



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 28, 2024 – 02:20 PM EST

PDB ID : 1ELP
Title : GAMMA-D CRYSTALLIN STRUCTURE AT 1.95 A RESOLUTION
Authors : Chirgadze, Yu.N.; Driessen, H.P.C.; Wright, G.; Slingsby, C.; Hay, R.E.; Lindley, P.F.
Deposited on : 1995-12-20
Resolution : 1.95 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 : 4.02b-467
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

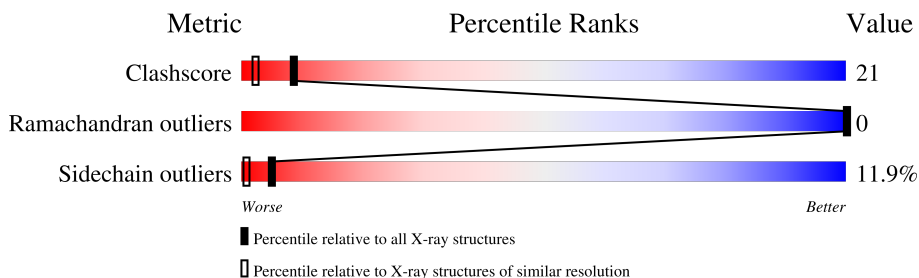
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 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))
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	173	
1	B	173	

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 3146 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 GAMMA-D CRYSTALLIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	173	1464	919	270	266	9	0	0	0
1	B	173	1464	919	270	266	9	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	75	ILE	VAL	conflict	UNP P08209
B	75	ILE	VAL	conflict	UNP P08209

- Molecule 2 is water.

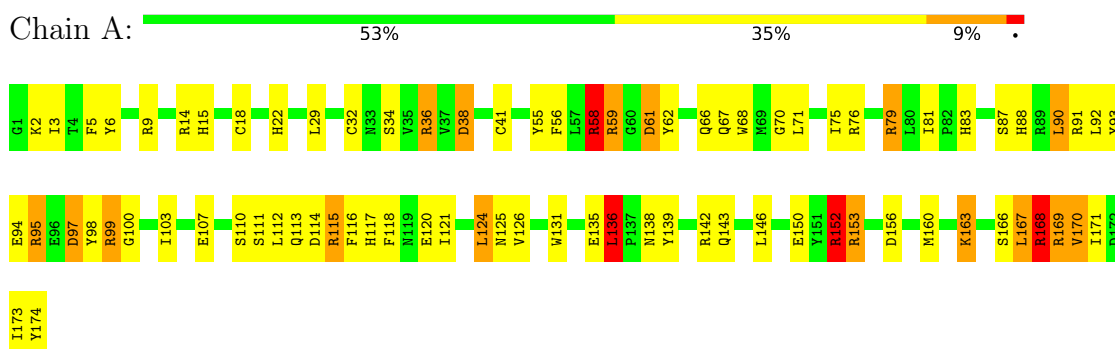
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	122	122	122	0	0
2	B	96	96	96	0	0

3 Residue-property plots [i](#)

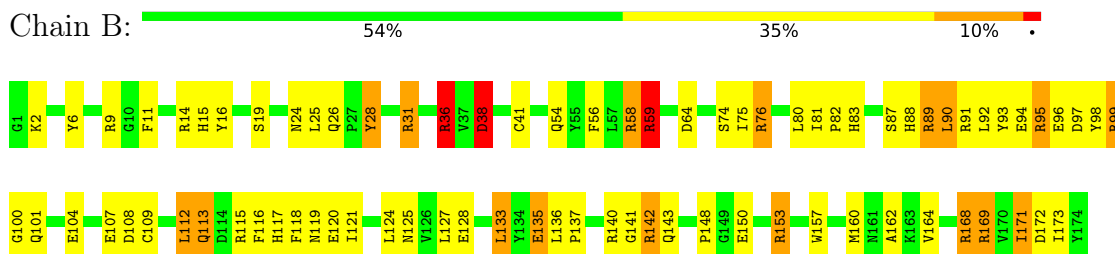
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

Note EDS was not executed.

- Molecule 1: GAMMA-D CRYSTALLIN



- Molecule 1: GAMMA-D CRYSTALLIN



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	57.81Å 70.03Å 117.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 1.95	Depositor
% Data completeness (in resolution range)	95.2 (8.00-1.95)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	RESTRAIN	Depositor
R, R_{free}	0.204 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3146	wwPDB-VP
Average B, all atoms (Å ²)	28.0	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	0.65	0/1506	1.60	14/2032 (0.7%)
1	B	0.62	0/1506	1.57	21/2032 (1.0%)
All	All	0.64	0/3012	1.59	35/4064 (0.9%)

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	12
1	B	0	12
All	All	0	24

There are no bond length outliers.

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	87	SER	N-CA-CB	-10.58	94.63	110.50
1	A	136	LEU	CB-CG-CD1	10.49	128.83	111.00
1	B	118	PHE	CG-CD2-CE2	9.24	130.97	120.80
1	A	167	LEU	CA-CB-CG	8.28	134.34	115.30
1	B	118	PHE	CZ-CE2-CD2	-7.87	110.65	120.10
1	B	91	ARG	NE-CZ-NH1	-7.81	116.40	120.30
1	B	38	ASP	CB-CG-OD2	-7.26	111.76	118.30
1	B	80	LEU	CB-CG-CD2	-6.66	99.68	111.00
1	A	58	ARG	N-CA-CB	6.54	122.37	110.60
1	A	97	ASP	CB-CG-OD2	-6.37	112.57	118.30
1	A	79	ARG	NE-CZ-NH2	-6.24	117.18	120.30
1	B	99	ARG	NE-CZ-NH1	6.20	123.40	120.30
1	A	14	ARG	NE-CZ-NH1	-6.05	117.27	120.30
1	B	118	PHE	CB-CG-CD1	5.95	124.97	120.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	64	ASP	CB-CG-OD1	5.93	123.63	118.30
1	B	119	ASN	N-CA-CB	5.77	120.98	110.60
1	A	34	SER	N-CA-CB	5.76	119.14	110.50
1	A	152	ARG	NE-CZ-NH1	-5.66	117.47	120.30
1	B	31	ARG	NE-CZ-NH2	5.66	123.13	120.30
1	B	93	TYR	CB-CG-CD2	-5.54	117.67	121.00
1	B	59	ARG	NE-CZ-NH2	5.42	123.01	120.30
1	B	153	ARG	CB-CG-CD	5.42	125.69	111.60
1	B	93	TYR	CG-CD2-CE2	-5.38	116.99	121.30
1	A	168	ARG	NE-CZ-NH1	-5.34	117.63	120.30
1	B	157	TRP	CA-CB-CG	5.32	123.81	113.70
1	A	93	TYR	CG-CD2-CE2	-5.30	117.06	121.30
1	A	124	LEU	CB-CA-C	-5.25	100.23	110.20
1	B	112	LEU	CB-CG-CD2	-5.25	102.08	111.00
1	B	118	PHE	CD1-CE1-CZ	5.24	126.39	120.10
1	B	133	LEU	CB-CG-CD1	-5.14	102.26	111.00
1	A	29	LEU	CB-CG-CD2	-5.12	102.29	111.00
1	B	25	LEU	CB-CG-CD1	-5.12	102.30	111.00
1	B	28	TYR	CB-CG-CD1	-5.12	117.93	121.00
1	B	107	GLU	CB-CA-C	-5.11	100.17	110.40
1	A	170	VAL	CA-CB-CG1	5.06	118.48	110.90

There are no chirality outliers.

All (24) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	115	ARG	Sidechain
1	A	142	ARG	Sidechain
1	A	153	ARG	Sidechain
1	A	168	ARG	Sidechain
1	A	169	ARG	Sidechain
1	A	36	ARG	Sidechain
1	A	58	ARG	Sidechain
1	A	76	ARG	Sidechain
1	A	9	ARG	Sidechain
1	A	91	ARG	Sidechain
1	A	95	ARG	Sidechain
1	A	99	ARG	Sidechain
1	B	14	ARG	Sidechain
1	B	140	ARG	Sidechain
1	B	168	ARG	Sidechain
1	B	169	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	B	36	ARG	Sidechain
1	B	58	ARG	Sidechain
1	B	59	ARG	Sidechain
1	B	76	ARG	Sidechain
1	B	89	ARG	Sidechain
1	B	9	ARG	Sidechain
1	B	95	ARG	Sidechain
1	B	99	ARG	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	1464	0	1374	63	0
1	B	1464	0	1374	54	0
2	A	122	0	0	4	0
2	B	96	0	0	2	0
All	All	3146	0	2748	117	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 21.

All (117) 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:B:90:LEU:HD21	1:B:92:LEU:HD21	1.41	1.02
1:A:90:LEU:HD21	1:A:126:VAL:HG22	1.52	0.90
1:B:90:LEU:HD21	1:B:92:LEU:CD2	2.02	0.89
1:A:152:ARG:NH1	1:A:153:ARG:HD3	1.89	0.87
1:A:90:LEU:HD11	1:A:124:LEU:HD22	1.61	0.83
1:B:113:GLN:C	1:B:113:GLN:HE21	1.82	0.81
1:A:92:LEU:HD23	1:A:124:LEU:CD2	2.13	0.79
1:A:135:GLU:HG3	1:A:136:LEU:HD13	1.66	0.78
1:A:90:LEU:CD2	1:A:126:VAL:HG22	2.14	0.78
1:B:113:GLN:HE21	1:B:113:GLN:CA	1.97	0.77
1:B:113:GLN:CA	1:B:113:GLN:NE2	2.48	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:32:CYS:HB3	1:A:75:ILE:HD12	1.68	0.74
1:B:113:GLN:HE22	1:B:117:HIS:HA	1.53	0.74
1:A:38:ASP:HB3	2:A:215:HOH:O	1.88	0.74
1:B:24:ASN:OD1	1:B:26:GLN:HG3	1.90	0.72
1:B:94:GLU:HG2	1:B:100:GLY:HA3	1.73	0.70
1:B:56:PHE:H	1:B:143:GLN:HE22	1.39	0.70
1:B:113:GLN:NE2	1:B:117:HIS:HA	2.07	0.69
1:A:92:LEU:HD23	1:A:124:LEU:HD21	1.74	0.69
1:B:113:GLN:NE2	1:B:113:GLN:HA	2.08	0.69
1:A:138:ASN:O	1:A:139:TYR:HB2	1.91	0.69
1:A:94:GLU:HB3	1:A:100:GLY:HA3	1.76	0.68
1:B:74:SER:O	1:B:75:ILE:HD12	1.93	0.68
1:B:121:ILE:HG21	1:B:124:LEU:HD23	1.76	0.66
1:A:152:ARG:HH11	1:A:153:ARG:HH11	1.42	0.66
1:A:55:TYR:CE1	1:A:70:GLY:HA2	2.30	0.65
1:B:89:ARG:HD3	1:B:104:GLU:OE2	1.97	0.65
1:B:38:ASP:HB3	2:B:222:HOH:O	1.97	0.65
1:A:90:LEU:CD1	1:A:124:LEU:HD22	2.27	0.64
1:A:120:GLU:O	1:A:121:ILE:HD13	1.97	0.64
1:A:88:HIS:HB3	1:A:131:TRP:CZ2	2.33	0.64
1:B:135:GLU:HG2	1:B:136:LEU:HG	1.80	0.63
1:A:94:GLU:HG2	1:A:95:ARG:HG3	1.82	0.61
1:A:66:GLN:HG3	2:A:238:HOH:O	2.01	0.60
1:A:153:ARG:O	1:A:156:ASP:HB2	2.02	0.59
1:A:116:PHE:O	1:A:117:HIS:HB2	2.02	0.59
1:A:56:PHE:H	1:A:143:GLN:HE22	1.51	0.58
1:B:74:SER:C	1:B:75:ILE:HD12	2.23	0.58
1:B:113:GLN:NE2	1:B:113:GLN:O	2.36	0.57
1:A:138:ASN:O	1:A:139:TYR:CB	2.52	0.57
1:B:87:SER:HB3	1:B:128:GLU:OE1	2.04	0.57
1:A:92:LEU:CD2	1:A:124:LEU:HD21	2.35	0.56
1:A:36:ARG:HD2	2:A:198:HOH:O	2.04	0.56
1:A:59:ARG:HB3	1:A:174:TYR:OXT	2.06	0.56
1:B:96:GLU:HG3	2:B:258:HOH:O	2.07	0.55
1:B:56:PHE:H	1:B:143:GLN:NE2	2.03	0.54
1:A:81:ILE:HG21	1:A:170:VAL:HG11	1.88	0.54
1:B:26:GLN:HG2	1:B:76:ARG:HG2	1.89	0.54
1:B:90:LEU:CD2	1:B:92:LEU:HG	2.38	0.54
1:A:92:LEU:HD23	1:A:124:LEU:HD23	1.89	0.53
1:B:90:LEU:HD21	1:B:92:LEU:CG	2.38	0.53
1:B:135:GLU:CG	1:B:136:LEU:HG	2.37	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:90:LEU:HD23	1:A:131:TRP:CD1	2.44	0.53
1:A:103:ILE:HG13	1:A:118:PHE:HE2	1.75	0.52
1:A:56:PHE:H	1:A:143:GLN:NE2	2.07	0.52
1:A:90:LEU:HD22	1:A:126:VAL:HA	1.90	0.52
1:B:88:HIS:CD2	1:B:169:ARG:HB3	2.44	0.52
1:B:94:GLU:HG3	1:B:95:ARG:HG3	1.91	0.51
1:B:41:CYS:HB3	1:B:56:PHE:HE1	1.76	0.51
1:A:152:ARG:HH12	1:A:153:ARG:HD3	1.71	0.51
1:A:139:TYR:CE1	1:A:166:SER:HB2	2.46	0.50
1:A:113:GLN:O	1:A:117:HIS:HA	2.12	0.50
1:A:97:ASP:CG	1:A:152:ARG:HE	2.15	0.50
1:A:41:CYS:HB3	1:A:56:PHE:HE1	1.77	0.50
1:B:11:PHE:CD2	1:B:36:ARG:NH2	2.80	0.49
1:B:41:CYS:HB3	1:B:56:PHE:CE1	2.47	0.49
1:A:111:SER:HB3	1:A:114:ASP:HB2	1.94	0.48
1:A:112:LEU:HD23	1:A:118:PHE:HB3	1.95	0.48
1:B:120:GLU:HA	1:B:162:ALA:O	2.12	0.48
1:B:172:ASP:OD1	1:B:173:ILE:N	2.43	0.48
1:B:89:ARG:HD2	1:B:127:LEU:HD12	1.96	0.48
1:A:68:TRP:CZ2	1:A:75:ILE:HD11	2.50	0.47
1:A:6:TYR:CD2	1:A:15:HIS:HB3	2.48	0.47
1:A:163:LYS:HZ2	1:A:163:LYS:CB	2.28	0.47
1:B:83:HIS:HE1	1:B:171:ILE:HG22	1.79	0.47
1:B:94:GLU:CG	1:B:100:GLY:HA3	2.44	0.47
1:A:81:ILE:CG2	1:A:170:VAL:HG11	2.44	0.46
1:A:61:ASP:N	1:A:61:ASP:OD1	2.49	0.46
1:A:112:LEU:HD23	1:A:118:PHE:CB	2.45	0.46
1:A:173:ILE:O	1:A:173:ILE:HG22	2.16	0.46
1:B:31:ARG:HG2	1:B:31:ARG:HH11	1.80	0.46
1:B:135:GLU:HG2	1:B:141:GLY:HA3	1.97	0.46
1:B:115:ARG:HG2	1:B:116:PHE:CE2	2.51	0.46
1:A:5:PHE:O	1:A:15:HIS:HA	2.16	0.46
1:A:169:ARG:CB	1:A:171:ILE:HD12	2.46	0.46
1:B:108:ASP:OD1	1:B:169:ARG:HG3	2.16	0.45
1:B:81:ILE:HA	1:B:82:PRO:HD3	1.87	0.45
1:B:173:ILE:HG22	1:B:173:ILE:O	2.16	0.45
1:B:2:LYS:HD2	1:B:38:ASP:HB2	1.98	0.44
1:A:126:VAL:HG21	1:A:146:LEU:HB3	1.98	0.44
1:B:96:GLU:O	1:B:97:ASP:HB2	2.17	0.44
1:A:103:ILE:CG1	1:A:118:PHE:HE2	2.31	0.44
1:B:136:LEU:HA	1:B:137:PRO:HD3	1.90	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:62:TYR:HA	1:A:67:GLN:HG2	1.99	0.44
1:B:58:ARG:HD3	1:B:173:ILE:HD11	2.00	0.43
1:B:31:ARG:HG2	1:B:31:ARG:NH1	2.34	0.43
1:A:173:ILE:O	1:A:174:TYR:HB2	2.19	0.43
1:B:133:LEU:HD21	1:B:164:VAL:HG22	2.00	0.43
1:B:98:TYR:OH	1:B:150:GLU:HB3	2.18	0.43
1:B:142:ARG:CG	1:B:142:ARG:HH11	2.31	0.43
1:B:90:LEU:C	1:B:90:LEU:HD23	2.39	0.42
1:B:109:CYS:SG	1:B:112:LEU:HD12	2.59	0.42
1:A:168:ARG:HG2	1:A:169:ARG:N	2.34	0.42
1:A:139:TYR:CD1	1:A:166:SER:HB2	2.54	0.42
1:B:6:TYR:CD2	1:B:15:HIS:HB3	2.55	0.42
1:A:163:LYS:HZ2	1:A:163:LYS:HB3	1.85	0.42
1:A:163:LYS:CB	1:A:163:LYS:NZ	2.80	0.41
1:A:41:CYS:HB3	1:A:56:PHE:CE1	2.55	0.41
1:A:116:PHE:O	1:A:117:HIS:CB	2.64	0.41
1:A:173:ILE:O	1:A:174:TYR:CB	2.68	0.41
1:A:152:ARG:HH11	1:A:153:ARG:HD3	1.80	0.41
1:B:16:TYR:CD1	1:B:28:TYR:HB3	2.56	0.41
1:A:90:LEU:CD1	1:A:124:LEU:CD2	2.97	0.41
1:A:113:GLN:HB2	2:A:272:HOH:O	2.20	0.41
1:A:3:ILE:CG2	1:A:18:CYS:HB2	2.51	0.40
1:A:97:ASP:HB2	1:A:99:ARG:CZ	2.51	0.40
1:B:142:ARG:CG	1:B:142:ARG:NH1	2.85	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 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	171/173 (99%)	167 (98%)	4 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	171/173 (99%)	166 (97%)	5 (3%)	0	100	100
All	All	342/346 (99%)	333 (97%)	9 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	155/155 (100%)	134 (86%)	21 (14%)	4	0
1	B	155/155 (100%)	139 (90%)	16 (10%)	7	1
All	All	310/310 (100%)	273 (88%)	37 (12%)	5	1

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	LYS
1	A	22	HIS
1	A	38	ASP
1	A	58	ARG
1	A	59	ARG
1	A	61	ASP
1	A	71	LEU
1	A	79	ARG
1	A	83	HIS
1	A	90	LEU
1	A	98	TYR
1	A	107	GLU
1	A	110	SER
1	A	115	ARG
1	A	125	ASN
1	A	136	LEU
1	A	150	GLU
1	A	152	ARG

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Mol	Chain	Res	Type
1	A	160	MET
1	A	163	LYS
1	A	167	LEU
1	B	19	SER
1	B	36	ARG
1	B	38	ASP
1	B	54	GLN
1	B	59	ARG
1	B	90	LEU
1	B	101	GLN
1	B	113	GLN
1	B	125	ASN
1	B	135	GLU
1	B	142	ARG
1	B	148	PRO
1	B	153	ARG
1	B	160	MET
1	B	168	ARG
1	B	171	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	12	GLN
1	A	47	GLN
1	A	125	ASN
1	A	143	GLN
1	B	83	HIS
1	B	101	GLN
1	B	113	GLN
1	B	119	ASN
1	B	125	ASN
1	B	143	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides 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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.