WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Dec 2, 2023 – 06:53 pm GMT

PDB ID	:	2UWC
Title	:	Crystal structure of Nasturtium xyloglucan hydrolase isoform NXG2
Authors	:	Baumann, M.J.; Eklof, J.M.; Michel, G.; Kallas, A.; Teeri, T.T.; Brumer, H.; Czjzek, M.
Deposited on	:	2007-03-20
Resolution	:	2.30 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

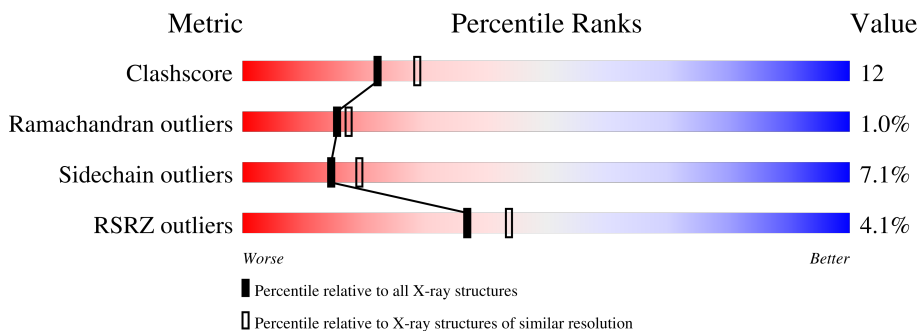|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
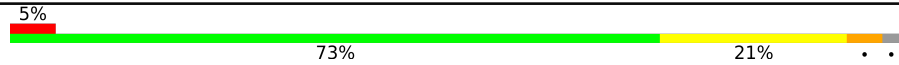*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	Percentile Ranks	Value
Clashscore		12
Ramachandran outliers		1.0%
Sidechain outliers		7.1%
RSRZ outliers		4.1%

Worse *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 <=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	271	5% — 73% ... 21% ..
1	B	271	3% — 79% ... 15% ..

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 4593 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 CELLULASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	266	Total 2154	C 1383	N 353	O 411	S 7	0	0	0
1	B	265	Total 2145	C 1377	N 351	O 410	S 7	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	129	LEU	MET	conflict	UNP Q07524
A	178	MET	LEU	conflict	UNP Q07524
B	129	LEU	MET	conflict	UNP Q07524
B	178	MET	LEU	conflict	UNP Q07524

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	144	Total 144	O 144	0	0
2	B	150	Total 150	O 150	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: CELLULASE

Chain A:

• Molecule 1: CELLULASE

Chain B:
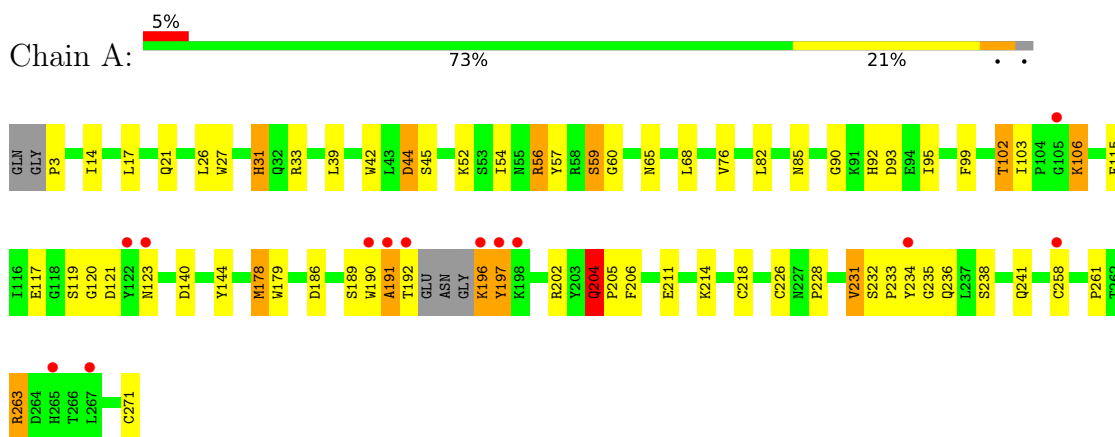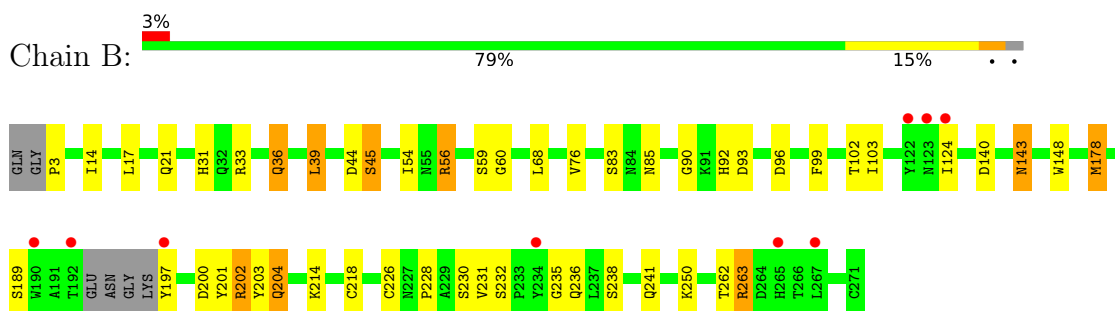
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 6	Depositor
Cell constants a, b, c, α, β, γ	152.12Å 152.12Å 83.23Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	31.31 – 2.30 39.68 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.8 (31.31-2.30) 97.8 (39.68-2.30)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.18 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.167 , 0.196 0.189 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	33.1	Xtriage
Anisotropy	0.025	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 28.7	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.478 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4593	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.62% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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	1.15	8/2227 (0.4%)	1.07	13/3038 (0.4%)
1	B	1.14	4/2218 (0.2%)	1.03	9/3027 (0.3%)
All	All	1.15	12/4445 (0.3%)	1.05	22/6065 (0.4%)

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	1
1	B	0	3
All	All	0	4

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	211	GLU	CB-CG	-9.24	1.34	1.52
1	B	204	GLN	CA-C	-7.36	1.33	1.52
1	B	21	GLN	CG-CD	7.01	1.67	1.51
1	A	21	GLN	CG-CD	6.96	1.67	1.51
1	A	117	GLU	CD-OE1	6.92	1.33	1.25
1	A	59	SER	CB-OG	-6.78	1.33	1.42
1	A	57	TYR	CE1-CZ	6.26	1.46	1.38
1	B	56	ARG	CB-CG	-6.21	1.35	1.52
1	B	143	ASN	CG-OD1	6.16	1.37	1.24
1	A	144	TYR	CD1-CE1	5.89	1.48	1.39
1	A	115	PHE	CB-CG	-5.67	1.41	1.51
1	A	233	PRO	C-O	5.19	1.33	1.23

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	204	GLN	C-N-CD	13.47	156.69	128.40
1	A	178	MET	CB-CG-SD	-9.15	84.94	112.40
1	B	140	ASP	CB-CG-OD2	-8.10	111.01	118.30
1	B	140	ASP	CB-CG-OD1	7.84	125.36	118.30
1	A	204	GLN	C-N-CA	-7.72	89.58	122.00
1	B	56	ARG	NE-CZ-NH2	-7.61	116.50	120.30
1	B	178	MET	CA-CB-CG	6.35	124.10	113.30
1	A	56	ARG	NE-CZ-NH2	-6.17	117.22	120.30
1	A	33	ARG	NE-CZ-NH1	6.11	123.36	120.30
1	A	186	ASP	CB-CG-OD1	6.04	123.74	118.30
1	B	178	MET	CB-CG-SD	-6.00	94.40	112.40
1	B	202	ARG	NE-CZ-NH1	5.98	123.29	120.30
1	A	231	VAL	CB-CA-C	5.72	122.28	111.40
1	A	121	ASP	CB-CG-OD1	5.59	123.34	118.30
1	B	33	ARG	NE-CZ-NH1	5.53	123.06	120.30
1	A	140	ASP	CB-CG-OD2	-5.26	113.57	118.30
1	A	140	ASP	CB-CG-OD1	5.18	122.96	118.30
1	B	39	LEU	CB-CG-CD2	5.16	119.78	111.00
1	A	234	TYR	C-N-CA	-5.16	111.47	122.30
1	B	39	LEU	CA-CB-CG	5.12	127.08	115.30
1	A	44	ASP	CB-CG-OD2	-5.06	113.75	118.30
1	A	44	ASP	CB-CG-OD1	5.04	122.84	118.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	235	GLY	Peptide
1	B	203	TYR	Peptide
1	B	235	GLY	Peptide
1	B	96	ASP	Peptide

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	2154	0	2008	63	0
1	B	2145	0	1995	31	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	144	0	0	14	0
2	B	150	0	0	6	0
All	All	4593	0	4003	94	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 12.

All (94) 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:204:GLN:O	1:A:205:PRO:C	1.73	1.15
1:A:196:LYS:O	1:A:197:TYR:CD1	2.01	1.14
1:A:103:ILE:HB	1:A:106:LYS:NZ	1.75	1.00
1:A:103:ILE:HB	1:A:106:LYS:HZ2	1.28	0.96
1:A:204:GLN:O	1:A:206:PHE:N	2.03	0.92
1:A:196:LYS:O	1:A:197:TYR:CG	2.25	0.90
1:B:238:SER:H	1:B:241:GLN:HE21	1.20	0.86
1:A:204:GLN:CA	2:A:2112:HOH:O	2.24	0.85
1:A:205:PRO:N	2:A:2112:HOH:O	2.11	0.83
1:B:204:GLN:O	1:B:204:GLN:HG3	1.78	0.83
1:A:103:ILE:CG2	1:A:106:LYS:HZ1	1.94	0.80
1:A:205:PRO:CD	2:A:2112:HOH:O	2.32	0.78
1:B:102:THR:HG23	2:B:2059:HOH:O	1.86	0.75
1:A:45:SER:H	1:A:204:GLN:NE2	1.86	0.74
1:A:103:ILE:CB	1:A:106:LYS:NZ	2.52	0.70
1:A:204:GLN:C	2:A:2112:HOH:O	2.27	0.70
1:A:238:SER:H	1:A:241:GLN:HE21	1.38	0.69
1:B:83:SER:HA	1:B:178:MET:HE1	1.74	0.68
1:B:262:THR:O	1:B:263:ARG:HB2	1.95	0.66
1:A:26:LEU:HD23	1:A:27:TRP:CZ3	2.30	0.66
1:B:200:ASP:OD1	1:B:202:ARG:HD3	1.97	0.65
1:A:191:ALA:HB1	1:A:197:TYR:O	1.97	0.64
1:A:204:GLN:N	2:A:2112:HOH:O	2.30	0.64
1:A:14:ILE:O	1:A:214:LYS:HE2	1.98	0.63
1:A:3:PRO:CA	2:A:2001:HOH:O	2.46	0.63
1:B:238:SER:H	1:B:241:GLN:NE2	1.93	0.63
1:B:263:ARG:NH2	2:B:2150:HOH:O	2.33	0.62
1:B:218:CYS:HG	1:B:226:CYS:HG	0.74	0.62
1:B:93:ASP:O	1:B:178:MET:HE1	1.99	0.61
1:A:196:LYS:O	1:A:197:TYR:CB	2.48	0.61
1:A:190:TRP:O	1:A:192:THR:N	2.32	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103:ILE:CG2	1:A:106:LYS:NZ	2.66	0.58
1:B:14:ILE:O	1:B:214:LYS:HE2	2.02	0.58
1:A:3:PRO:HA	2:A:2001:HOH:O	2.01	0.58
1:A:3:PRO:CB	2:A:2001:HOH:O	2.51	0.58
1:A:218:CYS:HG	1:A:226:CYS:HG	0.69	0.57
1:A:103:ILE:HG22	1:A:106:LYS:HZ1	1.70	0.56
1:A:26:LEU:HD23	1:A:27:TRP:HZ3	1.68	0.56
1:A:45:SER:H	1:A:204:GLN:HE21	1.53	0.55
1:B:263:ARG:HD2	2:B:2069:HOH:O	2.07	0.55
1:B:143:ASN:ND2	2:B:2081:HOH:O	2.36	0.55
1:A:52:LYS:HE2	1:A:179:TRP:CE3	2.43	0.54
1:A:45:SER:N	1:A:204:GLN:HE21	2.08	0.52
1:A:44:ASP:HB2	1:A:204:GLN:HG2	1.92	0.52
1:B:83:SER:HA	1:B:178:MET:CE	2.40	0.51
1:B:124:ILE:HG22	2:B:2150:HOH:O	2.11	0.51
1:A:103:ILE:CB	1:A:106:LYS:HZ1	2.20	0.50
1:A:56:ARG:HG2	1:A:179:TRP:CE2	2.47	0.50
1:A:56:ARG:HG3	1:A:179:TRP:CZ2	2.47	0.50
1:A:204:GLN:CB	2:A:2112:HOH:O	2.59	0.50
1:A:196:LYS:HG3	2:A:2108:HOH:O	2.12	0.49
1:A:238:SER:H	1:A:241:GLN:NE2	2.06	0.49
1:B:232:SER:CB	1:B:241:GLN:HE22	2.24	0.49
1:A:85:ASN:HD21	1:A:90:GLY:H	1.60	0.49
1:A:95:ILE:HG13	1:A:178:MET:HE2	1.93	0.49
1:A:103:ILE:CB	1:A:106:LYS:HZ2	2.12	0.48
1:B:59:SER:OG	1:B:228:PRO:HG3	2.13	0.48
1:B:45:SER:H	1:B:204:GLN:NE2	2.11	0.48
1:A:82:LEU:HD12	1:A:95:ILE:HD12	1.97	0.47
1:A:3:PRO:HB3	2:A:2001:HOH:O	2.15	0.47
1:A:196:LYS:HG3	1:A:197:TYR:H	1.80	0.47
1:A:56:ARG:CG	1:A:179:TRP:CE2	2.98	0.46
1:B:68:LEU:HD11	1:B:99:PHE:CD2	2.51	0.46
1:B:92:HIS:H	1:B:92:HIS:CD2	2.32	0.46
1:A:60:GLY:HA2	1:A:228:PRO:HB3	1.97	0.46
1:A:31:HIS:CE1	2:A:2035:HOH:O	2.68	0.45
1:A:205:PRO:HD2	2:A:2112:HOH:O	2.07	0.45
1:B:204:GLN:O	1:B:204:GLN:CG	2.54	0.45
1:A:26:LEU:HD23	1:A:27:TRP:CE3	2.51	0.45
1:B:83:SER:CA	1:B:178:MET:HE1	2.42	0.45
1:A:44:ASP:HB2	1:A:204:GLN:CG	2.46	0.45
1:A:68:LEU:HD11	1:A:99:PHE:CD2	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:201:TYR:O	1:B:204:GLN:HB2	2.17	0.45
1:B:85:ASN:ND2	1:B:90:GLY:H	2.16	0.44
1:A:31:HIS:HA	1:A:42:TRP:CZ2	2.52	0.44
1:A:85:ASN:ND2	1:A:90:GLY:H	2.15	0.44
1:A:232:SER:CB	1:A:241:GLN:HE22	2.30	0.44
1:B:44:ASP:HB2	1:B:204:GLN:NE2	2.31	0.44
1:B:148:TRP:CH2	1:B:178:MET:HG2	2.53	0.44
1:A:191:ALA:HB1	1:A:197:TYR:C	2.36	0.44
1:B:85:ASN:HD21	1:B:90:GLY:H	1.65	0.44
1:A:120:GLY:HA3	1:A:123:ASN:O	2.19	0.43
1:A:204:GLN:O	1:A:205:PRO:O	2.29	0.43
1:B:232:SER:HB2	1:B:241:GLN:HE22	1.82	0.43
1:B:3:PRO:N	2:B:2001:HOH:O	2.51	0.43
1:A:44:ASP:CB	1:A:204:GLN:HG2	2.49	0.42
1:A:102:THR:HG21	1:A:106:LYS:O	2.20	0.42
1:A:258:CYS:HG	1:A:271:CYS:CB	2.25	0.42
1:A:204:GLN:HB3	2:A:2112:HOH:O	2.18	0.41
1:B:36:GLN:HE21	1:B:36:GLN:HB2	1.76	0.41
1:A:196:LYS:CG	1:A:197:TYR:H	2.32	0.41
1:A:92:HIS:H	1:A:92:HIS:CD2	2.38	0.41
1:A:82:LEU:HA	1:A:179:TRP:O	2.21	0.41
1:B:60:GLY:HA2	1:B:228:PRO:HB3	2.03	0.41

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	262/271 (97%)	248 (95%)	10 (4%)	4 (2%)	10	10
1	B	261/271 (96%)	251 (96%)	9 (3%)	1 (0%)	34	42
All	All	523/542 (96%)	499 (95%)	19 (4%)	5 (1%)	15	17

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	191	ALA
1	A	197	TYR
1	A	204	GLN
1	A	263	ARG
1	B	263	ARG

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	233/236 (99%)	215 (92%)	18 (8%)	13	16
1	B	232/236 (98%)	217 (94%)	15 (6%)	17	23
All	All	465/472 (98%)	432 (93%)	33 (7%)	14	19

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

Mol	Chain	Res	Type
1	A	17	LEU
1	A	31	HIS
1	A	39	LEU
1	A	54	ILE
1	A	59	SER
1	A	65	ASN
1	A	76	VAL
1	A	93	ASP
1	A	102	THR
1	A	106	LYS
1	A	119	SER
1	A	189	SER
1	A	196	LYS
1	A	202	ARG
1	A	231	VAL
1	A	236	GLN
1	A	261	PRO
1	A	263	ARG

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Mol	Chain	Res	Type
1	B	17	LEU
1	B	31	HIS
1	B	36	GLN
1	B	39	LEU
1	B	45	SER
1	B	54	ILE
1	B	56	ARG
1	B	76	VAL
1	B	103	ILE
1	B	189	SER
1	B	197	TYR
1	B	230	SER
1	B	231	VAL
1	B	236	GLN
1	B	250	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	ASN
1	A	65	ASN
1	A	85	ASN
1	A	86	GLN
1	A	92	HIS
1	A	143	ASN
1	A	204	GLN
1	A	241	GLN
1	B	36	GLN
1	B	65	ASN
1	B	85	ASN
1	B	86	GLN
1	B	92	HIS
1	B	204	GLN
1	B	241	GLN
1	B	265	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	266/271 (98%)	0.26	13 (4%)	29	36	25, 33, 48, 58	4 (1%)
1	B	265/271 (97%)	0.22	9 (3%)	45	52	27, 33, 48, 58	3 (1%)
All	All	531/542 (97%)	0.24	22 (4%)	37	44	25, 33, 49, 58	7 (1%)

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	192	THR	5.3
1	A	197	TYR	5.1
1	B	122	TYR	4.6
1	A	196	LYS	4.4
1	A	192	THR	3.8
1	B	197	TYR	3.7
1	A	191	ALA	3.6
1	A	234	TYR	3.1
1	B	234	TYR	3.0
1	A	122	TYR	2.8
1	A	190	TRP	2.7
1	B	190	TRP	2.7
1	B	267	LEU	2.7
1	A	267	LEU	2.3
1	A	265	HIS	2.2
1	A	258	CYS	2.2
1	B	265	HIS	2.2
1	A	123	ASN	2.1
1	B	123	ASN	2.1
1	A	105	GLY	2.1
1	B	124	ILE	2.0
1	A	198	LYS	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.