



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 04:23 AM UTC

PDB ID : 1TGN / pdb_00001tgn
Title : STRUCTURE OF BOVINE TRYPSINOGEN AT 1.9 ANGSTROMS RESOLUTION
Authors : Kossiakoff, A.A.; Stroud, R.M.
Deposited on : 1979-09-19
Resolution : 1.65 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 : 4-5-2 with Phenix2.0
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

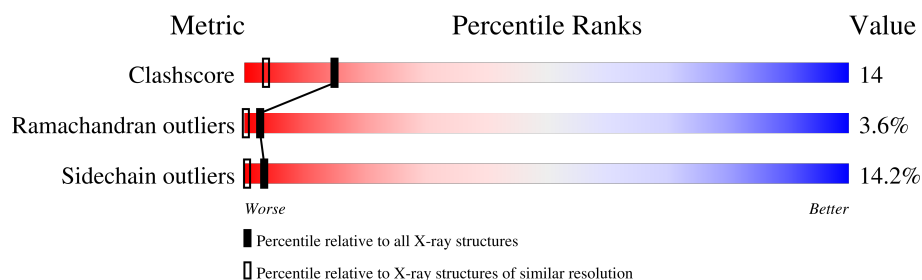
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 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	190562	2662 (1.66-1.66)
Ramachandran outliers	187476	2621 (1.66-1.66)
Sidechain outliers	187428	2621 (1.66-1.66)

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	229	<div> <div></div> <div>55%</div> <div>28%</div> <div>10%</div> <div>5%</div> <div></div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 1621 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 TRYPSINOGEN.

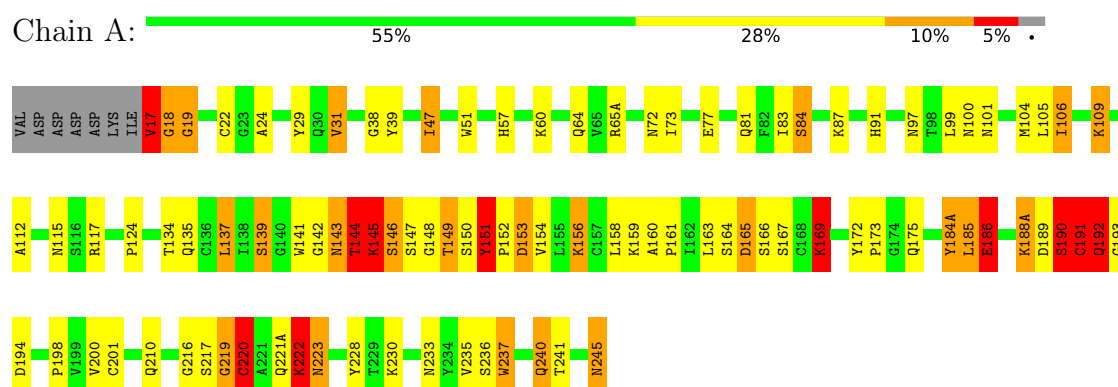
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	222	1621	1006	278	323	14	0	0	0

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: TRYPSINOGEN



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	55.15Å 55.15Å 109.30Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	(Not available) – 1.65	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-1.65)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	unknown	Depositor
R, R_{free}	(Not available) , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1621	wwPDB-VP
Average B, all atoms (Å ²)	11.0	wwPDB-VP

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	1.66	16/1652 (1.0%)	2.58	131/2239 (5.9%)

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	1	3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	220	CYS	CA-CB	18.67	1.85	1.53
1	A	151	TYR	CA-CB	10.19	1.67	1.53
1	A	184(A)	TYR	CA-C	-8.00	1.43	1.52
1	A	151	TYR	CB-CG	7.28	1.67	1.51
1	A	144	THR	CA-CB	7.12	1.65	1.53
1	A	184(A)	TYR	C-N	-6.88	1.24	1.33
1	A	57	HIS	ND1-CE1	-6.09	1.26	1.32
1	A	146	SER	CA-C	5.93	1.60	1.52
1	A	237	TRP	NE1-CE2	-5.83	1.31	1.37
1	A	134	THR	C-N	-5.60	1.25	1.33
1	A	57	HIS	CE1-NE2	-5.57	1.26	1.32
1	A	188(A)	LYS	CA-C	5.53	1.59	1.52
1	A	47	ILE	N-CA	5.52	1.53	1.46
1	A	144	THR	N-CA	5.41	1.53	1.46
1	A	193	GLY	CA-C	5.23	1.59	1.51
1	A	51	TRP	NE1-CE2	-5.06	1.31	1.37

All (131) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	151	TYR	CB-CA-C	17.36	132.82	108.68
1	A	100	ASN	OD1-CG-ND2	-15.27	107.33	122.60
1	A	117	ARG	NE-CZ-NH1	-13.20	108.30	121.50
1	A	152	PRO	N-CA-C	-12.14	98.32	113.98
1	A	81	GLN	OE1-CD-NE2	-12.07	110.53	122.60
1	A	151	TYR	CB-CG-CD2	11.81	138.52	120.80
1	A	220	CYS	O-C-N	-11.79	106.59	121.92
1	A	150	SER	CB-CA-C	11.00	132.31	110.42
1	A	190	SER	CA-C-N	10.96	142.48	121.54
1	A	190	SER	C-N-CA	10.96	142.48	121.54
1	A	144	THR	CA-CB-CG2	10.90	129.03	110.50
1	A	192	GLN	OE1-CD-NE2	-9.96	112.64	122.60
1	A	186	GLU	N-CA-C	9.80	124.97	109.39
1	A	184(A)	TYR	CA-C-N	-9.60	104.68	120.71
1	A	184(A)	TYR	C-N-CA	-9.60	104.68	120.71
1	A	17	VAL	CA-CB-CG2	9.51	126.56	110.40
1	A	188(A)	LYS	O-C-N	-9.14	112.50	123.29
1	A	117	ARG	NE-CZ-NH2	9.02	127.32	119.20
1	A	47	ILE	CA-CB-CG2	9.00	125.80	110.50
1	A	135	GLN	CB-CG-CD	-8.83	97.58	112.60
1	A	222	LYS	O-C-N	-8.72	110.99	122.59
1	A	145	LYS	O-C-N	8.71	134.18	122.59
1	A	188(A)	LYS	N-CA-CB	-8.66	96.98	110.57
1	A	101	ASN	OD1-CG-ND2	-8.52	114.08	122.60
1	A	216	GLY	O-C-N	-7.91	115.29	124.15
1	A	65(A)	ARG	NE-CZ-NH1	-7.89	113.61	121.50
1	A	100	ASN	CB-CG-ND2	7.89	128.23	116.40
1	A	245	ASN	OD1-CG-ND2	-7.82	114.78	122.60
1	A	210	GLN	OE1-CD-NE2	-7.67	114.93	122.60
1	A	115	ASN	O-C-N	-7.59	113.99	122.72
1	A	149	THR	CA-C-N	-7.57	107.08	121.54
1	A	149	THR	C-N-CA	-7.57	107.08	121.54
1	A	223	ASN	O-C-N	-7.53	112.58	122.59
1	A	220	CYS	CA-CB-SG	-7.38	97.42	114.40
1	A	149	THR	N-CA-CB	7.37	122.94	110.49
1	A	144	THR	O-C-N	7.32	132.33	122.59
1	A	142	GLY	O-C-N	-7.30	113.21	122.70
1	A	169	LYS	N-CA-C	7.15	119.15	111.36
1	A	151	TYR	CG-CD1-CE1	7.12	131.88	121.20
1	A	151	TYR	CB-CG-CD1	-7.09	110.16	120.80
1	A	192	GLN	CG-CD-NE2	7.02	126.94	116.40
1	A	169	LYS	CB-CA-C	-7.02	98.92	110.85
1	A	222	LYS	CA-C-N	6.82	134.57	121.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	222	LYS	C-N-CA	6.82	134.57	121.54
1	A	22	CYS	N-CA-C	6.76	118.72	111.36
1	A	135	GLN	OE1-CD-NE2	6.69	129.29	122.60
1	A	173	PRO	O-C-N	-6.67	114.71	122.85
1	A	198	PRO	CB-CA-C	-6.58	101.21	110.63
1	A	190	SER	N-CA-CB	-6.57	99.39	110.49
1	A	192	GLN	O-C-N	-6.54	113.89	122.59
1	A	141	TRP	CA-C-N	-6.53	108.62	121.41
1	A	141	TRP	C-N-CA	-6.53	108.62	121.41
1	A	106	ILE	CB-CA-C	-6.47	101.68	110.42
1	A	135	GLN	N-CA-CB	-6.45	99.52	110.16
1	A	135	GLN	CA-CB-CG	-6.41	101.29	114.10
1	A	167	SER	CB-CA-C	-6.37	100.22	110.79
1	A	65(A)	ARG	NH1-CZ-NH2	6.35	127.56	119.30
1	A	223	ASN	OD1-CG-ND2	-6.33	116.27	122.60
1	A	60	LYS	N-CA-CB	-6.32	101.96	111.56
1	A	236	SER	CB-CA-C	6.31	120.79	110.88
1	A	184(A)	TYR	CA-CB-CG	-6.27	102.61	113.90
1	A	84	SER	CA-CB-OG	-6.27	98.56	111.10
1	A	124	PRO	N-CA-CB	6.25	109.14	103.33
1	A	24	ALA	CB-CA-C	-6.17	99.48	109.72
1	A	186	GLU	OE1-CD-OE2	-6.15	108.13	122.90
1	A	150	SER	CA-C-O	-6.14	111.73	120.51
1	A	194	ASP	CA-CB-CG	6.07	118.67	112.60
1	A	124	PRO	CB-CA-C	-6.03	103.08	110.98
1	A	185	LEU	CA-C-N	-5.94	113.08	122.23
1	A	185	LEU	C-N-CA	-5.94	113.08	122.23
1	A	38	GLY	CA-C-O	5.91	124.70	119.56
1	A	217	SER	CA-CB-OG	5.90	122.90	111.10
1	A	165	ASP	CB-CA-C	5.86	120.19	110.81
1	A	151	TYR	CA-C-O	-5.86	114.74	120.19
1	A	190	SER	CB-CA-C	5.82	122.01	110.42
1	A	240	GLN	CA-CB-CG	5.78	125.65	114.10
1	A	184(A)	TYR	N-CA-C	-5.76	99.52	108.90
1	A	222	LYS	CA-CB-CG	5.75	125.60	114.10
1	A	112	ALA	CA-C-N	5.75	130.62	121.66
1	A	112	ALA	C-N-CA	5.75	130.62	121.66
1	A	144	THR	CA-C-N	5.74	132.50	121.54
1	A	144	THR	C-N-CA	5.74	132.50	121.54
1	A	223	ASN	CB-CG-ND2	5.74	125.00	116.40
1	A	47	ILE	N-CA-CB	-5.73	101.77	111.23
1	A	192	GLN	CA-CB-CG	5.70	125.50	114.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	165	ASP	OD1-CG-OD2	-5.70	109.23	122.90
1	A	220	CYS	CB-CA-C	5.69	119.83	110.83
1	A	72	ASN	CA-CB-CG	5.69	118.29	112.60
1	A	159	LYS	CG-CD-CE	5.69	124.38	111.30
1	A	143	ASN	CB-CG-ND2	5.67	124.90	116.40
1	A	188(A)	LYS	CB-CG-CD	5.66	124.32	111.30
1	A	190	SER	CA-CB-OG	5.63	122.36	111.10
1	A	222	LYS	N-CA-CB	-5.61	101.00	110.49
1	A	172	TYR	CA-C-N	5.55	125.86	119.93
1	A	172	TYR	C-N-CA	5.55	125.86	119.93
1	A	193	GLY	CA-C-N	5.50	132.34	122.38
1	A	193	GLY	C-N-CA	5.50	132.34	122.38
1	A	189	ASP	O-C-N	-5.50	115.27	122.59
1	A	175	GLN	N-CA-C	5.49	120.25	113.50
1	A	81	GLN	CG-CD-NE2	5.48	124.62	116.40
1	A	97	ASN	CB-CG-ND2	5.48	124.62	116.40
1	A	189	ASP	CA-C-O	5.42	128.26	120.51
1	A	152	PRO	N-CA-CB	5.41	108.66	103.52
1	A	219	GLY	CA-C-N	-5.39	114.48	122.56
1	A	219	GLY	C-N-CA	-5.39	114.48	122.56
1	A	137	LEU	O-C-N	5.38	129.51	123.27
1	A	17	VAL	CG1-CB-CG2	-5.37	98.99	110.80
1	A	139	SER	CA-CB-OG	-5.34	100.42	111.10
1	A	83	ILE	O-C-N	-5.29	117.49	123.20
1	A	188(A)	LYS	CD-CE-NZ	5.28	128.79	111.90
1	A	143	ASN	CB-CA-C	-5.28	100.22	110.46
1	A	144	THR	N-CA-CB	5.26	119.38	110.49
1	A	184(A)	TYR	CB-CG-CD1	-5.24	112.95	120.80
1	A	77	GLU	CB-CG-CD	5.23	121.49	112.60
1	A	220	CYS	N-CA-C	5.22	119.28	112.13
1	A	18	GLY	O-C-N	5.21	129.47	122.70
1	A	31	VAL	CA-CB-CG2	5.18	119.21	110.40
1	A	145	LYS	CA-C-O	-5.16	113.13	120.51
1	A	91	HIS	O-C-N	-5.14	116.72	121.30
1	A	230	LYS	CA-CB-CG	-5.13	103.84	114.10
1	A	146	SER	CA-C-N	5.13	130.79	122.07
1	A	146	SER	C-N-CA	5.13	130.79	122.07
1	A	134	THR	CA-C-O	5.12	127.14	121.56
1	A	235	VAL	CG1-CB-CG2	-5.12	99.54	110.80
1	A	233	ASN	OD1-CG-ND2	-5.11	117.49	122.60
1	A	185	LEU	N-CA-CB	-5.07	102.63	110.13
1	A	161	PRO	N-CA-CB	5.04	107.98	103.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	64	GLN	CG-CD-NE2	5.03	123.94	116.40
1	A	60	LYS	CB-CA-C	5.02	118.86	110.43
1	A	135	GLN	N-CA-C	5.02	117.79	109.46
1	A	236	SER	N-CA-CB	-5.00	102.75	110.01

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	151	TYR	CA

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	151	TYR	Sidechain
1	A	228	TYR	Sidechain
1	A	39	TYR	Sidechain

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	1621	0	1579	44	0
All	All	1621	0	1579	44	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 (44) 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:220:CYS:CA	1:A:220:CYS:CB	1.85	1.52
1:A:18:GLY:HA2	1:A:188(A):LYS:HG3	1.68	0.74
1:A:19:GLY:HA2	1:A:188(A):LYS:HE2	1.70	0.73
1:A:151:TYR:O	1:A:156:LYS:HE3	1.89	0.72
1:A:220:CYS:CA	1:A:220:CYS:SG	2.77	0.72
1:A:18:GLY:CA	1:A:188(A):LYS:HG3	2.26	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:105:LEU:CD1	1:A:241:THR:HG21	2.26	0.65
1:A:220:CYS:SG	1:A:220:CYS:N	2.72	0.63
1:A:105:LEU:CD1	1:A:241:THR:CG2	2.77	0.62
1:A:18:GLY:C	1:A:188(A):LYS:HE3	2.25	0.62
1:A:190:SER:O	1:A:220:CYS:HB3	2.01	0.60
1:A:151:TYR:C	1:A:153:ASP:N	2.60	0.58
1:A:19:GLY:HA2	1:A:188(A):LYS:CE	2.33	0.58
1:A:165:ASP:CG	1:A:169:LYS:HE2	2.30	0.57
1:A:219:GLY:HA3	1:A:221(A):GLN:HG3	1.87	0.56
1:A:105:LEU:HD12	1:A:241:THR:HG21	1.88	0.56
1:A:237:TRP:O	1:A:241:THR:HG22	2.06	0.55
1:A:104:MET:HE3	1:A:106:ILE:HD11	1.87	0.55
1:A:143:ASN:O	1:A:144:THR:HB	2.05	0.55
1:A:87:LYS:HE2	1:A:245:ASN:HD22	1.72	0.54
1:A:143:ASN:HB2	1:A:145:LYS:HG2	1.91	0.52
1:A:18:GLY:HA2	1:A:188(A):LYS:CG	2.38	0.52
1:A:144:THR:CG2	1:A:145:LYS:N	2.73	0.51
1:A:18:GLY:O	1:A:188(A):LYS:HE3	2.11	0.50
1:A:151:TYR:C	1:A:153:ASP:H	2.21	0.49
1:A:29:TYR:CZ	1:A:200:VAL:HG21	2.47	0.49
1:A:185:LEU:HB3	1:A:186:GLU:OE1	2.12	0.49
1:A:158:LEU:CD2	1:A:160:ALA:HB2	2.43	0.49
1:A:84:SER:OG	1:A:109:LYS:CE	2.62	0.48
1:A:18:GLY:CA	1:A:188(A):LYS:CG	2.90	0.48
1:A:165:ASP:OD1	1:A:169:LYS:HE2	2.13	0.48
1:A:151:TYR:H	1:A:154:VAL:HG22	1.79	0.46
1:A:156:LYS:N	1:A:156:LYS:HD2	2.30	0.46
1:A:165:ASP:OD2	1:A:169:LYS:HE2	2.16	0.46
1:A:105:LEU:HD11	1:A:241:THR:CG2	2.45	0.46
1:A:18:GLY:C	1:A:188(A):LYS:HG3	2.41	0.45
1:A:84:SER:OG	1:A:109:LYS:HE3	2.15	0.45
1:A:105:LEU:CD1	1:A:241:THR:HG23	2.45	0.44
1:A:143:ASN:O	1:A:191:CYS:HB3	2.17	0.43
1:A:186:GLU:OE1	1:A:223:ASN:HB3	2.18	0.43
1:A:105:LEU:HD11	1:A:241:THR:HG21	1.99	0.41
1:A:18:GLY:HA2	1:A:188(A):LYS:HA	2.02	0.41
1:A:184(A):TYR:CE1	1:A:188(A):LYS:HB3	2.55	0.41
1:A:17:VAL:CB	1:A:145:LYS:NZ	2.84	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	220/229 (96%)	196 (89%)	16 (7%)	8 (4%)	2 0

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	144	THR
1	A	146	SER
1	A	191	CYS
1	A	192	GLN
1	A	145	LYS
1	A	19	GLY
1	A	222	LYS
1	A	148	GLY

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	183/190 (96%)	157 (86%)	26 (14%)	3 0

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	VAL
1	A	31	VAL
1	A	47	ILE

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Mol	Chain	Res	Type
1	A	73	ILE
1	A	99	LEU
1	A	109	LYS
1	A	137	LEU
1	A	139	SER
1	A	144	THR
1	A	145	LYS
1	A	147	SER
1	A	149	THR
1	A	153	ASP
1	A	156	LYS
1	A	163	LEU
1	A	164	SER
1	A	166	SER
1	A	169	LYS
1	A	186	GLU
1	A	190	SER
1	A	191	CYS
1	A	192	GLN
1	A	201	CYS
1	A	220	CYS
1	A	222	LYS
1	A	240	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	ASN
1	A	79	ASN
1	A	100	ASN
1	A	233	ASN
1	A	245	ASN

5.3.3 RNA ⓘ

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 [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.

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.