Full wwPDB EM Validation Report

Jul 16, 2025 – 12:39 AM JST

PDB ID	:	8H8A / pdb_00008h8a
EMDB ID	:	EMD-34540
Title	:	Type VI secretion system effector RhsP in its post-autoproteolysis and monomeric form
Authors	:	Tang, L.; Dong, S.Q.; Rasheed, N.; Wu, H.W.; Zhou, N.K.; Li, H.D.; Wang, M.L.; Zheng, J.; He, J.; Chao, W.C.H.
Deposited on	:	2022-10-22
Resolution	:	3.25 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

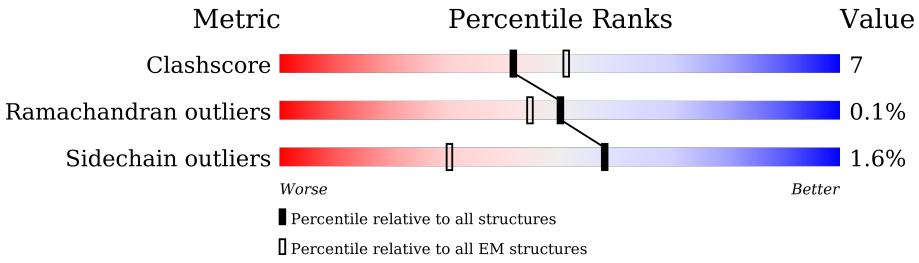
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.25 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	1152	69% 14% • 16%
2	B	250	26% • 70%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8454 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 Putative Rhs-family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	964	7844	4941	1360	1534	9	0	0

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	initiating methionine	UNP Q87PI5
A	-19	GLY	-	expression tag	UNP Q87PI5
A	-18	SER	-	expression tag	UNP Q87PI5
A	-17	SER	-	expression tag	UNP Q87PI5
A	-16	HIS	-	expression tag	UNP Q87PI5
A	-15	HIS	-	expression tag	UNP Q87PI5
A	-14	HIS	-	expression tag	UNP Q87PI5
A	-13	HIS	-	expression tag	UNP Q87PI5
A	-12	HIS	-	expression tag	UNP Q87PI5
A	-11	HIS	-	expression tag	UNP Q87PI5
A	-10	SER	-	expression tag	UNP Q87PI5
A	-9	GLN	-	expression tag	UNP Q87PI5
A	-8	ASP	-	expression tag	UNP Q87PI5
A	-7	PRO	-	expression tag	UNP Q87PI5
A	-6	GLU	-	expression tag	UNP Q87PI5
A	-5	ASN	-	expression tag	UNP Q87PI5
A	-4	LEU	-	expression tag	UNP Q87PI5
A	-3	TYR	-	expression tag	UNP Q87PI5
A	-2	PHE	-	expression tag	UNP Q87PI5
A	-1	GLN	-	expression tag	UNP Q87PI5
A	0	SER	-	expression tag	UNP Q87PI5

- Molecule 2 is a protein called C-terminal peptide from Putative Rhs-family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	75	610	376	108	123	3	0	0

There is a discrepancy between the modelled and reference sequences:

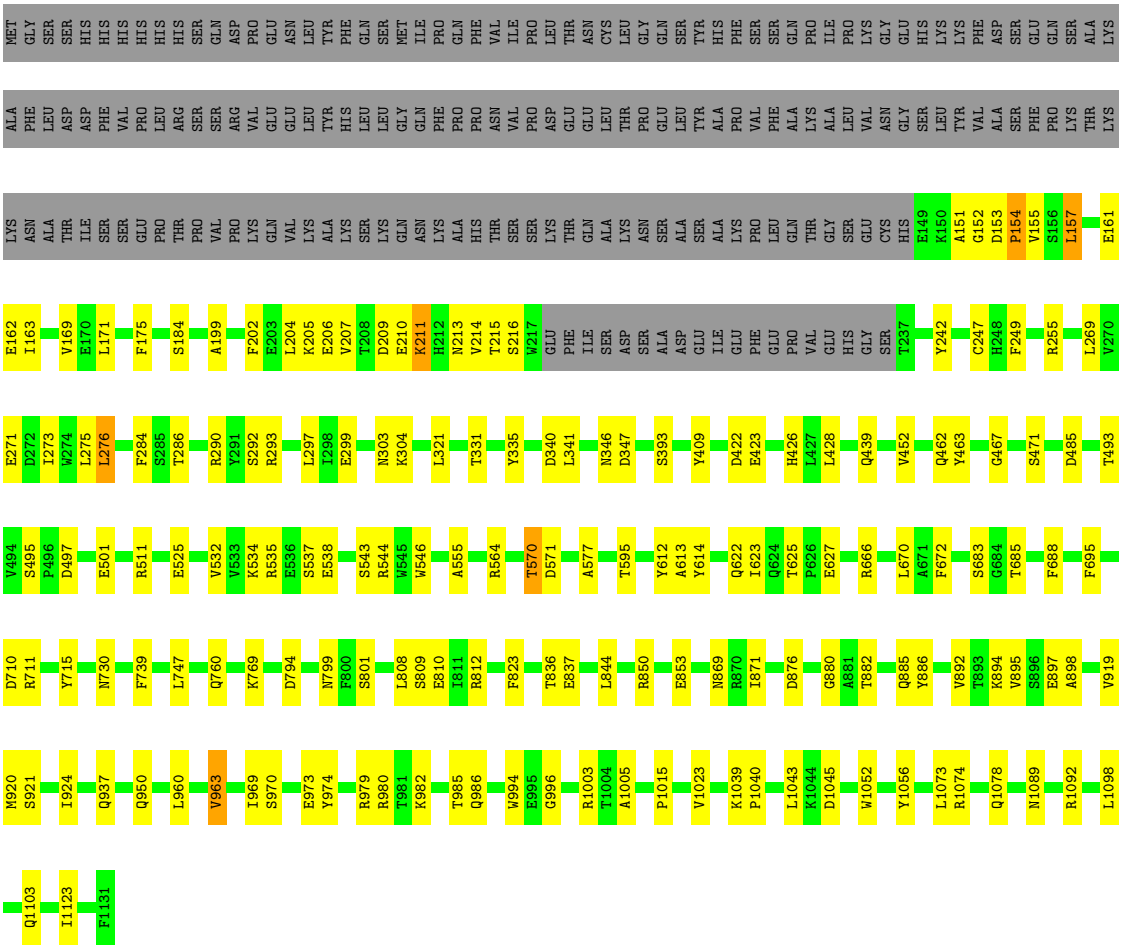
Chain	Residue	Modelled	Actual	Comment	Reference
B	1354	ALA	HIS	engineered mutation	UNP Q87PI5

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.

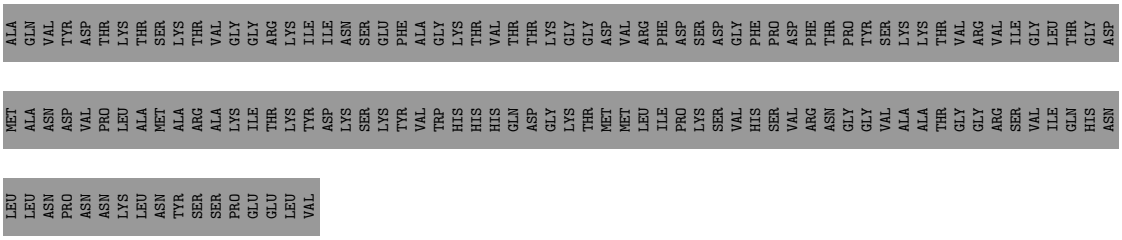
- Molecule 1: Putative Rhs-family protein

Chain A:



- Molecule 2: C-terminal peptide from Putative Rhs-family protein

Chain B:


ALA GLN VAL TYR ASP THR LYS THR SER LYS THR VAL GLY GLY ARG LYS ILE ILE ASN SER GLU PHE ALA GLY LYS THR VAL THR THR LYS GLY GLY ASP VAL ARG PHE ASP SER ASP GLY PHE PRO ASP PHE THR PRO TYR SER LYS LYS THR VAL ARG VAL ILE GLY LEU THR GLY ASP
MET ALA ASN ASP VAL PRO LEU ALA MET ALA ARG ALA LYS ILE THR LYS TYR ASP LYS SER LYS TYR VAL TRP HIS HIS HIS GLN ASP GLY LYS THR MET MET LEU ILE PRO LYS SER VAL HIS SER VAL ARG ASN GLY GLY VAL ALA ALA THR GLY GLY ARG SER VAL ILE GLN HIS ASN
LEU LEU ASN PRO ASN ASN LYS LEU ASN TYR SER SER PRO GLU GLU LEU VAL

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	368563	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	60	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.11	0/8035	0.32	0/10877
2	B	0.13	0/617	0.36	0/827
All	All	0.12	0/8652	0.33	0/11704

There are no bond length outliers.

There are no bond angle outliers.

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	7844	0	7397	104	0
2	B	610	0	589	7	0
All	All	8454	0	7986	108	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 7.

All (108) 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:153:ASP:HB3	1:A:154:PRO:HD3	1.60	0.84
1:A:290:ARG:HB3	1:A:299:GLU:HB3	1.72	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:GLY:HA3	1:A:155:VAL:HG22	1.72	0.70
1:A:462:GLN:HB3	1:A:471:SER:HB3	1.75	0.69
1:A:1078:GLN:HG2	1:A:1089:ASN:HB3	1.75	0.67
1:A:154:PRO:HG2	1:A:162:GLU:OE2	1.96	0.65
2:B:1210:ARG:HH21	2:B:1212:ILE:HG22	1.60	0.65
1:A:154:PRO:HB2	1:A:163:ILE:O	1.97	0.64
1:A:625:THR:HG22	1:A:627:GLU:H	1.64	0.62
1:A:463:TYR:HB3	1:A:467:GLY:HA2	1.80	0.62
1:A:153:ASP:CB	1:A:154:PRO:HD3	2.30	0.61
1:A:1043:LEU:HB3	1:A:1052:TRP:HB3	1.83	0.61
1:A:151:ALA:HB1	1:A:409:TYR:CZ	2.36	0.61
1:A:564:ARG:HB2	1:A:577:ALA:HB3	1.83	0.60
1:A:1074:ARG:HB2	1:A:1078:GLN:HB2	1.83	0.60
1:A:799:ASN:HB2	1:A:812:ARG:HB2	1.84	0.60
1:A:666:ARG:HH21	1:A:670:LEU:HD12	1.68	0.59
1:A:205:LYS:HB2	1:A:210:GLU:HG3	1.86	0.58
1:A:1073:LEU:O	1:A:1074:ARG:NH2	2.37	0.58
1:A:151:ALA:HB3	1:A:157:LEU:HD21	1.86	0.58
1:A:836:THR:HG22	1:A:837:GLU:H	1.69	0.57
1:A:207:VAL:HA	1:A:255:ARG:HH21	1.68	0.57
1:A:205:LYS:HB2	1:A:210:GLU:CB	2.35	0.57
1:A:808:LEU:HD23	1:A:1015:PRO:HG3	1.86	0.56
1:A:850:ARG:NH1	1:A:869:ASN:OD1	2.39	0.55
1:A:199:ALA:HA	1:A:215:THR:HB	1.89	0.55
1:A:710:ASP:HB3	1:A:937:GLN:HE21	1.70	0.54
1:A:205:LYS:HB2	1:A:210:GLU:CG	2.38	0.54
1:A:920:MET:HG3	1:A:921:SER:H	1.72	0.54
1:A:206:GLU:HG3	1:A:210:GLU:HG3	1.90	0.54
1:A:269:LEU:HG	1:A:276:LEU:HB2	1.90	0.54
1:A:1039:LYS:HD2	1:A:1056:TYR:HD2	1.72	0.54
1:A:214:VAL:HG12	1:A:216:SER:H	1.73	0.53
1:A:885:GLN:HB2	1:A:894:LYS:HG2	1.91	0.53
1:A:202:PHE:HE1	1:A:214:VAL:HG13	1.75	0.51
1:A:321:LEU:HD13	1:A:331:THR:HB	1.93	0.51
1:A:292:SER:OG	1:A:293:ARG:N	2.44	0.51
1:A:535:ARG:HB3	1:A:543:SER:HB2	1.94	0.50
1:A:152:GLY:O	1:A:153:ASP:C	2.53	0.50
1:A:495:SER:O	1:A:497:ASP:N	2.45	0.49
1:A:801:SER:HB3	1:A:810:GLU:HB3	1.95	0.48
1:A:153:ASP:HB3	1:A:154:PRO:CD	2.39	0.48
1:A:546:TRP:HB2	1:A:555:ALA:HB3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:340:ASP:N	1:A:340:ASP:OD1	2.45	0.48
1:A:242:TYR:OH	1:A:426:HIS:NE2	2.44	0.48
1:A:511:ARG:NH2	2:B:1210:ARG:H	2.11	0.48
1:A:493:THR:HB	1:A:501:GLU:HG2	1.95	0.48
1:A:979:ARG:NH1	1:A:996:GLY:O	2.46	0.47
1:A:1045:ASP:OD1	1:A:1045:ASP:N	2.47	0.47
1:A:919:VAL:HG12	1:A:924:ILE:HA	1.96	0.47
1:A:1078:GLN:HA	1:A:1089:ASN:HA	1.96	0.47
1:A:205:LYS:HB2	1:A:210:GLU:HB3	1.94	0.47
1:A:511:ARG:HH22	2:B:1210:ARG:H	1.62	0.47
1:A:844:LEU:HB3	1:A:853:GLU:HB3	1.97	0.46
1:A:335:TYR:HA	1:A:341:LEU:HA	1.98	0.46
1:A:683:SER:HA	1:A:695:PHE:HB2	1.98	0.46
1:A:211:LYS:NZ	1:A:213:ASN:HA	2.31	0.46
1:A:439:GLN:HB2	1:A:452:VAL:HB	1.98	0.46
1:A:204:LEU:HG	1:A:206:GLU:O	2.15	0.46
1:A:595:THR:HG22	1:A:614:TYR:HE2	1.81	0.46
2:B:1142:GLN:O	2:B:1146:GLU:HG3	2.16	0.46
1:A:809:SER:HA	1:A:823:PHE:HB2	1.97	0.45
1:A:963:VAL:HG13	1:A:970:SER:HB2	1.97	0.45
1:A:924:ILE:HD11	1:A:1098:LEU:HD21	1.99	0.45
1:A:297:LEU:H	1:A:297:LEU:HD23	1.82	0.45
2:B:1213:ASN:HB3	2:B:1214:TYR:CD2	2.51	0.45
1:A:739:PHE:HB3	1:A:747:LEU:HD11	1.97	0.45
1:A:876:ASP:HB3	1:A:880:GLY:HA3	1.98	0.45
1:A:393:SER:O	1:A:393:SER:OG	2.33	0.45
1:A:1003:ARG:HD2	1:A:1005:ALA:H	1.82	0.45
1:A:206:GLU:H	1:A:210:GLU:HB2	1.82	0.44
1:A:171:LEU:HD12	1:A:175:PHE:HB3	1.99	0.44
1:A:715:TYR:OH	2:B:1167:GLU:OE1	2.31	0.44
1:A:273:ILE:HD12	1:A:275:LEU:HG	2.00	0.44
1:A:670:LEU:HD13	1:A:688:PHE:HB3	2.00	0.44
1:A:960:LEU:O	1:A:974:TYR:OH	2.30	0.44
1:A:525:GLU:HB3	1:A:534:LYS:HB3	2.00	0.43
1:A:672:PHE:HE1	1:A:685:THR:HB	1.82	0.43
1:A:303:ASN:O	1:A:304:LYS:HD2	2.19	0.43
1:A:613:ALA:HB3	1:A:622:GLN:HG2	2.00	0.43
1:A:1040:PRO:HG3	1:A:1073:LEU:HB2	2.00	0.43
1:A:422:ASP:HB3	1:A:428:LEU:HD11	2.00	0.43
1:A:871:ILE:HD12	1:A:1123:ILE:HG22	1.99	0.43
2:B:1182:ARG:H	2:B:1185:ASN:HD22	1.67	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:485:ASP:OD1	1:A:485:ASP:N	2.42	0.43
1:A:683:SER:O	1:A:683:SER:OG	2.35	0.43
1:A:501:GLU:N	1:A:501:GLU:OE2	2.52	0.43
1:A:760:GLN:HB2	1:A:769:LYS:HB3	2.00	0.42
1:A:249:PHE:CZ	1:A:255:ARG:HG3	2.54	0.42
1:A:534:LYS:HD2	1:A:544:ARG:HH11	1.84	0.42
1:A:882:THR:HG23	1:A:897:GLU:HA	2.00	0.42
1:A:886:TYR:HD1	1:A:892:VAL:HA	1.84	0.42
1:A:1092:ARG:HA	1:A:1103:GLN:HE21	1.85	0.42
1:A:206:GLU:HB2	1:A:209:ASP:OD1	2.18	0.42
1:A:161:GLU:HG2	1:A:184:SER:HB3	2.00	0.42
1:A:612:TYR:HD1	1:A:623:ILE:HG12	1.85	0.42
1:A:711:ARG:HA	1:A:730:ASN:HB3	2.02	0.42
1:A:169:VAL:HG12	1:A:347:ASP:HB2	2.02	0.42
1:A:980:ARG:O	1:A:994:TRP:NE1	2.41	0.42
1:A:271:GLU:C	1:A:273:ILE:H	2.28	0.42
1:A:423:GLU:H	1:A:423:GLU:CD	2.28	0.42
1:A:950:GLN:HE21	1:A:963:VAL:HG21	1.86	0.41
1:A:331:THR:HG23	1:A:346:ASN:HA	2.02	0.41
1:A:537:SER:OG	1:A:538:GLU:N	2.53	0.41
1:A:897:GLU:HG2	1:A:898:ALA:N	2.35	0.41
1:A:985:THR:OG1	1:A:986:GLN:N	2.53	0.40
1:A:570:THR:HG22	1:A:571:ASP:H	1.87	0.40
1:A:973:GLU:HB2	1:A:982:LYS:HB2	2.02	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	960/1152 (83%)	873 (91%)	86 (9%)	1 (0%)	48 77

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	B	71/250 (28%)	67 (94%)	4 (6%)	0	100 100
All	All	1031/1402 (74%)	940 (91%)	90 (9%)	1 (0%)	50 77

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	154	PRO

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 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	834/1004 (83%)	821 (98%)	13 (2%)	58 74
2	B	67/218 (31%)	66 (98%)	1 (2%)	60 75
All	All	901/1222 (74%)	887 (98%)	14 (2%)	58 74

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	157	LEU
1	A	211	LYS
1	A	247	CYS
1	A	276	LEU
1	A	284	PHE
1	A	286	THR
1	A	532	VAL
1	A	570	THR
1	A	794	ASP
1	A	895	VAL
1	A	963	VAL
1	A	969	ILE
1	A	1023	VAL
2	B	1212	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	213	ASN
1	A	281	ASN
1	A	311	GLN
1	A	328	GLN
1	A	360	HIS
1	A	373	HIS
1	A	456	ASN
1	A	460	GLN
1	A	462	GLN
1	A	506	ASN
1	A	510	GLN
1	A	529	HIS
1	A	551	GLN
1	A	622	GLN
1	A	657	GLN
1	A	658	GLN
1	A	660	ASN
1	A	755	GLN
1	A	772	GLN
1	A	786	GLN
1	A	868	GLN
1	A	937	GLN
1	A	939	ASN
1	A	986	GLN
1	A	1014	GLN
1	A	1071	ASN
1	A	1076	GLN
1	A	1087	HIS
1	A	1103	GLN
1	A	1114	ASN
1	A	1117	GLN
1	A	1121	ASN
2	B	1141	GLN
2	B	1148	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.