



Full wwPDB EM Validation Report ⓘ

Mar 24, 2026 – 12:05 PM UTC

PDB ID : 1FQY / pdb_00001fqy
Title : STRUCTURE OF AQUAPORIN-1 AT 3.8 Å RESOLUTION BY ELECTRON CRYSTALLOGRAPHY
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Deposited on : 2000-09-07
Resolution : 3.80 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB/EMDB entry.

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
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
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

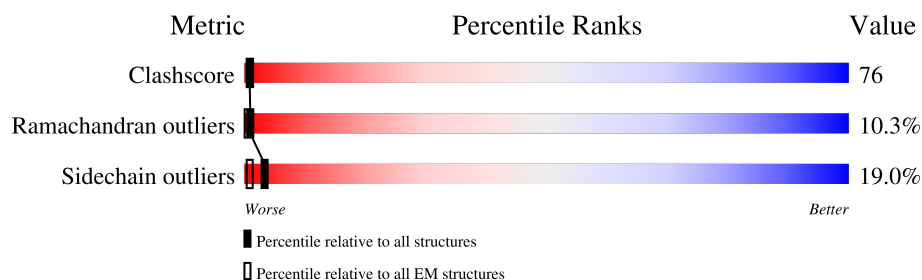
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON CRYSTALLOGRAPHY

The reported resolution of this entry is 3.80 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)	EM structures (#Entries)
Clashscore	229148	23984
Ramachandran outliers	224038	23583
Sidechain outliers	223484	23102

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	269	

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 1661 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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.

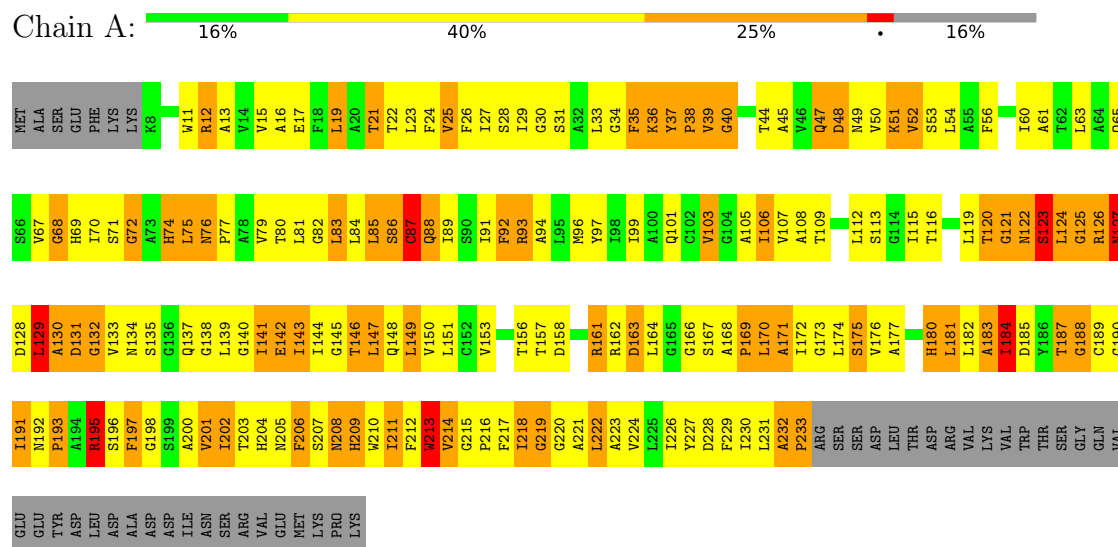
- Molecule 1 is a protein called AQUAPORIN-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	226	1661	1077	283	296	5	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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: AQUAPORIN-1



4 Data and refinement statistics

Xtriage (Phenix) and EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 4 21 2	Depositor
Cell constants a, b, c, α , β , γ	96.00Å 96.00Å 100.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 3.80	Depositor
% Data completeness (in resolution range)	50.8 (6.00-3.80)	Depositor
R_{merge}	0.49	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.399 , 0.417	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1661	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

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	1.02	2/1693 (0.1%)	1.75	49/2308 (2.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	184	ILE	CA-CB	8.43	1.66	1.54
1	A	202	ILE	CA-CB	-6.12	1.46	1.54

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	163	ASP	N-CA-C	14.34	128.89	110.24
1	A	45	ALA	N-CA-C	-13.19	93.05	112.04
1	A	37	TYR	N-CA-C	13.11	138.77	109.81
1	A	211	ILE	N-CA-C	-10.89	96.20	111.89
1	A	35	PHE	N-CA-C	9.69	123.07	111.82
1	A	120	THR	N-CA-C	9.52	125.80	107.71
1	A	88	GLN	N-CA-C	9.47	125.46	108.69
1	A	162	ARG	N-CA-C	9.45	125.38	110.17
1	A	131	ASP	N-CA-C	-9.35	99.59	112.12
1	A	232	ALA	N-CA-C	8.69	129.02	109.81
1	A	49	ASN	N-CA-C	8.68	129.28	110.80
1	A	157	THR	N-CA-C	8.64	124.22	112.90
1	A	125	GLY	N-CA-C	-8.44	100.42	114.76
1	A	180	HIS	N-CA-C	8.26	120.28	111.28
1	A	205	ASN	N-CA-C	8.24	123.15	113.18
1	A	87	CYS	N-CA-C	8.12	123.00	113.18
1	A	76	ASN	CA-C-N	7.97	127.64	119.19
1	A	76	ASN	C-N-CA	7.97	127.64	119.19
1	A	37	TYR	CA-C-N	-7.55	110.40	119.84
1	A	37	TYR	C-N-CA	-7.55	110.40	119.84
1	A	121	GLY	N-CA-C	-7.24	96.03	113.18
1	A	122	ASN	CA-C-N	7.18	135.25	121.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	122	ASN	C-N-CA	7.18	135.25	121.54
1	A	92	PHE	N-CA-C	7.17	120.78	109.39
1	A	122	ASN	N-CA-C	-6.98	100.97	110.68
1	A	12	ARG	N-CA-C	-6.79	103.90	111.71
1	A	93	ARG	N-CA-C	-6.66	102.26	110.65
1	A	184	ILE	N-CA-C	6.61	123.08	109.34
1	A	170	LEU	N-CA-C	-6.49	104.20	111.28
1	A	206	PHE	N-CA-C	6.45	119.46	109.07
1	A	164	LEU	N-CA-C	-6.39	104.92	114.64
1	A	123	SER	N-CA-C	6.36	124.35	110.80
1	A	162	ARG	CA-C-N	6.35	130.15	120.82
1	A	162	ARG	C-N-CA	6.35	130.15	120.82
1	A	124	LEU	N-CA-C	6.31	124.25	110.80
1	A	207	SER	N-CA-C	-6.22	105.40	112.87
1	A	52	VAL	N-CA-C	-6.16	104.51	110.42
1	A	219	GLY	N-CA-C	-6.01	105.52	112.50
1	A	132	GLY	N-CA-C	5.86	127.07	113.18
1	A	47	GLN	N-CA-C	5.80	123.15	110.80
1	A	175	SER	N-CA-C	-5.61	105.07	111.07
1	A	129	LEU	N-CA-C	5.57	122.66	110.80
1	A	40	GLY	N-CA-C	5.51	126.23	113.18
1	A	187	THR	N-CA-C	-5.50	98.66	108.13
1	A	127	ASN	N-CA-C	-5.50	99.09	110.80
1	A	133	VAL	N-CA-C	-5.38	98.15	109.34
1	A	222	LEU	N-CA-C	-5.35	106.02	112.54
1	A	195	ARG	NE-CZ-NH2	5.34	124.01	119.20
1	A	106	ILE	N-CA-C	5.11	115.88	110.72

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	1661	0	1712	256	0
All	All	1661	0	1712	256	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 76.

All (256) 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:212:PHE:O	1:A:216:PRO:HD2	1.52	1.10
1:A:77:PRO:HD2	1:A:193:PRO:HD2	1.36	1.08
1:A:17:GLU:OE1	1:A:97:TYR:CD2	2.14	1.00
1:A:115:ILE:HG13	1:A:116:THR:H	1.25	0.98
1:A:149:LEU:O	1:A:153:VAL:HG23	1.67	0.94
1:A:167:SER:O	1:A:170:LEU:HG	1.67	0.94
1:A:120:THR:HA	1:A:123:SER:HB3	1.51	0.91
1:A:76:ASN:HB3	1:A:192:ASN:ND2	1.86	0.90
1:A:129:LEU:HD11	1:A:195:ARG:HE	1.38	0.89
1:A:134:ASN:HD21	1:A:137:GLN:HB2	1.38	0.88
1:A:209:HIS:HA	1:A:212:PHE:CD2	2.08	0.88
1:A:190:GLY:CA	1:A:195:ARG:NH2	2.36	0.88
1:A:51:LYS:HD3	1:A:52:VAL:H	1.39	0.84
1:A:83:LEU:HD11	1:A:92:PHE:CZ	2.11	0.84
1:A:190:GLY:HA3	1:A:195:ARG:NH2	1.92	0.84
1:A:70:ILE:HD11	1:A:161:ARG:HD3	1.59	0.84
1:A:99:ILE:O	1:A:103:VAL:HG22	1.78	0.84
1:A:120:THR:CA	1:A:123:SER:HB3	2.07	0.84
1:A:149:LEU:HD22	1:A:191:ILE:HD11	1.59	0.83
1:A:17:GLU:OE1	1:A:97:TYR:CE2	2.32	0.83
1:A:70:ILE:HD11	1:A:161:ARG:CD	2.08	0.82
1:A:48:ASP:O	1:A:51:LYS:HD2	1.78	0.82
1:A:129:LEU:HD11	1:A:189:CYS:O	1.80	0.81
1:A:190:GLY:HA3	1:A:195:ARG:HH21	1.44	0.80
1:A:61:ALA:HB2	1:A:173:GLY:HA3	1.64	0.79
1:A:77:PRO:HD2	1:A:193:PRO:CD	2.12	0.78
1:A:83:LEU:HD21	1:A:92:PHE:CE1	2.19	0.77
1:A:52:VAL:HG12	1:A:56:PHE:HE1	1.49	0.77
1:A:190:GLY:CA	1:A:195:ARG:HH21	1.95	0.77
1:A:176:VAL:HG12	1:A:180:HIS:HE1	1.50	0.76
1:A:17:GLU:OE1	1:A:97:TYR:HD2	1.65	0.76
1:A:51:LYS:HZ3	1:A:52:VAL:HG22	1.52	0.75
1:A:51:LYS:NZ	1:A:52:VAL:HG22	2.03	0.74
1:A:190:GLY:HA2	1:A:195:ARG:NH2	2.01	0.74
1:A:231:LEU:HD12	1:A:232:ALA:H	1.52	0.74
1:A:192:ASN:O	1:A:195:ARG:HD2	1.88	0.74
1:A:21:THR:O	1:A:25:VAL:HG23	1.88	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:168:ALA:HB3	1:A:169:PRO:HD3	1.70	0.72
1:A:83:LEU:HG	1:A:84:LEU:N	2.03	0.72
1:A:209:HIS:O	1:A:212:PHE:HB2	1.90	0.71
1:A:63:LEU:O	1:A:67:VAL:HG22	1.90	0.71
1:A:134:ASN:ND2	1:A:137:GLN:HB2	2.05	0.71
1:A:115:ILE:HG13	1:A:116:THR:N	2.05	0.71
1:A:51:LYS:HD3	1:A:52:VAL:N	2.06	0.70
1:A:70:ILE:HD11	1:A:161:ARG:CZ	2.20	0.70
1:A:97:TYR:O	1:A:101:GLN:HG3	1.91	0.70
1:A:36:LYS:HA	1:A:44:THR:HG21	1.73	0.70
1:A:70:ILE:HD11	1:A:161:ARG:NE	2.06	0.70
1:A:128:ASP:C	1:A:129:LEU:HD23	2.17	0.70
1:A:83:LEU:HD21	1:A:92:PHE:HE1	1.56	0.69
1:A:213:TRP:CZ3	1:A:217:PHE:HB2	2.28	0.69
1:A:116:THR:HG22	1:A:119:LEU:HG	1.74	0.69
1:A:210:TRP:C	1:A:212:PHE:N	2.46	0.69
1:A:53:SER:OG	1:A:181:LEU:HD23	1.93	0.69
1:A:129:LEU:HD11	1:A:195:ARG:NE	2.07	0.68
1:A:215:GLY:O	1:A:218:ILE:HG12	1.95	0.67
1:A:163:ASP:OD2	1:A:166:GLY:HA2	1.94	0.67
1:A:151:LEU:CD1	1:A:227:TYR:HD1	2.08	0.67
1:A:147:LEU:O	1:A:151:LEU:HB2	1.95	0.67
1:A:184:ILE:HD12	1:A:189:CYS:H	1.58	0.67
1:A:36:LYS:HA	1:A:44:THR:CG2	2.26	0.66
1:A:176:VAL:HG12	1:A:180:HIS:CE1	2.30	0.66
1:A:81:LEU:O	1:A:85:LEU:HG	1.95	0.66
1:A:80:THR:O	1:A:83:LEU:HD23	1.96	0.65
1:A:76:ASN:O	1:A:79:VAL:HG22	1.97	0.65
1:A:85:LEU:N	1:A:85:LEU:HD23	2.09	0.65
1:A:141:ILE:HG13	1:A:142:GLU:N	2.11	0.65
1:A:172:ILE:O	1:A:176:VAL:HG23	1.98	0.64
1:A:52:VAL:O	1:A:56:PHE:HD1	1.81	0.63
1:A:166:GLY:O	1:A:170:LEU:HD23	1.98	0.63
1:A:217:PHE:O	1:A:221:ALA:N	2.32	0.63
1:A:149:LEU:HD22	1:A:191:ILE:CD1	2.28	0.63
1:A:121:GLY:C	1:A:123:SER:H	2.05	0.62
1:A:74:HIS:O	1:A:75:LEU:HD23	2.00	0.62
1:A:226:ILE:O	1:A:230:ILE:HG12	1.99	0.62
1:A:209:HIS:HA	1:A:212:PHE:CG	2.34	0.62
1:A:105:ALA:O	1:A:108:ALA:HB3	2.01	0.61
1:A:89:ILE:HA	1:A:92:PHE:HB2	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:190:GLY:HA2	1:A:195:ARG:CZ	2.31	0.61
1:A:231:LEU:HD12	1:A:232:ALA:N	2.16	0.60
1:A:180:HIS:HA	1:A:183:ALA:HB3	1.82	0.60
1:A:214:VAL:O	1:A:218:ILE:HG12	2.02	0.60
1:A:83:LEU:HD11	1:A:92:PHE:HZ	1.63	0.59
1:A:206:PHE:C	1:A:208:ASN:H	2.09	0.59
1:A:208:ASN:O	1:A:210:TRP:N	2.35	0.59
1:A:134:ASN:OD1	1:A:135:SER:N	2.35	0.59
1:A:151:LEU:HD11	1:A:227:TYR:HD1	1.67	0.59
1:A:213:TRP:HE3	1:A:213:TRP:O	1.86	0.59
1:A:91:ILE:HG12	1:A:91:ILE:O	2.03	0.59
1:A:156:THR:HG21	1:A:168:ALA:HB1	1.83	0.59
1:A:210:TRP:CZ3	1:A:213:TRP:HD1	2.21	0.59
1:A:96:MET:O	1:A:99:ILE:HG22	2.03	0.58
1:A:192:ASN:O	1:A:195:ARG:NH1	2.36	0.58
1:A:167:SER:HA	1:A:170:LEU:HD21	1.86	0.58
1:A:170:LEU:O	1:A:174:LEU:HG	2.03	0.58
1:A:176:VAL:HG13	1:A:191:ILE:HD13	1.85	0.58
1:A:210:TRP:HZ3	1:A:213:TRP:HD1	1.50	0.58
1:A:129:LEU:HD13	1:A:188:GLY:O	2.03	0.57
1:A:80:THR:HG21	1:A:94:ALA:HB1	1.85	0.57
1:A:189:CYS:O	1:A:189:CYS:SG	2.62	0.57
1:A:33:LEU:HD21	1:A:125:GLY:HA2	1.87	0.56
1:A:167:SER:HA	1:A:170:LEU:CD2	2.35	0.56
1:A:86:SER:OG	1:A:87:CYS:N	2.39	0.56
1:A:12:ARG:HA	1:A:15:VAL:CG2	2.36	0.56
1:A:129:LEU:HD22	1:A:188:GLY:C	2.31	0.56
1:A:163:ASP:HB2	1:A:166:GLY:H	1.71	0.56
1:A:206:PHE:HB3	1:A:208:ASN:HB2	1.88	0.56
1:A:168:ALA:O	1:A:171:ALA:HB3	2.07	0.55
1:A:151:LEU:HD12	1:A:227:TYR:CD1	2.42	0.54
1:A:142:GLU:HG3	1:A:190:GLY:O	2.08	0.54
1:A:145:GLY:O	1:A:148:GLN:HG2	2.07	0.54
1:A:197:PHE:O	1:A:201:VAL:HG23	2.07	0.54
1:A:226:ILE:HA	1:A:229:PHE:CE2	2.42	0.54
1:A:129:LEU:CD1	1:A:189:CYS:O	2.54	0.54
1:A:129:LEU:CD1	1:A:195:ARG:HH21	2.20	0.54
1:A:31:SER:O	1:A:35:PHE:HD1	1.91	0.53
1:A:147:LEU:HD13	1:A:219:GLY:O	2.07	0.53
1:A:149:LEU:HD13	1:A:176:VAL:HG22	1.90	0.53
1:A:206:PHE:C	1:A:208:ASN:N	2.64	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:THR:HG21	1:A:198:GLY:O	2.09	0.53
1:A:228:ASP:OD1	1:A:233:PRO:HD2	2.08	0.53
1:A:209:HIS:CD2	1:A:210:TRP:CD1	2.97	0.52
1:A:210:TRP:C	1:A:212:PHE:H	2.14	0.52
1:A:36:LYS:O	1:A:36:LYS:HG2	2.09	0.52
1:A:206:PHE:HB3	1:A:208:ASN:CB	2.40	0.52
1:A:70:ILE:CD1	1:A:161:ARG:HD3	2.36	0.52
1:A:26:PHE:CZ	1:A:115:ILE:HD11	2.45	0.52
1:A:130:ALA:HB2	1:A:212:PHE:CZ	2.44	0.52
1:A:17:GLU:CD	1:A:97:TYR:CE2	2.89	0.51
1:A:70:ILE:CD1	1:A:161:ARG:NH1	2.74	0.51
1:A:149:LEU:HG	1:A:150:VAL:N	2.24	0.51
1:A:37:TYR:O	1:A:38:PRO:C	2.50	0.51
1:A:33:LEU:HD12	1:A:112:LEU:HD21	1.93	0.50
1:A:28:SER:HB2	1:A:56:PHE:CD2	2.46	0.50
1:A:51:LYS:O	1:A:54:LEU:HB2	2.11	0.50
1:A:220:GLY:HA2	1:A:223:ALA:HB3	1.94	0.50
1:A:220:GLY:O	1:A:223:ALA:HB3	2.12	0.50
1:A:174:LEU:O	1:A:177:ALA:HB3	2.12	0.49
1:A:200:ALA:HB1	1:A:204:HIS:CD2	2.48	0.49
1:A:44:THR:HG23	1:A:47:GLN:H	1.78	0.49
1:A:121:GLY:C	1:A:123:SER:N	2.71	0.49
1:A:209:HIS:HA	1:A:212:PHE:CE2	2.44	0.49
1:A:106:ILE:HD12	1:A:201:VAL:HG21	1.94	0.49
1:A:52:VAL:O	1:A:56:PHE:CD1	2.64	0.49
1:A:12:ARG:HA	1:A:15:VAL:HG22	1.94	0.49
1:A:26:PHE:HZ	1:A:115:ILE:HD11	1.76	0.49
1:A:209:HIS:C	1:A:212:PHE:HB2	2.38	0.49
1:A:139:LEU:HD22	1:A:211:ILE:CG2	2.43	0.49
1:A:180:HIS:O	1:A:181:LEU:C	2.56	0.49
1:A:67:VAL:O	1:A:68:GLY:C	2.56	0.49
1:A:183:ALA:HB1	1:A:189:CYS:HA	1.94	0.49
1:A:151:LEU:CD1	1:A:227:TYR:CD1	2.93	0.48
1:A:200:ALA:HB1	1:A:204:HIS:HB3	1.95	0.48
1:A:13:ALA:O	1:A:16:ALA:HB3	2.14	0.48
1:A:23:LEU:O	1:A:27:ILE:HG13	2.12	0.48
1:A:80:THR:CG2	1:A:94:ALA:HB1	2.44	0.48
1:A:70:ILE:HD11	1:A:161:ARG:NH1	2.29	0.48
1:A:70:ILE:CD1	1:A:161:ARG:CZ	2.89	0.48
1:A:48:ASP:O	1:A:51:LYS:CD	2.56	0.48
1:A:51:LYS:HD3	1:A:52:VAL:HG23	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:69:HIS:CG	1:A:70:ILE:H	2.32	0.48
1:A:120:THR:HA	1:A:123:SER:CB	2.35	0.48
1:A:134:ASN:HD21	1:A:138:GLY:N	2.12	0.47
1:A:180:HIS:O	1:A:184:ILE:HB	2.14	0.47
1:A:120:THR:CB	1:A:123:SER:HB3	2.44	0.47
1:A:80:THR:O	1:A:83:LEU:HB3	2.14	0.47
1:A:212:PHE:O	1:A:216:PRO:CD	2.43	0.47
1:A:127:ASN:C	1:A:129:LEU:N	2.70	0.47
1:A:124:LEU:HD23	1:A:126:ARG:HG3	1.97	0.47
1:A:48:ASP:OD1	1:A:51:LYS:HD2	2.15	0.47
1:A:172:ILE:O	1:A:175:SER:HB3	2.14	0.47
1:A:210:TRP:CZ3	1:A:213:TRP:CD1	3.02	0.47
1:A:129:LEU:O	1:A:131:ASP:N	2.48	0.47
1:A:140:GLY:O	1:A:143:ILE:HG12	2.15	0.47
1:A:17:GLU:CD	1:A:97:TYR:HE2	2.23	0.46
1:A:129:LEU:CD1	1:A:195:ARG:NH2	2.79	0.46
1:A:229:PHE:CD1	1:A:229:PHE:C	2.93	0.46
1:A:69:HIS:CG	1:A:70:ILE:N	2.83	0.46
1:A:26:PHE:HE1	1:A:112:LEU:CD1	2.29	0.46
1:A:141:ILE:CG1	1:A:142:GLU:N	2.78	0.46
1:A:200:ALA:O	1:A:204:HIS:HD2	1.98	0.46
1:A:25:VAL:HA	1:A:28:SER:OG	2.16	0.46
1:A:151:LEU:HD12	1:A:227:TYR:HD1	1.76	0.46
1:A:222:LEU:O	1:A:226:ILE:HG23	2.16	0.46
1:A:210:TRP:HZ3	1:A:213:TRP:CD1	2.30	0.46
1:A:37:TYR:HB2	1:A:119:LEU:HD22	1.98	0.45
1:A:26:PHE:HZ	1:A:115:ILE:CD1	2.30	0.45
1:A:77:PRO:HD2	1:A:193:PRO:CG	2.47	0.45
1:A:129:LEU:HD12	1:A:195:ARG:NH2	2.31	0.45
1:A:147:LEU:CD1	1:A:223:ALA:HB2	2.46	0.45
1:A:163:ASP:CG	1:A:166:GLY:HA2	2.41	0.45
1:A:12:ARG:O	1:A:16:ALA:N	2.37	0.45
1:A:50:VAL:HG23	1:A:51:LYS:N	2.32	0.44
1:A:60:ILE:HG23	1:A:75:LEU:CD1	2.48	0.44
1:A:196:SER:O	1:A:197:PHE:C	2.60	0.44
1:A:82:GLY:HA2	1:A:224:VAL:HG21	1.99	0.44
1:A:106:ILE:HG23	1:A:201:VAL:HG21	2.00	0.44
1:A:156:THR:HG21	1:A:168:ALA:CB	2.46	0.44
1:A:69:HIS:CD2	1:A:70:ILE:H	2.36	0.44
1:A:184:ILE:CD1	1:A:189:CYS:HB3	2.48	0.44
1:A:11:TRP:O	1:A:12:ARG:C	2.61	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:218:ILE:HA	1:A:221:ALA:CB	2.49	0.43
1:A:200:ALA:O	1:A:202:ILE:N	2.51	0.43
1:A:187:THR:O	1:A:188:GLY:O	2.36	0.43
1:A:30:GLY:O	1:A:34:GLY:N	2.49	0.43
1:A:127:ASN:C	1:A:129:LEU:H	2.26	0.43
1:A:65:GLN:HE21	1:A:65:GLN:HB3	1.61	0.43
1:A:81:LEU:HD23	1:A:81:LEU:HA	1.93	0.43
1:A:91:ILE:O	1:A:91:ILE:CG1	2.66	0.43
1:A:146:THR:HG23	1:A:150:VAL:HG23	2.00	0.43
1:A:220:GLY:HA2	1:A:223:ALA:CB	2.48	0.43
1:A:12:ARG:O	1:A:15:VAL:HG23	2.19	0.43
1:A:38:PRO:O	1:A:39:VAL:C	2.62	0.43
1:A:124:LEU:HG	1:A:126:ARG:HA	2.01	0.43
1:A:151:LEU:HD12	1:A:151:LEU:HA	1.90	0.43
1:A:83:LEU:HD11	1:A:92:PHE:CE1	2.50	0.42
1:A:24:PHE:HB2	1:A:63:LEU:HD13	2.01	0.42
1:A:71:SER:OG	1:A:72:GLY:N	2.52	0.42
1:A:84:LEU:O	1:A:86:SER:N	2.52	0.42
1:A:176:VAL:O	1:A:180:HIS:ND1	2.52	0.42
1:A:200:ALA:C	1:A:202:ILE:N	2.77	0.42
1:A:184:ILE:CG2	1:A:185:ASP:N	2.83	0.42
1:A:115:ILE:CG1	1:A:116:THR:H	2.09	0.42
1:A:60:ILE:HG23	1:A:75:LEU:HD11	2.02	0.42
1:A:81:LEU:O	1:A:82:GLY:C	2.62	0.42
1:A:19:LEU:O	1:A:22:THR:HB	2.19	0.42
1:A:149:LEU:HD22	1:A:191:ILE:CG1	2.50	0.42
1:A:218:ILE:HA	1:A:221:ALA:HB3	2.01	0.42
1:A:76:ASN:HA	1:A:77:PRO:HD3	1.76	0.42
1:A:213:TRP:O	1:A:215:GLY:N	2.53	0.41
1:A:144:ILE:O	1:A:147:LEU:HB3	2.20	0.41
1:A:147:LEU:HD13	1:A:223:ALA:HB2	2.01	0.41
1:A:171:ALA:O	1:A:172:ILE:C	2.62	0.41
1:A:129:LEU:CD1	1:A:195:ARG:NE	2.79	0.41
1:A:200:ALA:HB1	1:A:204:HIS:CG	2.55	0.41
1:A:28:SER:HB2	1:A:56:PHE:CE2	2.55	0.41
1:A:87:CYS:O	1:A:88:GLN:HG3	2.20	0.41
1:A:230:ILE:HD13	1:A:230:ILE:HA	1.86	0.41
1:A:27:ILE:O	1:A:30:GLY:N	2.53	0.41
1:A:109:THR:O	1:A:112:LEU:HB3	2.19	0.41
1:A:126:ARG:O	1:A:128:ASP:N	2.54	0.41
1:A:24:PHE:CD2	1:A:25:VAL:HG22	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:37:TYR:CB	1:A:119:LEU:HD22	2.51	0.41
1:A:37:TYR:CD2	1:A:38:PRO:HD3	2.56	0.41
1:A:84:LEU:O	1:A:85:LEU:C	2.63	0.41
1:A:182:LEU:O	1:A:183:ALA:C	2.63	0.41
1:A:208:ASN:C	1:A:210:TRP:N	2.78	0.41
1:A:127:ASN:O	1:A:129:LEU:N	2.53	0.41
1:A:231:LEU:HD12	1:A:231:LEU:HA	1.62	0.41
1:A:200:ALA:CB	1:A:204:HIS:HB3	2.51	0.40
1:A:139:LEU:HD22	1:A:211:ILE:HG21	2.01	0.40
1:A:208:ASN:O	1:A:211:ILE:N	2.54	0.40
1:A:112:LEU:O	1:A:113:SER:C	2.64	0.40
1:A:208:ASN:ND2	1:A:212:PHE:CE1	2.89	0.40
1:A:35:PHE:CZ	1:A:51:LYS:HE3	2.56	0.40
1:A:65:GLN:O	1:A:65:GLN:HG2	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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	224/269 (83%)	142 (63%)	59 (26%)	23 (10%)	0 6

All (23) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	GLY
1	A	126	ARG
1	A	158	ASP
1	A	188	GLY
1	A	39	VAL
1	A	48	ASP
1	A	68	GLY

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Mol	Chain	Res	Type
1	A	74	HIS
1	A	130	ALA
1	A	132	GLY
1	A	161	ARG
1	A	201	VAL
1	A	209	HIS
1	A	86	SER
1	A	184	ILE
1	A	85	LEU
1	A	123	SER
1	A	171	ALA
1	A	183	ALA
1	A	213	TRP
1	A	214	VAL
1	A	141	ILE
1	A	72	GLY

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 PDB entries followed by that with respect to all EM entries.

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	174/214 (81%)	141 (81%)	33 (19%)	1 10

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	LEU
1	A	21	THR
1	A	25	VAL
1	A	29	ILE
1	A	36	LYS
1	A	38	PRO
1	A	51	LYS
1	A	75	LEU
1	A	83	LEU
1	A	87	CYS

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Mol	Chain	Res	Type
1	A	93	ARG
1	A	103	VAL
1	A	107	VAL
1	A	122	ASN
1	A	127	ASN
1	A	129	LEU
1	A	142	GLU
1	A	143	ILE
1	A	146	THR
1	A	147	LEU
1	A	149	LEU
1	A	169	PRO
1	A	181	LEU
1	A	184	ILE
1	A	191	ILE
1	A	193	PRO
1	A	195	ARG
1	A	197	PHE
1	A	203	THR
1	A	208	ASN
1	A	213	TRP
1	A	218	ILE
1	A	233	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	ASN
1	A	65	GLN
1	A	69	HIS
1	A	127	ASN
1	A	137	GLN
1	A	192	ASN
1	A	208	ASN
1	A	209	HIS

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.