CZ2	2.53	0.43
1:C:160:TYR:CZ	1:C:248:GLY:HA2	2.53	0.43
1:C:410:ASN:O	1:C:414:GLU:HG2	2.18	0.43
1:C:457:ASP:O	1:C:470:TYR:CD1	2.70	0.43
1:A:18:GLU:O	1:A:29:THR:HA	2.18	0.43
1:B:355:HIS:HB2	1:B:478:MET:CE	2.44	0.43
1:A:42:ASN:O	1:A:44:LYS:HG3	2.18	0.43
1:A:434:GLU:CD	1:B:435:ARG:HH12	2.27	0.43
1:B:340:GLU:HG3	1:B:464:ASN:HD22	1.84	0.43
1:A:55:GLU:CD	1:A:274:LEU:HB2	2.44	0.43
1:B:462:LEU:HA	1:B:462:LEU:HD22	1.70	0.43
1:C:30:VAL:CG1	1:C:31:THR:N	2.79	0.43
1:C:452:ARG:C	1:C:454:GLN:H	2.26	0.43
1:A:478:MET:C	1:A:480:SER:H	2.27	0.43
1:C:354:HIS:HA	1:C:362:GLY:O	2.18	0.43
1:A:320:LEU:HB3	1:A:440:HIS:CG	2.54	0.43
1:B:423:TYR:CE2	1:B:427:LEU:HD22	2.53	0.43
1:B:430:LEU:HA	1:B:430:LEU:HD23	1.81	0.43
1:B:361:SER:HA	1:B:362:GLY:HA3	1.68	0.43
1:C:150:MET:HE1	1:C:178:ILE:O	2.19	0.43
1:A:7:ILE:HG23	1:A:7:ILE:O	2.19	0.42
1:A:309:VAL:CG1	1:A:422:THR:HA	2.47	0.42
1:B:138:CYS:O	1:B:145:SER:HB3	2.19	0.42
1:C:10:GLY:HA3	1:C:343:TRP:CH2	2.54	0.42
1:B:111:SER:HB2	1:B:265:SER:HB2	2.01	0.42
1:B:110:THR:HG23	1:B:111:SER:N	2.34	0.42
1:C:10:GLY:N	1:C:343:TRP:CH2	2.87	0.42
1:C:11:TYR:HE2	1:C:323:VAL:HG23	1.84	0.42
1:C:20:VAL:HG21	1:C:317:ALA:HB2	2.01	0.42
1:A:95:TYR:CD2	1:A:229:MET:HG3	2.54	0.42
1:A:404:ARG:HA	1:A:404:ARG:HD2	1.89	0.42
1:C:213:ILE:HA	1:C:214:PRO:HD3	1.91	0.42
1:A:413:MET:HE1	1:C:412:LYS:CG	2.50	0.42
1:A:430:LEU:HA	1:A:430:LEU:HD23	1.69	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:158:SER:O	1:C:195:GLN:HG3	2.20	0.42
1:A:310:LYS:HG3	1:A:418:LEU:HD21	2.02	0.42
1:B:23:ILE:HD12	1:B:23:ILE:HG23	1.71	0.42
1:C:303:GLY:HA2	1:C:392:PHE:CE1	2.54	0.42
1:A:51:ILE:HA	1:A:52:PRO:HD3	1.86	0.42
1:A:392:PHE:CD2	1:A:392:PHE:C	2.98	0.41
1:C:22:THR:HG22	1:C:433:ASN:HB3	2.01	0.41
1:C:274:LEU:HD23	1:C:276:ASN:H	1.84	0.41
1:C:488:TYR:N	1:C:489:PRO:CD	2.82	0.41
1:C:489:PRO:O	1:C:492:GLU:HG2	2.20	0.41
1:A:269:LYS:HE2	1:A:398:GLU:OE1	2.20	0.41
1:A:283:THR:HG22	1:A:301:THR:HG22	2.02	0.41
1:C:213:ILE:HD13	1:C:213:ILE:H	1.85	0.41
1:B:431:MET:O	1:B:435:ARG:HG3	2.20	0.41
1:B:488:TYR:N	1:B:489:PRO:CD	2.83	0.41
1:C:346:MET:HE2	1:C:346:MET:HB3	1.83	0.41
1:A:447:LEU:HD12	1:A:447:LEU:HA	1.91	0.41
1:B:268:MET:HE3	1:B:268:MET:HB2	1.98	0.41
1:C:140:VAL:HG22	1:C:145:SER:HB2	2.03	0.41
1:C:361:SER:HA	1:C:362:GLY:HA3	1.66	0.41
1:B:31:THR:CG2	1:B:32:HIS:CE1	3.04	0.41
1:C:30:VAL:HG13	1:C:31:THR:N	2.35	0.41
1:A:495:SER:C	1:A:496:LYS:HG3	2.45	0.41
1:B:31:THR:HG22	1:B:32:HIS:N	2.35	0.41
1:A:292:LEU:HA	1:A:293:PRO:HD3	1.87	0.41
1:A:462:LEU:HD13	1:A:462:LEU:HA	1.93	0.41
1:C:70:GLU:HB3	1:C:91:ASN:ND2	2.35	0.41
1:B:410:ASN:O	1:B:414:GLU:HG2	2.21	0.41
1:C:261:LYS:HB2	1:C:261:LYS:NZ	2.32	0.41
1:C:416:GLY:O	1:C:420:VAL:HG23	2.20	0.41
1:C:113:THR:CG2	1:C:260:SER:HB2	2.51	0.41
1:A:159:ASN:HD22	1:A:159:ASN:HA	1.70	0.40
1:A:95:TYR:HA	1:A:96:PRO:HD3	1.96	0.40
1:B:51:ILE:HD13	1:B:79:GLU:CD	2.46	0.40
1:B:110:THR:HG21	1:B:265:SER:H	1.83	0.40
1:B:111:SER:O	1:B:112:VAL:HG23	2.21	0.40
1:B:307:LYS:NZ	2:B:2050:HOH:O	2.54	0.40
1:C:78:PRO:O	1:C:114:HIS:HA	2.21	0.40
1:C:110:THR:HG23	1:C:265:SER:N	2.36	0.40
1:C:129:HIS:CE1	1:C:161:PRO:HD2	2.57	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	479/507 (94%)	430 (90%)	42 (9%)	7 (2%)	8	13
1	B	479/507 (94%)	437 (91%)	37 (8%)	5 (1%)	12	20
1	C	479/507 (94%)	429 (90%)	42 (9%)	8 (2%)	7	12
All	All	1437/1521 (94%)	1296 (90%)	121 (8%)	20 (1%)	9	14

All (20) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	80	TRP
1	A	348	ASP
1	C	80	TRP
1	A	276	ASN
1	A	395	VAL
1	A	456	ARG
1	B	80	TRP
1	B	359	GLN
1	C	362	GLY
1	C	471	HIS
1	A	114	HIS
1	B	362	GLY
1	C	277	CYS
1	C	361	SER
1	C	395	VAL
1	A	362	GLY
1	B	486	TYR
1	C	75	LEU
1	C	456	ARG
1	B	395	VAL

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	415/445 (93%)	376 (91%)	39 (9%)	8	13
1	B	415/445 (93%)	382 (92%)	33 (8%)	11	19
1	C	415/445 (93%)	379 (91%)	36 (9%)	9	16
All	All	1245/1335 (93%)	1137 (91%)	108 (9%)	9	16

All (108) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	GLU
1	A	30	VAL
1	A	61	ILE
1	A	74	LEU
1	A	75	LEU
1	A	90	THR
1	A	108	LEU
1	A	110	THR
1	A	112	VAL
1	A	113	THR
1	A	114	HIS
1	A	127	THR
1	A	162	VAL
1	A	181	ILE
1	A	188	THR
1	A	190	GLN
1	A	192	THR
1	A	193	LEU
1	A	213	ILE
1	A	216	ILE
1	A	218	THR
1	A	241	VAL
1	A	259	ILE
1	A	261	LYS
1	A	264	SER
1	A	274	LEU

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Mol	Chain	Res	Type
1	A	279	THR
1	A	320	LEU
1	A	338	PHE
1	A	347	VAL
1	A	351	TYR
1	A	356	SER
1	A	359	GLN
1	A	378	THR
1	A	391	GLN
1	A	409	LEU
1	A	442	SER
1	A	462	LEU
1	A	496	LYS
1	B	7	ILE
1	B	30	VAL
1	B	31	THR
1	B	61	ILE
1	B	74	LEU
1	B	76	SER
1	B	80	TRP
1	B	90	THR
1	B	108	LEU
1	B	112	VAL
1	B	114	HIS
1	B	127	THR
1	B	131	THR
1	B	166	SER
1	B	192	THR
1	B	213	ILE
1	B	237	GLU
1	B	241	VAL
1	B	261	LYS
1	B	273	THR
1	B	274	LEU
1	B	279	THR
1	B	311	SER
1	B	320	LEU
1	B	340	GLU
1	B	359	GLN
1	B	368	GLU
1	B	378	THR
1	B	397	LYS

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Mol	Chain	Res	Type
1	B	401	ASN
1	B	409	LEU
1	B	434	GLU
1	B	462	LEU
1	C	7	ILE
1	C	30	VAL
1	C	39	LYS
1	C	61	ILE
1	C	75	LEU
1	C	76	SER
1	C	90	THR
1	C	110	THR
1	C	112	VAL
1	C	127	THR
1	C	131	THR
1	C	192	THR
1	C	193	LEU
1	C	196	ASN
1	C	213	ILE
1	C	216	ILE
1	C	241	VAL
1	C	260	SER
1	C	264	SER
1	C	279	THR
1	C	283	THR
1	C	291	THR
1	C	307	LYS
1	C	320	LEU
1	C	323	VAL
1	C	340	GLU
1	C	347	VAL
1	C	351	TYR
1	C	359	GLN
1	C	368	GLU
1	C	379	ASN
1	C	401	ASN
1	C	404	ARG
1	C	409	LEU
1	C	435	ARG
1	C	462	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (39) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	100	ASN
1	A	107	HIS
1	A	128	GLN
1	A	159	ASN
1	A	190	GLN
1	A	196	ASN
1	A	249	ASN
1	A	359	GLN
1	A	389	ASN
1	A	391	GLN
1	A	454	GLN
1	B	12	HIS
1	B	91	ASN
1	B	107	HIS
1	B	125	GLN
1	B	129	HIS
1	B	174	GLN
1	B	190	GLN
1	B	196	ASN
1	B	249	ASN
1	B	344	GLN
1	B	359	GLN
1	B	389	ASN
1	B	479	ASN
1	C	32	HIS
1	C	91	ASN
1	C	114	HIS
1	C	129	HIS
1	C	159	ASN
1	C	185	ASN
1	C	190	GLN
1	C	195	GLN
1	C	249	ASN
1	C	355	HIS
1	C	359	GLN
1	C	379	ASN
1	C	389	ASN
1	C	408	ASN
1	C	454	GLN

5.3.3 RNA ⓘ

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, 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	485/507 (95%)	0.50	43 (8%) 15 12	43, 81, 145, 205	0
1	B	485/507 (95%)	0.47	37 (7%) 20 15	40, 70, 125, 207	0
1	C	485/507 (95%)	0.55	39 (8%) 18 14	42, 81, 139, 180	0
All	All	1455/1521 (95%)	0.51	119 (8%) 17 13	40, 77, 137, 207	0

All (119) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	87	GLU	5.6
1	B	277	CYS	5.4
1	C	138	CYS	4.9
1	B	278	GLU	4.8
1	B	463	GLY	4.8
1	A	330	GLY	4.6
1	B	468	GLU	4.5
1	A	434	GLU	4.4
1	B	494	GLU	4.4
1	A	138	CYS	4.2
1	C	59	CYS	4.2
1	C	361	SER	4.1
1	B	113	THR	3.7
1	A	323	VAL	3.7
1	B	46	CYS	3.6
1	B	462	LEU	3.6
1	C	473	CYS	3.6
1	A	277	CYS	3.5
1	C	46	CYS	3.5
1	B	239	TRP	3.5
1	A	492	GLU	3.4
1	B	6	GLN	3.3
1	A	113	THR	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	189	GLU	3.3
1	A	374	PHE	3.3
1	A	7	ILE	3.3
1	C	8	CYS	3.2
1	B	133	GLY	3.2
1	A	469	PHE	3.2
1	B	262	ARG	3.2
1	A	467	PHE	3.2
1	B	466	CYS	3.2
1	C	216	ILE	3.1
1	C	142	GLY	3.1
1	C	113	THR	3.0
1	C	345	GLY	3.0
1	C	362	GLY	3.0
1	B	142	GLY	2.9
1	C	197	VAL	2.9
1	A	389	ASN	2.9
1	B	8	CYS	2.9
1	C	496	LYS	2.9
1	B	360	GLY	2.8
1	B	237	GLU	2.8
1	C	492	GLU	2.8
1	B	435	ARG	2.8
1	C	140	VAL	2.8
1	A	132	THR	2.7
1	A	378	THR	2.7
1	A	262	ARG	2.7
1	A	496	LYS	2.7
1	C	476	GLU	2.6
1	A	140	VAL	2.6
1	B	434	GLU	2.6
1	C	88	ASN	2.6
1	C	89	PRO	2.6
1	C	195	GLN	2.6
1	C	330	GLY	2.6
1	A	473	CYS	2.6
1	A	187	ASP	2.5
1	C	472	LYS	2.5
1	A	8	CYS	2.5
1	A	276	ASN	2.5
1	B	330	GLY	2.5
1	A	237	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	481	VAL	2.5
1	B	94	CYS	2.5
1	C	475	ASP	2.5
1	A	391	GLN	2.5
1	C	374	PHE	2.5
1	C	394	ALA	2.5
1	A	396	GLY	2.4
1	B	197	VAL	2.4
1	C	375	ASP	2.4
1	A	118	ILE	2.4
1	A	124	ASP	2.4
1	B	473	CYS	2.4
1	A	142	GLY	2.4
1	B	356	SER	2.4
1	C	458	ASN	2.3
1	B	477	CYS	2.3
1	A	188	THR	2.3
1	A	485	THR	2.3
1	C	42	ASN	2.3
1	B	482	LYS	2.3
1	C	87	GLU	2.3
1	B	157	GLY	2.3
1	A	162	VAL	2.3
1	B	459	VAL	2.3
1	B	312	ASP	2.2
1	C	487	ASP	2.2
1	A	354	HIS	2.2
1	C	355	HIS	2.2
1	A	94	CYS	2.2
1	C	223	ASN	2.2
1	A	362	GLY	2.2
1	A	85	GLU	2.2
1	A	346	MET	2.2
1	B	305	CYS	2.2
1	A	438	ASP	2.2
1	C	457	ASP	2.2
1	B	9	ILE	2.2
1	C	79	GLU	2.1
1	C	414	GLU	2.1
1	A	435	ARG	2.1
1	B	188	THR	2.1
1	C	72	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	87	GLU	2.1
1	B	414	GLU	2.1
1	A	9	ILE	2.1
1	A	189	GLU	2.1
1	B	368	GLU	2.1
1	C	468	GLU	2.1
1	C	494	GLU	2.1
1	A	26	ARG	2.1
1	B	140	VAL	2.1
1	A	472	LYS	2.1
1	C	185	ASN	2.1
1	C	247	THR	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.