



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 2, 2023 – 12:29 pm GMT

PDB ID : 2VS6
Title : K173A, R174A, K177A-trichosanthin
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Shaw, P.C.; Ng, A.
Deposited on : 2008-04-21
Resolution : 2.40 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) : 1.13
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

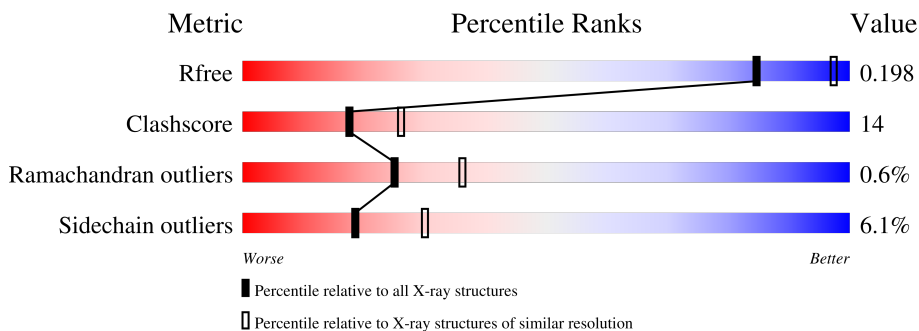
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	248	74% (green), 21% (yellow), 5% (orange), 0% (red), 0% (grey)
1	B	248	76% (green), 21% (yellow), 3% (orange), 0% (red), 0% (grey)

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4184 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 RIBOSOME-INACTIVATING PROTEIN ALPHA-TRICHOSANTHIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	247	1896	1202	320	369	5	0	0	0
1	B	248	1907	1208	324	370	5	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	173	ALA	LYS	engineered mutation	UNP P09989
A	174	ALA	ARG	engineered mutation	UNP P09989
A	177	ALA	LYS	engineered mutation	UNP P09989
B	173	ALA	LYS	engineered mutation	UNP P09989
B	174	ALA	ARG	engineered mutation	UNP P09989
B	177	ALA	LYS	engineered mutation	UNP P09989

- Molecule 2 is water.

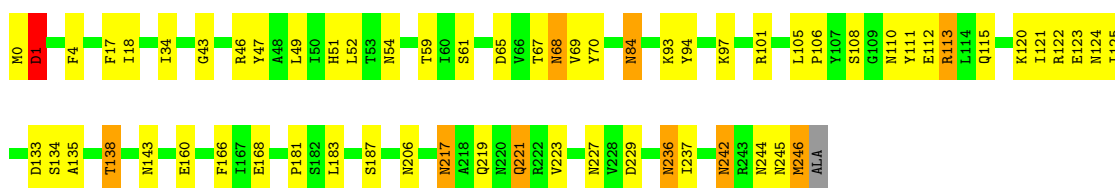
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	215	Total 215	O 215	0	0
2	B	166	Total 166	O 166	0	0

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.

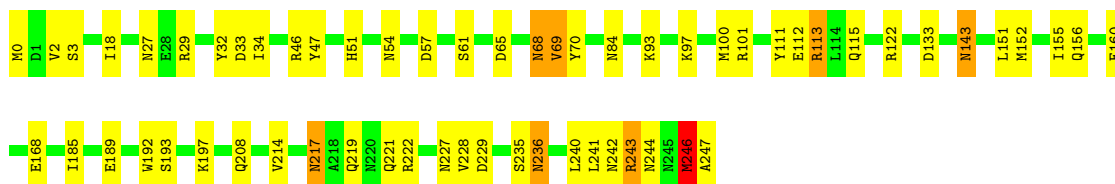
- Molecule 1: RIBOSOME-INACTIVATING PROTEIN ALPHA-TRICHOSANTHIN

Chain A:  74% 21%



- Molecule 1: RIBOSOME-INACTIVATING PROTEIN ALPHA-TRICHOSANTHIN

Chain B:  76% 21%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	70.03Å 95.84Å 101.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 30.54 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.0 (50.00-2.40) 98.8 (30.54-1.90)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.60 (at 1.89Å)	Xtrriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.191 , 0.236 0.195 , 0.198	Depositor DCC
R_{free} test set	2753 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	19.0	Xtrriage
Anisotropy	0.135	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 58.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4184	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.50% 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	9.22	5/1928 (0.3%)	1.22	5/2623 (0.2%)
1	B	0.66	7/1939 (0.4%)	0.68	4/2637 (0.2%)
All	All	6.53	12/3867 (0.3%)	0.99	9/5260 (0.2%)

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	2	1
1	B	1	0
All	All	3	1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	246	MET	C-O	351.49	7.91	1.23
1	A	246	MET	CA-C	200.03	6.73	1.52
1	B	246	MET	C-O	-13.86	0.97	1.23
1	B	0	MET	C-O	-8.40	1.07	1.23
1	B	0	MET	N-CA	-8.17	1.30	1.46
1	A	0	MET	CA-CB	-7.56	1.37	1.53
1	B	246	MET	CB-CG	-6.78	1.29	1.51
1	A	0	MET	C-O	-6.75	1.10	1.23
1	B	246	MET	N-CA	-6.52	1.33	1.46
1	B	246	MET	CA-C	-6.22	1.36	1.52
1	B	0	MET	CA-C	-6.13	1.37	1.52
1	A	0	MET	CB-CG	-5.47	1.33	1.51

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	246	MET	CA-C-O	-50.85	13.32	120.10
1	A	246	MET	N-CA-C	-13.62	74.23	111.00
1	B	0	MET	CG-SD-CE	9.59	115.55	100.20
1	B	246	MET	CB-CG-SD	-7.30	90.49	112.40
1	A	1	ASP	O-C-N	-6.41	112.44	122.70
1	A	246	MET	N-CA-CB	5.83	121.09	110.60
1	B	0	MET	CB-CA-C	5.75	121.89	110.40
1	B	0	MET	CB-CG-SD	5.22	128.06	112.40
1	A	1	ASP	N-CA-CB	5.05	119.68	110.60

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	1	ASP	CA
1	A	246	MET	CA
1	B	246	MET	CA

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1	ASP	Mainchain

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	1896	0	1901	59	0
1	B	1907	0	1917	45	0
2	A	215	0	0	0	0
2	B	166	0	0	2	0
All	All	4184	0	3818	104	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 14.

All (104) 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:68:ASN:HB3	1:A:246:MET:C	1.27	1.49
1:A:245:ASN:ND2	1:A:246:MET:C	1.84	1.28
1:A:246:MET:HA	1:A:246:MET:O	1.39	1.22
1:A:68:ASN:CB	1:A:246:MET:C	2.12	1.15
1:A:120:LYS:HD3	1:A:125:ILE:HD11	1.37	1.07
1:A:246:MET:O	1:A:246:MET:CA	2.06	1.04
1:A:245:ASN:HD21	1:A:246:MET:C	1.59	1.00
1:A:242:ASN:HD22	1:A:244:ASN:H	1.11	0.96
1:A:227:ASN:HD22	1:A:229:ASP:H	1.11	0.94
1:A:245:ASN:HD22	1:A:246:MET:C	1.70	0.91
1:B:242:ASN:HD22	1:B:244:ASN:H	1.21	0.88
1:B:227:ASN:HD22	1:B:229:ASP:H	1.21	0.88
1:B:246:MET:O	1:B:246:MET:HG2	1.73	0.88
1:B:115:GLN:NE2	1:B:122:ARG:H	1.74	0.86
1:A:120:LYS:HD3	1:A:125:ILE:CD1	2.10	0.81
1:B:115:GLN:HE21	1:B:122:ARG:H	1.29	0.80
1:B:217:ASN:ND2	1:B:221:GLN:H	1.80	0.79
1:B:65:ASP:HB3	1:B:68:ASN:HD21	1.46	0.78
1:A:217:ASN:HD21	1:A:221:GLN:HG3	1.55	0.71
1:A:115:GLN:HE21	1:A:122:ARG:H	1.38	0.71
1:A:111:TYR:O	1:A:115:GLN:HG3	1.90	0.71
1:B:227:ASN:ND2	1:B:229:ASP:H	1.89	0.70
1:A:227:ASN:ND2	1:A:229:ASP:HB2	2.08	0.69
1:B:243:ARG:HA	1:B:247:ALA:HA	1.74	0.69
1:A:115:GLN:NE2	1:A:122:ARG:H	1.90	0.68
1:B:93:LYS:O	1:B:97:LYS:HE3	1.94	0.68
1:B:217:ASN:HD21	1:B:221:GLN:H	1.40	0.68
1:A:134:SER:O	1:A:138:THR:HG22	1.97	0.64
1:B:68:ASN:ND2	1:B:70:TYR:H	1.98	0.62
1:A:166:PHE:H	1:A:236:ASN:ND2	1.99	0.61
1:A:227:ASN:ND2	1:A:229:ASP:H	1.91	0.60
1:A:242:ASN:ND2	1:A:244:ASN:H	1.92	0.60
1:A:227:ASN:HD21	1:A:229:ASP:HB2	1.65	0.60
1:A:65:ASP:HB3	1:A:68:ASN:HD21	1.65	0.60
1:B:197:LYS:HD2	1:B:247:ALA:HB1	1.82	0.60
1:A:217:ASN:HD22	1:A:217:ASN:C	2.03	0.59
1:A:217:ASN:HD21	1:A:221:GLN:H	1.52	0.58
1:B:54:ASN:HB2	1:B:133:ASP:OD1	2.04	0.57
1:B:246:MET:O	1:B:246:MET:CG	2.29	0.57
1:B:217:ASN:C	1:B:217:ASN:HD22	2.09	0.56
1:B:65:ASP:HB3	1:B:68:ASN:ND2	2.20	0.56
1:B:112:GLU:OE1	1:B:113:ARG:NE	2.38	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:18:ILE:HG13	1:B:168:GLU:HG3	1.87	0.56
1:A:166:PHE:H	1:A:236:ASN:HD21	1.53	0.55
1:A:217:ASN:ND2	1:A:221:GLN:H	2.06	0.54
1:A:108:SER:OG	1:A:113:ARG:HG2	2.06	0.53
1:A:68:ASN:HD22	1:A:68:ASN:C	2.12	0.52
1:A:110:ASN:ND2	1:A:112:GLU:HB3	2.24	0.52
1:B:100:MET:O	1:B:101:ARG:HD2	2.10	0.51
1:A:68:ASN:ND2	1:A:70:TYR:H	2.08	0.50
1:A:1:ASP:OD1	1:A:49:LEU:N	2.38	0.50
1:A:54:ASN:HB2	1:A:133:ASP:OD1	2.14	0.48
1:A:242:ASN:HD22	1:A:244:ASN:N	1.95	0.48
1:B:217:ASN:ND2	1:B:219:GLN:H	2.11	0.48
1:A:68:ASN:HD22	1:A:69:VAL:N	2.12	0.48
1:A:217:ASN:ND2	1:A:221:GLN:HG3	2.28	0.48
1:A:227:ASN:HD22	1:A:229:ASP:N	1.94	0.48
1:A:123:GLU:HA	1:A:181:PRO:HG2	1.96	0.47
1:B:68:ASN:C	1:B:68:ASN:HD22	2.16	0.47
1:B:227:ASN:ND2	1:B:229:ASP:HB2	2.29	0.47
1:B:214:VAL:HG11	1:B:222:ARG:NH2	2.29	0.47
1:B:97:LYS:NZ	2:B:2071:HOH:O	2.47	0.47
1:B:68:ASN:HD22	1:B:69:VAL:N	2.13	0.47
1:A:51:HIS:HD2	1:A:61:SER:OG	1.98	0.47
1:A:120:LYS:CD	1:A:125:ILE:HD11	2.27	0.46
1:A:93:LYS:O	1:A:97:LYS:HD3	2.15	0.46
1:B:32:TYR:CE2	1:B:228:VAL:HG11	2.50	0.46
1:B:192:TRP:CH2	1:B:241:LEU:HB2	2.51	0.46
1:B:242:ASN:ND2	1:B:244:ASN:H	2.01	0.46
1:B:27:ASN:N	1:B:27:ASN:HD22	2.13	0.45
1:B:143:ASN:ND2	2:B:2106:HOH:O	2.49	0.45
1:A:68:ASN:CA	1:A:246:MET:C	2.81	0.45
1:B:185:ILE:O	1:B:189:GLU:HG3	2.16	0.45
1:A:217:ASN:C	1:A:217:ASN:ND2	2.70	0.45
1:B:51:HIS:HD2	1:B:61:SER:OG	2.00	0.45
1:B:160:GLU:OE1	1:B:160:GLU:HA	2.17	0.45
1:B:151:LEU:O	1:B:155:ILE:HG13	2.16	0.45
1:A:43:GLY:HA3	1:A:94:TYR:CZ	2.53	0.44
1:A:237:ILE:O	1:A:237:ILE:HG23	2.17	0.44
1:A:4:PHE:HB2	1:A:17:PHE:CG	2.53	0.44
1:A:67:THR:C	1:A:246:MET:C	2.76	0.44
1:B:46:ARG:HD2	1:B:47:TYR:CZ	2.53	0.44
1:B:2:VAL:CG1	1:B:3:SER:N	2.81	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:236:ASN:C	1:B:236:ASN:HD22	2.21	0.44
1:B:111:TYR:O	1:B:115:GLN:HG3	2.18	0.43
1:B:246:MET:O	1:B:247:ALA:HB2	2.18	0.43
1:A:68:ASN:CG	1:A:246:MET:C	2.76	0.43
1:A:217:ASN:ND2	1:A:219:GLN:H	2.16	0.43
1:A:113:ARG:N	1:A:113:ARG:HD2	2.34	0.43
1:A:18:ILE:HG13	1:A:168:GLU:HG3	2.01	0.43
1:A:84:ASN:HB2	1:A:105:LEU:O	2.19	0.42
1:A:121:ILE:HG13	1:A:123:GLU:HG2	2.01	0.42
1:B:222:ARG:NH1	1:B:222:ARG:HB3	2.34	0.42
1:A:34:ILE:HD13	1:A:237:ILE:HG23	2.01	0.42
1:A:183:LEU:O	1:A:187:SER:HB2	2.18	0.42
1:B:34:ILE:HG22	1:B:240:LEU:HG	2.01	0.42
1:A:46:ARG:HD2	1:A:47:TYR:CZ	2.55	0.41
1:B:152:MET:O	1:B:156:GLN:HG3	2.20	0.41
1:A:52:LEU:O	1:A:59:THR:HG23	2.22	0.40
1:A:135:ALA:O	1:A:138:THR:HG23	2.21	0.40
1:B:32:TYR:O	1:B:33:ASP:HB2	2.21	0.40
1:A:105:LEU:HA	1:A:106:PRO:HD3	1.89	0.40
1:A:160:GLU:HA	1:A:160:GLU:OE1	2.21	0.40
1:B:68:ASN:HD22	1:B:70:TYR:H	1.67	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	245/248 (99%)	235 (96%)	10 (4%)	0	100	100
1	B	246/248 (99%)	238 (97%)	5 (2%)	3 (1%)	13	19
All	All	491/496 (99%)	473 (96%)	15 (3%)	3 (1%)	25	36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	246	MET
1	B	29	ARG
1	B	69	VAL

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	205/206 (100%)	192 (94%)	13 (6%)	18	28
1	B	206/206 (100%)	194 (94%)	12 (6%)	20	32
All	All	411/412 (100%)	386 (94%)	25 (6%)	18	30

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	68	ASN
1	A	84	ASN
1	A	101	ARG
1	A	113	ARG
1	A	124	ASN
1	A	138	THR
1	A	143	ASN
1	A	206	ASN
1	A	217	ASN
1	A	221	GLN
1	A	223	VAL
1	A	236	ASN
1	A	242	ASN
1	B	57	ASP
1	B	68	ASN
1	B	84	ASN
1	B	113	ARG
1	B	143	ASN
1	B	193	SER
1	B	208	GLN

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Mol	Chain	Res	Type
1	B	217	ASN
1	B	235	SER
1	B	236	ASN
1	B	243	ARG
1	B	246	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (36) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	ASN
1	A	51	HIS
1	A	68	ASN
1	A	84	ASN
1	A	115	GLN
1	A	124	ASN
1	A	143	ASN
1	A	145	ASN
1	A	156	GLN
1	A	206	ASN
1	A	217	ASN
1	A	220	ASN
1	A	221	GLN
1	A	227	ASN
1	A	236	ASN
1	A	242	ASN
1	A	244	ASN
1	A	245	ASN
1	B	20	ASN
1	B	27	ASN
1	B	51	HIS
1	B	68	ASN
1	B	84	ASN
1	B	110	ASN
1	B	115	GLN
1	B	124	ASN
1	B	143	ASN
1	B	145	ASN
1	B	156	GLN
1	B	170	GLN
1	B	217	ASN
1	B	221	GLN
1	B	227	ASN

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Mol	Chain	Res	Type
1	B	236	ASN
1	B	242	ASN
1	B	244	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

6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.