



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 11, 2024 – 08:02 PM EDT

PDB ID : 2GAW
Title : WILD TYPE GLYCOSYLSPARAGINASE FROM FLAVOBACTERIUM
MENINGOSEPTICUM
Authors : Guo, H.-C.; Xu, Q.
Deposited on : 1998-05-29
Resolution : 2.20 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
Xtriage (Phenix) : 1.20.1
EDS : 2.36.2
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

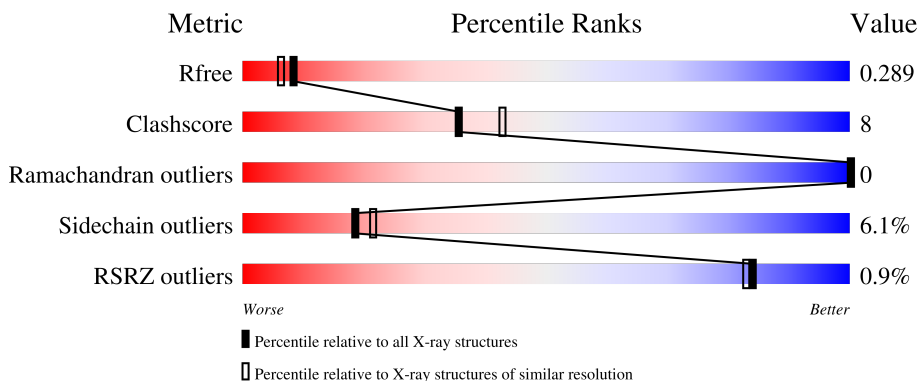
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	130704	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	151	 2% (poor fit), 70% (0 outliers), 17% (1 outlier), 10% (2+ outliers)
1	C	151	 % (poor fit), 67% (0 outliers), 20% (1 outlier), 10% (2+ outliers)
2	B	144	 75% (0 outliers), 19% (1 outlier), 6% (2+ outliers)
2	D	144	 76% (0 outliers), 17% (1 outlier), 7% (2+ outliers)

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4322 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 GLYCOSYLASPARAGINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	136	1056	665	184	201	6	0	0	0
1	C	136	1056	665	184	201	6	0	0	0

- Molecule 2 is a protein called GLYCOSYLASPARAGINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	139	1038	643	191	197	7	0	0	0
2	D	139	1038	643	191	197	7	0	0	0

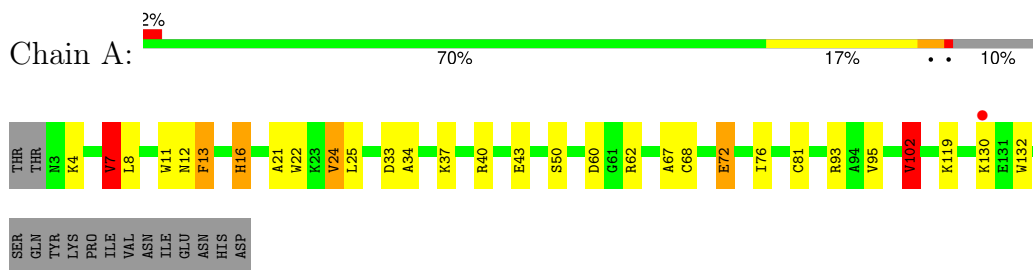
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	35	Total 35	O 35	0	0
3	B	31	Total 31	O 31	0	0
3	C	34	Total 34	O 34	0	0
3	D	34	Total 34	O 34	0	0

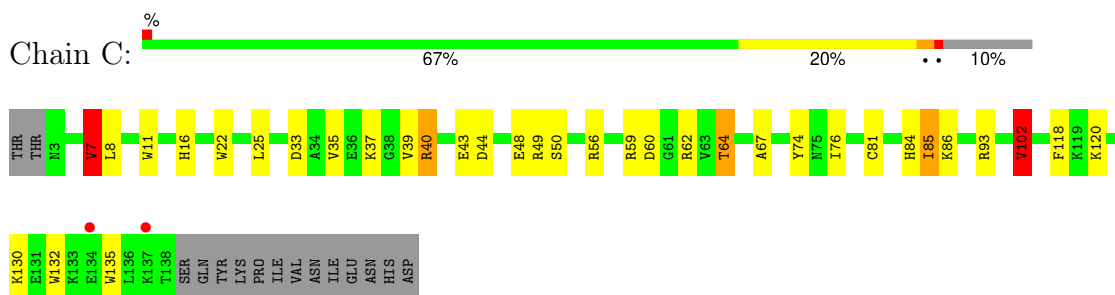
3 Residue-property plots

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.

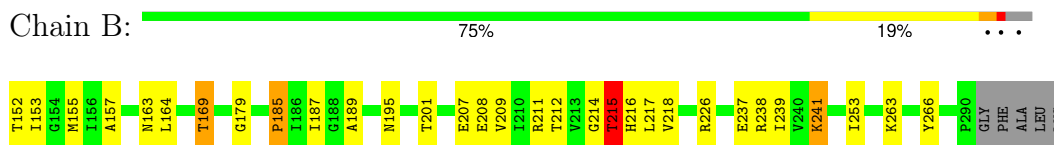
- Molecule 1: GLYCOSYLASPARAGINASE



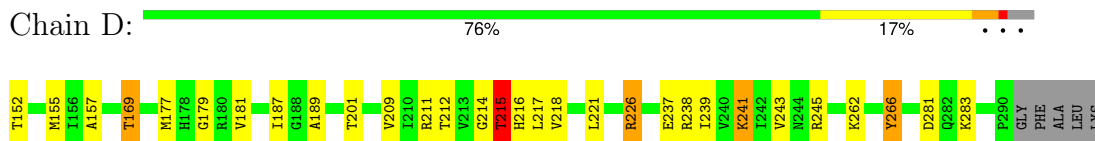
- Molecule 1: GLYCOSYLASPARAGINASE



- Molecule 2: GLYCOSYLASPARAGINASE



- Molecule 2: GLYCOSYLASPARAGINASE



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	46.20Å 97.30Å 61.80Å 90.00° 90.30° 90.00°	Depositor
Resolution (Å)	6.00 – 2.20 34.66 – 2.10	Depositor EDS
% Data completeness (in resolution range)	87.0 (6.00-2.20) 81.5 (34.66-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.38 (at 2.10Å)	Xtrriage
Refinement program	XTALVIEW, X-PLOR 3.1	Depositor
R, R_{free}	0.246 , 0.297 0.245 , 0.289	Depositor DCC
R_{free} test set	1261 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å ²)	12.4	Xtrriage
Anisotropy	0.538	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 58.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.042 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	4322	wwPDB-VP
Average B, all atoms (Å ²)	10.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.49% 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	0.80	0/1076	1.48	16/1453 (1.1%)
1	C	0.81	0/1076	1.51	21/1453 (1.4%)
2	B	0.68	0/1051	1.26	5/1414 (0.4%)
2	D	0.70	0/1051	1.29	8/1414 (0.6%)
All	All	0.75	0/4254	1.39	50/5734 (0.9%)

There are no bond length outliers.

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	40	ARG	NE-CZ-NH2	-9.90	115.35	120.30
1	A	40	ARG	NE-CZ-NH2	-9.55	115.52	120.30
2	B	187	ILE	CA-C-N	8.53	133.26	116.20
1	C	11	TRP	CD1-CG-CD2	8.46	113.07	106.30
1	C	135	TRP	CD1-CG-CD2	8.28	112.92	106.30
1	A	22	TRP	CD1-CG-CD2	8.26	112.91	106.30
1	A	135	TRP	CD1-CG-CD2	8.25	112.90	106.30
1	C	11	TRP	CE2-CD2-CG	-8.23	100.72	107.30
1	A	11	TRP	CD1-CG-CD2	8.19	112.85	106.30
1	C	22	TRP	CD1-CG-CD2	8.01	112.71	106.30
1	A	11	TRP	CE2-CD2-CG	-7.99	100.91	107.30
1	C	132	TRP	CD1-CG-CD2	7.92	112.64	106.30
2	D	187	ILE	CA-C-N	7.89	131.98	116.20
1	A	132	TRP	CD1-CG-CD2	7.79	112.53	106.30
1	A	22	TRP	CE2-CD2-CG	-7.66	101.18	107.30
1	C	132	TRP	CE2-CD2-CG	-7.38	101.39	107.30
1	C	135	TRP	CE2-CD2-CG	-7.37	101.41	107.30
1	C	22	TRP	CE2-CD2-CG	-7.35	101.42	107.30
1	A	132	TRP	CE2-CD2-CG	-7.26	101.49	107.30
1	A	135	TRP	CE2-CD2-CG	-7.21	101.53	107.30
2	D	245	ARG	NE-CZ-NH1	7.07	123.83	120.30
2	B	211	ARG	NE-CZ-NH2	-7.06	116.77	120.30
2	D	215	THR	N-CA-CB	-6.81	97.36	110.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	215	THR	N-CA-CB	-6.80	97.38	110.30
1	A	93	ARG	NE-CZ-NH2	-6.49	117.05	120.30
1	C	93	ARG	NE-CZ-NH2	-6.37	117.12	120.30
2	D	226	ARG	NE-CZ-NH2	-6.34	117.13	120.30
1	C	102	VAL	N-CA-CB	-6.31	97.61	111.50
1	C	11	TRP	CG-CD2-CE3	6.28	139.55	133.90
2	D	211	ARG	NE-CZ-NH2	-6.24	117.18	120.30
2	B	187	ILE	O-C-N	-6.03	112.94	123.20
2	D	187	ILE	O-C-N	-6.00	113.00	123.20
2	B	266	TYR	CB-CG-CD2	-5.85	117.49	121.00
1	C	85	ILE	O-C-N	5.78	131.96	122.70
2	D	266	TYR	CB-CG-CD2	-5.71	117.57	121.00
1	C	11	TRP	CB-CG-CD1	-5.67	119.62	127.00
2	D	245	ARG	NE-CZ-NH2	-5.64	117.48	120.30
1	C	7	VAL	CB-CA-C	-5.57	100.82	111.40
1	A	7	VAL	CB-CA-C	-5.54	100.88	111.40
1	C	74	TYR	CB-CG-CD2	-5.47	117.72	121.00
1	C	48	GLU	CA-C-N	-5.46	105.19	117.20
1	C	135	TRP	CG-CD1-NE1	-5.34	104.76	110.10
1	A	8	LEU	CA-CB-CG	5.29	127.47	115.30
1	A	11	TRP	CG-CD2-CE3	5.29	138.66	133.90
1	A	135	TRP	CG-CD1-NE1	-5.27	104.83	110.10
1	C	59	ARG	NE-CZ-NH2	-5.22	117.69	120.30
1	C	8	LEU	CA-CB-CG	5.20	127.26	115.30
1	A	93	ARG	NE-CZ-NH1	5.19	122.89	120.30
1	A	102	VAL	N-CA-CB	-5.12	100.25	111.50
1	C	49	ARG	NE-CZ-NH2	-5.01	117.79	120.30

There are no chirality outliers.

There are no planarity outliers.

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	1056	0	1052	22	0
1	C	1056	0	1052	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	1038	0	1041	22	0
2	D	1038	0	1041	20	0
3	A	35	0	0	3	0
3	B	31	0	0	6	0
3	C	34	0	0	2	0
3	D	34	0	0	5	0
All	All	4322	0	4186	68	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 (68) 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:24:VAL:HG11	1:A:34:ALA:HA	1.27	1.17
1:A:21:ALA:O	1:A:24:VAL:HG13	1.68	0.93
1:A:24:VAL:HG11	1:A:34:ALA:CA	1.98	0.93
1:A:21:ALA:O	1:A:24:VAL:CG1	2.22	0.88
1:C:64:THR:HG23	1:C:81:CYS:HA	1.63	0.80
2:B:155:MET:HB2	3:B:644:HOH:O	1.94	0.68
1:C:44:ASP:HA	1:C:86:LYS:HD3	1.79	0.65
1:C:43:GLU:OE2	2:D:169:THR:HG21	1.98	0.64
1:C:60:ASP:HB2	1:C:62:ARG:NH1	2.13	0.63
1:A:24:VAL:HG11	1:A:34:ALA:CB	2.28	0.63
1:A:72:GLU:HG2	2:B:163:ASN:HB3	1.81	0.62
1:C:67:ALA:HB2	2:D:169:THR:HG23	1.82	0.62
2:B:216:HIS:HD2	2:D:216:HIS:HD2	1.48	0.61
1:A:76:ILE:HG13	1:A:102:VAL:HG22	1.82	0.61
2:B:208:GLU:HG3	2:B:253:ILE:HG23	1.82	0.61
2:D:189:ALA:O	2:D:215:THR:HB	2.01	0.60
1:C:50:SER:HG	2:D:152:THR:N	1.98	0.60
1:A:21:ALA:O	1:A:24:VAL:HG12	2.02	0.59
1:A:50:SER:HG	2:B:152:THR:N	2.02	0.57
1:A:13:PHE:HA	1:A:16:HIS:CE1	2.39	0.57
1:A:67:ALA:HB2	2:B:169:THR:HG23	1.88	0.56
1:A:43:GLU:OE2	2:B:169:THR:HG21	2.06	0.56
1:A:24:VAL:CG1	1:A:34:ALA:CB	2.84	0.55
1:A:68:CYS:HB3	2:B:185:PRO:HA	1.88	0.54
1:C:7:VAL:HG13	2:D:157:ALA:HB2	1.90	0.54
2:B:189:ALA:O	2:B:215:THR:HB	2.07	0.54
2:D:266:TYR:HD2	3:D:637:HOH:O	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:7:VAL:HG13	2:B:157:ALA:HB2	1.90	0.52
3:A:625:HOH:O	2:D:177:MET:SD	2.60	0.50
1:C:39:VAL:HG11	3:D:630:HOH:O	2.12	0.50
2:B:155:MET:HE3	3:B:644:HOH:O	2.12	0.49
2:D:214:GLY:HA3	3:D:620:HOH:O	2.11	0.49
1:A:81:CYS:SG	2:B:179:GLY:HA2	2.53	0.48
1:A:7:VAL:HG22	1:A:25:LEU:HD12	1.96	0.48
1:C:7:VAL:HG22	1:C:25:LEU:HD12	1.96	0.48
1:A:95:VAL:HG13	3:A:632:HOH:O	2.14	0.48
1:C:81:CYS:SG	2:D:179:GLY:HA2	2.54	0.48
2:B:217:LEU:HD21	2:B:238:ARG:HD2	1.95	0.47
2:D:217:LEU:HD21	2:D:238:ARG:HD2	1.96	0.47
1:A:33:ASP:O	1:A:37:LYS:HG2	2.15	0.46
2:B:207:GLU:HG3	1:C:102:VAL:HB	1.98	0.46
2:B:237:GLU:O	2:B:241:LYS:HG2	2.16	0.46
1:C:40:ARG:HD3	3:C:723:HOH:O	2.14	0.46
1:C:33:ASP:O	1:C:37:LYS:HG2	2.16	0.45
1:C:56:ARG:HD2	3:C:662:HOH:O	2.15	0.45
1:C:84:HIS:HB3	1:C:120:LYS:HG3	1.97	0.45
1:C:85:ILE:HD12	1:C:118:PHE:HB3	1.99	0.45
2:B:214:GLY:HA3	3:B:606:HOH:O	2.17	0.44
2:D:237:GLU:O	2:D:241:LYS:HG2	2.17	0.44
2:D:214:GLY:O	2:D:218:VAL:HG23	2.18	0.44
1:A:4:LYS:NZ	3:A:643:HOH:O	2.46	0.44
2:B:152:THR:HG21	3:B:634:HOH:O	2.18	0.43
2:D:221:LEU:O	2:D:226:ARG:HD3	2.17	0.43
2:B:214:GLY:O	2:B:218:VAL:HG23	2.18	0.43
1:C:76:ILE:HG13	1:C:102:VAL:HG22	2.00	0.43
2:B:212:THR:HG21	2:B:239:ILE:HG12	2.01	0.43
2:B:153:ILE:HG12	3:B:644:HOH:O	2.20	0.42
1:A:24:VAL:CG1	1:A:34:ALA:HB2	2.49	0.42
2:D:212:THR:HG21	2:D:239:ILE:HG12	2.02	0.42
2:D:281:ASP:OD2	2:D:283:LYS:NZ	2.51	0.42
2:B:164:LEU:HD12	2:B:195:ASN:HA	2.02	0.42
1:A:60:ASP:HB2	1:A:62:ARG:NH1	2.34	0.41
2:D:262:LYS:HA	2:D:262:LYS:HD3	1.70	0.41
2:B:209:VAL:HA	3:B:606:HOH:O	2.19	0.41
2:D:209:VAL:HA	3:D:620:HOH:O	2.20	0.41
1:C:60:ASP:HB2	1:C:62:ARG:HH12	1.85	0.41
2:D:209:VAL:HG13	3:D:620:HOH:O	2.20	0.40
1:C:35:VAL:HA	2:D:155:MET:SD	2.62	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	134/151 (89%)	130 (97%)	4 (3%)	0	100	100
1	C	134/151 (89%)	130 (97%)	4 (3%)	0	100	100
2	B	137/144 (95%)	132 (96%)	5 (4%)	0	100	100
2	D	137/144 (95%)	132 (96%)	5 (4%)	0	100	100
All	All	542/590 (92%)	524 (97%)	18 (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	113/128 (88%)	104 (92%)	9 (8%)	12	12
1	C	113/128 (88%)	108 (96%)	5 (4%)	28	35
2	B	107/110 (97%)	100 (94%)	7 (6%)	17	19
2	D	107/110 (97%)	101 (94%)	6 (6%)	21	25
All	All	440/476 (92%)	413 (94%)	27 (6%)	18	21

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	VAL
1	A	12	ASN
1	A	13	PHE
1	A	16	HIS
1	A	24	VAL
1	A	72	GLU
1	A	102	VAL
1	A	119	LYS
1	A	130	LYS
2	B	169	THR
2	B	185	PRO
2	B	201	THR
2	B	215	THR
2	B	226	ARG
2	B	241	LYS
2	B	263	LYS
1	C	7	VAL
1	C	16	HIS
1	C	64	THR
1	C	102	VAL
1	C	130	LYS
2	D	169	THR
2	D	181	VAL
2	D	201	THR
2	D	215	THR
2	D	241	LYS
2	D	243	VAL

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	16	HIS
2	B	216	HIS
2	B	223	ASN
2	B	230	GLN
1	C	16	HIS
2	D	205	HIS
2	D	216	HIS
2	D	223	ASN
2	D	230	GLN
2	D	249	ASN

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	136/151 (90%)	0.09	3 (2%) 62 59	4, 9, 22, 26	0
1	C	136/151 (90%)	0.13	2 (1%) 73 72	4, 9, 22, 26	0
2	B	139/144 (96%)	0.07	0 100 100	1, 8, 14, 17	0
2	D	139/144 (96%)	0.18	0 100 100	1, 8, 14, 18	0
All	All	550/590 (93%)	0.12	5 (0%) 84 83	1, 9, 17, 26	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	138	THR	3.6
1	C	134	GLU	2.5
1	A	137	LYS	2.1
1	A	130	LYS	2.1
1	C	137	LYS	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 monosaccharides 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.