



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 27, 2024 – 01:04 PM EST

PDB ID : 1BGW  
Title : TOPOISOMERASE RESIDUES 410-1202,  
Authors : Berger, J.M.; Gamblin, S.J.; Harrison, S.C.; Wang, J.C.  
Deposited on : 1996-02-20  
Resolution : 2.70 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](mailto: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>.

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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

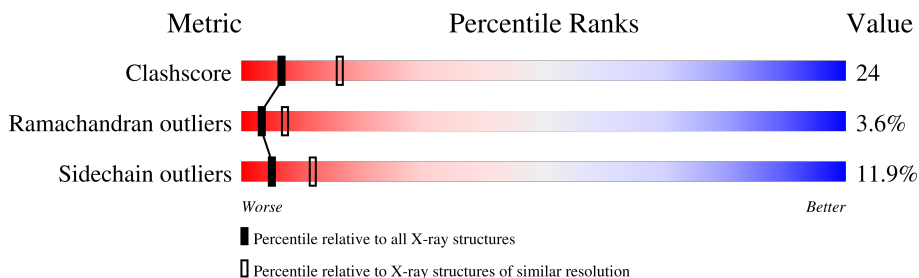
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)

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  $\geq 3$ , 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	793	 49%      28%      8%      14%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7125 atoms, of which 1459 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 TOPOISOMERASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	680	6825	3587	1259	938	1021	20	0	1	1

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	548	LEU	PRO	conflict	UNP P06786

- Molecule 2 is water.

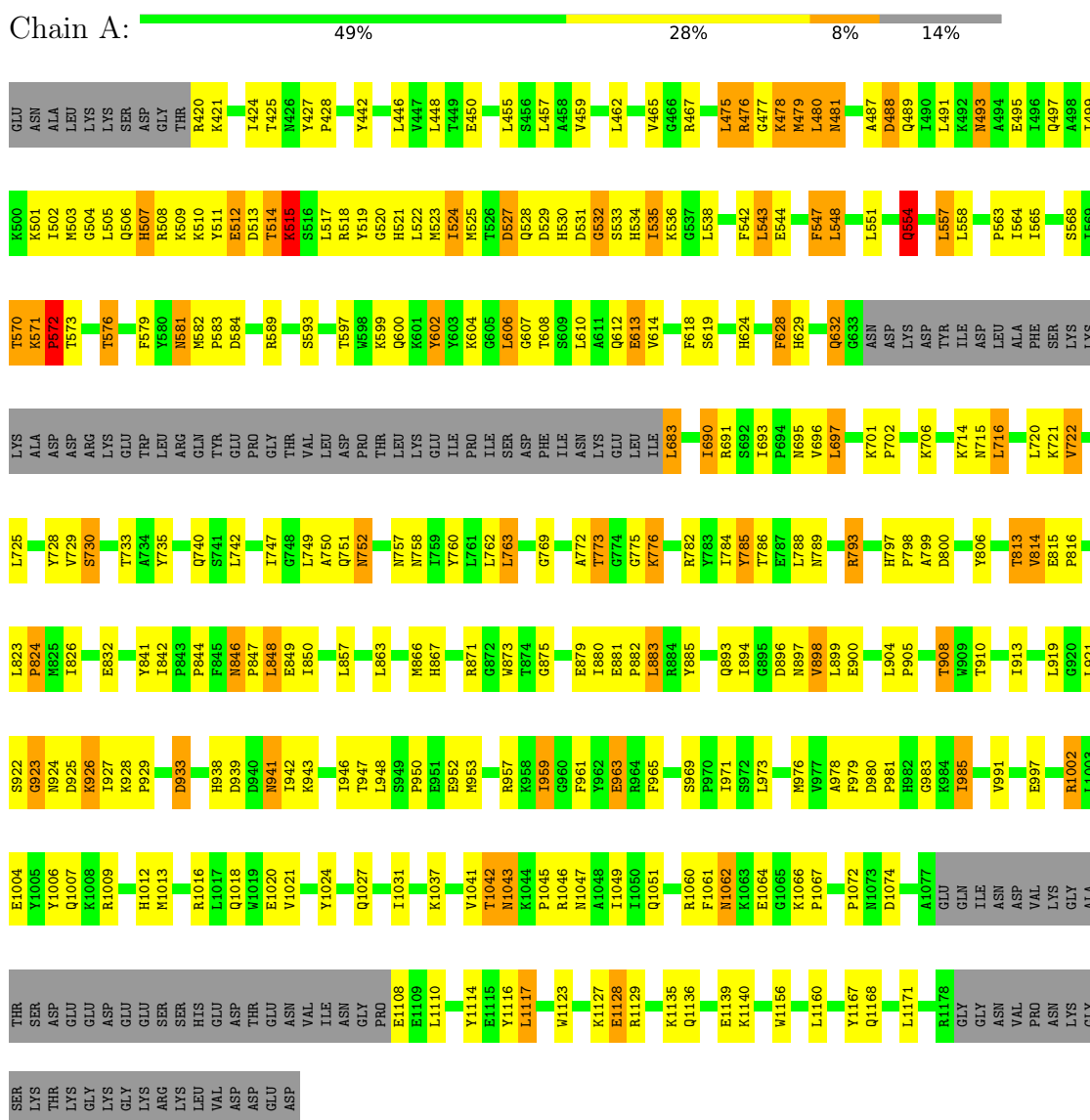
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	H	O		
2	A	100	300	200	100	0	0

### 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. 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: TOPOISOMERASE



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	154.10Å 154.10Å 127.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	14.00 – 2.70	Depositor
% Data completeness (in resolution range)	99.3 (14.00-2.70)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.220 , 0.277	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	7125	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	54.0	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	2.57	2/5694 (0.0%)	1.14	10/7675 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	683[A]	LEU	CB-CG	132.96	5.38	1.52
1	A	683[B]	LEU	CB-CG	132.96	5.38	1.52

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	683[A]	LEU	CB-CG-CD1	36.72	173.42	111.00
1	A	683[B]	LEU	CB-CG-CD1	36.72	173.42	111.00
1	A	683[A]	LEU	CB-CG-CD2	-27.02	65.07	111.00
1	A	683[B]	LEU	CB-CG-CD2	-27.02	65.07	111.00
1	A	683[A]	LEU	CA-CB-CG	-9.81	92.74	115.30
1	A	683[B]	LEU	CA-CB-CG	-9.81	92.74	115.30
1	A	475	LEU	N-CA-C	-6.06	94.64	111.00
1	A	1072	PRO	N-CA-CB	5.86	110.33	103.30
1	A	762	LEU	N-CA-C	5.86	126.81	111.00
1	A	813	THR	N-CA-CB	5.50	120.75	110.30

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	5566	1259	5576	263	0
2	A	100	200	0	12	0
All	All	5666	1459	5576	263	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 24.

All (263) 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:572:PRO:HD2	2:A:8:HOH:O	1.54	1.05
1:A:548:LEU:HD13	1:A:548:LEU:H	1.24	0.99
1:A:554:GLN:HB2	1:A:782:ARG:HH22	1.27	0.96
1:A:797:HIS:HD2	1:A:799:ALA:H	1.14	0.94
1:A:632:GLN:HE21	1:A:632:GLN:HA	1.31	0.93
1:A:476:ARG:HG2	1:A:477:GLY:H	1.36	0.91
1:A:1041:VAL:HG12	1:A:1049:ILE:HD11	1.52	0.90
1:A:832:GLU:HG2	1:A:841:TYR:HD1	1.41	0.85
1:A:1024:TYR:HE2	1:A:1136:GLN:HE21	1.25	0.84
1:A:442:TYR:HB2	1:A:514:THR:HG22	1.57	0.84
1:A:548:LEU:H	1:A:548:LEU:CD1	1.92	0.83
1:A:923:GLY:H	1:A:929:PRO:HB3	1.44	0.81
1:A:883:LEU:HD13	1:A:973:LEU:HB2	1.63	0.80
1:A:442:TYR:HB2	1:A:514:THR:CG2	2.11	0.79
1:A:797:HIS:CD2	1:A:799:ALA:H	2.00	0.79
1:A:632:GLN:HA	1:A:632:GLN:NE2	1.94	0.79
1:A:1062:ASN:HD21	1:A:1066:LYS:H	1.29	0.78
1:A:733:THR:HA	1:A:814:VAL:HG13	1.64	0.77
1:A:763:LEU:O	1:A:786:THR:HG22	1.84	0.77
1:A:957:ARG:HG2	1:A:961:PHE:HE1	1.50	0.77
1:A:521:HIS:HE1	1:A:629:HIS:HE1	1.32	0.76
1:A:503:MET:HE3	1:A:519:TYR:HB2	1.66	0.76
1:A:442:TYR:O	1:A:520:GLY:HA3	1.86	0.75
1:A:921:LEU:HD11	1:A:933:ASP:HA	1.68	0.75
1:A:1060:ARG:NH1	1:A:1114:TYR:CE2	2.55	0.75
1:A:882:PRO:O	1:A:883:LEU:HB2	1.86	0.74
1:A:832:GLU:HG2	1:A:841:TYR:CD1	2.25	0.71
1:A:1046:ARG:O	1:A:1049:ILE:HG22	1.91	0.71
1:A:758:ASN:ND2	1:A:844:PRO:HB3	2.05	0.71
1:A:504:GLY:O	1:A:517:LEU:HD23	1.91	0.71
1:A:521:HIS:HE1	1:A:629:HIS:CE1	2.08	0.71
1:A:476:ARG:CG	1:A:477:GLY:H	2.04	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:897:ASN:HD21	1:A:950:PRO:HA	1.56	0.70
1:A:427:TYR:HE2	1:A:501:LYS:HD2	1.55	0.70
1:A:527:ASP:O	1:A:528:GLN:HG2	1.92	0.70
1:A:612:GLN:HA	1:A:612:GLN:OE1	1.93	0.69
1:A:763:LEU:N	2:A:45:HOH:O	2.24	0.69
1:A:750:ALA:HA	2:A:45:HOH:O	1.92	0.69
1:A:898:VAL:HG13	1:A:947:THR:HG23	1.75	0.69
1:A:773:THR:O	1:A:776:LYS:HE2	1.92	0.68
1:A:846:ASN:HB3	1:A:849:GLU:HG2	1.76	0.68
1:A:543:LEU:HB3	1:A:551:LEU:HD22	1.76	0.67
1:A:450:GLU:HB2	1:A:535:ILE:HD12	1.76	0.67
1:A:554:GLN:HB2	1:A:782:ARG:NH2	2.06	0.67
1:A:1062:ASN:ND2	1:A:1066:LYS:H	1.93	0.67
1:A:564:ILE:HG22	1:A:565:ILE:HG13	1.77	0.66
1:A:814:VAL:HG12	1:A:815:GLU:H	1.59	0.66
1:A:757:ASN:O	1:A:871:ARG:NH1	2.28	0.66
1:A:923:GLY:N	1:A:929:PRO:HB3	2.11	0.65
1:A:582:MET:N	1:A:583:PRO:HD2	2.11	0.65
1:A:1041:VAL:CG1	1:A:1049:ILE:HD11	2.24	0.65
1:A:760:TYR:HB2	2:A:45:HOH:O	1.97	0.64
1:A:695:ASN:ND2	1:A:696:VAL:O	2.30	0.64
1:A:457:LEU:HD22	1:A:614:VAL:HG21	1.80	0.63
1:A:521:HIS:CE1	1:A:629:HIS:HE1	2.15	0.62
1:A:849:GLU:C	1:A:866:MET:HE2	2.20	0.62
1:A:544:GLU:HA	1:A:548:LEU:HB3	1.82	0.61
1:A:628:PHE:HD1	1:A:628:PHE:O	1.82	0.61
1:A:971:ILE:HA	2:A:82:HOH:O	1.99	0.61
1:A:455:LEU:O	1:A:459:VAL:HG23	2.01	0.61
1:A:476:ARG:HG2	1:A:477:GLY:N	2.13	0.61
1:A:457:LEU:HD22	1:A:614:VAL:CG2	2.31	0.61
1:A:531:ASP:O	1:A:533:SER:N	2.34	0.60
1:A:797:HIS:HD2	1:A:799:ALA:N	1.92	0.60
1:A:772:ALA:HA	1:A:910:THR:HB	1.82	0.60
1:A:716:LEU:HD21	1:A:720:LEU:HD21	1.84	0.60
1:A:752:ASN:HB2	1:A:760:TYR:CE1	2.37	0.60
1:A:487:ALA:O	1:A:488:ASP:HB2	2.00	0.60
1:A:846:ASN:HD22	1:A:847:PRO:N	2.01	0.59
1:A:581:ASN:ND2	1:A:584:ASP:HB2	2.18	0.59
1:A:570:THR:O	1:A:571:LYS:HB2	2.02	0.58
1:A:515:LYS:N	2:A:5:HOH:O	2.35	0.58
1:A:730:SER:OG	1:A:735:TYR:HB3	2.03	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:980:ASP:HB2	1:A:981:PRO:HD2	1.85	0.58
1:A:505:LEU:HD23	1:A:517:LEU:HD22	1.85	0.57
1:A:530:HIS:CD2	1:A:532:GLY:HA3	2.39	0.57
1:A:850:ILE:N	1:A:866:MET:HE2	2.19	0.57
1:A:938:HIS:CD2	1:A:943:LYS:H	2.23	0.57
1:A:948:LEU:HD23	1:A:952:GLU:HB3	1.86	0.57
1:A:1002:ARG:HD2	1:A:1006:TYR:CE2	2.40	0.57
1:A:521:HIS:CE1	1:A:629:HIS:CE1	2.91	0.56
1:A:904:LEU:HD22	1:A:913:ILE:HG13	1.86	0.56
1:A:946:ILE:HG22	1:A:948:LEU:HD12	1.87	0.56
1:A:1024:TYR:HE2	1:A:1136:GLN:NE2	1.98	0.56
1:A:925:ASP:CG	1:A:926:LYS:H	2.08	0.56
1:A:499:ILE:O	1:A:503:MET:HG3	2.06	0.55
1:A:806:TYR:CE2	1:A:816:PRO:HG3	2.42	0.55
1:A:581:ASN:ND2	1:A:581:ASN:N	2.55	0.55
1:A:735:TYR:CE2	1:A:742:LEU:HG	2.41	0.55
1:A:897:ASN:ND2	1:A:950:PRO:HA	2.22	0.55
1:A:946:ILE:HG22	1:A:948:LEU:CD1	2.37	0.55
1:A:424:ILE:HG12	1:A:518:ARG:NH1	2.22	0.55
1:A:980:ASP:HB2	1:A:997:GLU:OE2	2.07	0.54
1:A:448:LEU:HD22	1:A:475:LEU:HD11	1.89	0.54
1:A:1123:TRP:O	1:A:1129:ARG:HG3	2.07	0.54
1:A:493:ASN:N	1:A:493:ASN:HD22	2.05	0.54
1:A:1108:GLU:HB2	1:A:1110:LEU:H	1.72	0.54
1:A:957:ARG:HG2	1:A:961:PHE:CE1	2.38	0.54
1:A:846:ASN:HD22	1:A:846:ASN:C	2.10	0.54
1:A:952:GLU:OE1	1:A:952:GLU:HA	2.08	0.54
1:A:722:VAL:HG13	1:A:784:ILE:HG13	1.90	0.53
1:A:1060:ARG:NH1	1:A:1114:TYR:HE2	2.05	0.53
1:A:735:TYR:CD2	1:A:742:LEU:HG	2.44	0.53
1:A:814:VAL:HG12	1:A:815:GLU:N	2.24	0.53
1:A:879:GLU:OE2	1:A:882:PRO:HA	2.08	0.53
1:A:505:LEU:O	1:A:506:GLN:HB2	2.09	0.53
1:A:847:PRO:HA	1:A:850:ILE:HD12	1.90	0.53
1:A:1062:ASN:C	1:A:1062:ASN:HD22	2.12	0.52
1:A:564:ILE:HD12	1:A:581:ASN:HA	1.91	0.52
1:A:925:ASP:O	1:A:927:ILE:N	2.41	0.52
1:A:1020:GLU:O	1:A:1024:TYR:HD1	1.92	0.52
1:A:981:PRO:HD2	1:A:997:GLU:OE2	2.10	0.52
1:A:610:LEU:HA	1:A:613:GLU:HG2	1.92	0.52
1:A:1041:VAL:CB	1:A:1049:ILE:HD11	2.39	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:696:VAL:O	1:A:697:LEU:CB	2.57	0.52
1:A:749:LEU:HA	2:A:79:HOH:O	2.10	0.52
1:A:696:VAL:HG23	1:A:826:ILE:HG21	1.91	0.52
1:A:1012:HIS:CD2	1:A:1016:ARG:HH21	2.27	0.52
1:A:535:ILE:HG22	1:A:536:LYS:N	2.24	0.51
1:A:985:ILE:H	1:A:985:ILE:HD12	1.75	0.51
1:A:1135:LYS:O	1:A:1139:GLU:HG3	2.10	0.51
1:A:867:HIS:CD2	1:A:885:TYR:HE2	2.29	0.51
1:A:893:GLN:HA	1:A:899:LEU:HD23	1.93	0.51
1:A:510:LYS:O	1:A:511:TYR:HB2	2.11	0.51
1:A:608:THR:HG22	1:A:608:THR:O	2.11	0.51
1:A:959:ILE:O	1:A:963:GLU:HG3	2.11	0.51
1:A:1002:ARG:HD3	1:A:1002:ARG:O	2.11	0.50
1:A:857:LEU:HG	1:A:863:LEU:HD21	1.92	0.50
1:A:1002:ARG:HD2	1:A:1006:TYR:HE2	1.75	0.50
1:A:702:PRO:O	1:A:706:LYS:HG3	2.12	0.50
1:A:880:ILE:HG13	1:A:881:GLU:H	1.76	0.49
1:A:1002:ARG:HD3	1:A:1002:ARG:C	2.32	0.49
1:A:532:GLY:O	1:A:534:HIS:CD2	2.65	0.49
1:A:557:LEU:HD12	1:A:558:LEU:N	2.28	0.49
1:A:581:ASN:N	1:A:581:ASN:HD22	2.10	0.49
1:A:509:LYS:O	1:A:512:GLU:HB2	2.13	0.49
1:A:571:LYS:HB3	1:A:572:PRO:HD3	1.95	0.49
1:A:1002:ARG:NH1	1:A:1006:TYR:CD2	2.80	0.49
1:A:1041:VAL:HA	1:A:1049:ILE:HD11	1.95	0.49
1:A:424:ILE:CG1	1:A:518:ARG:NH1	2.76	0.49
1:A:1045:PRO:O	1:A:1049:ILE:HG22	2.13	0.49
1:A:690:ILE:HG22	1:A:691:ARG:N	2.27	0.49
1:A:758:ASN:ND2	1:A:844:PRO:CB	2.74	0.49
1:A:476:ARG:CG	1:A:477:GLY:N	2.73	0.48
1:A:927:ILE:HG23	1:A:928:LYS:HG2	1.96	0.48
1:A:758:ASN:HD21	1:A:844:PRO:CB	2.27	0.48
1:A:1128:GLU:HG2	2:A:32:HOH:O	2.13	0.48
1:A:478:LYS:HE2	1:A:529:ASP:OD2	2.12	0.48
1:A:589:ARG:HA	1:A:593:SER:HB3	1.95	0.48
1:A:696:VAL:O	1:A:697:LEU:HB2	2.14	0.48
1:A:465:VAL:CG1	1:A:618:PHE:HB3	2.43	0.48
1:A:721:LYS:HG2	1:A:785:TYR:CZ	2.49	0.48
1:A:1004:GLU:O	1:A:1007:GLN:HB2	2.14	0.48
1:A:1016:ARG:O	1:A:1020:GLU:HG3	2.13	0.48
1:A:628:PHE:CD1	1:A:628:PHE:C	2.87	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:905:PRO:O	1:A:908:THR:HB	2.15	0.47
1:A:1006:TYR:CZ	1:A:1156:TRP:HA	2.49	0.47
1:A:478:LYS:O	1:A:479:MET:HG2	2.15	0.47
1:A:581:ASN:HD21	1:A:584:ASP:HB2	1.76	0.47
1:A:733:THR:HB	1:A:814:VAL:CG1	2.45	0.47
1:A:530:HIS:O	1:A:531:ASP:C	2.53	0.47
1:A:701:LYS:HG3	2:A:11:HOH:O	2.15	0.47
1:A:842:ILE:HG12	1:A:976:MET:HG2	1.97	0.47
1:A:846:ASN:HD22	1:A:847:PRO:CD	2.28	0.47
1:A:1060:ARG:HH12	1:A:1114:TYR:HE2	1.62	0.47
1:A:922:SER:O	1:A:924:ASN:N	2.49	0.47
1:A:1021:VAL:HG23	1:A:1140:LYS:HG3	1.97	0.46
1:A:1027:GLN:O	1:A:1031:ILE:HG12	2.15	0.46
1:A:599:LYS:HD3	1:A:600:GLN:O	2.16	0.46
1:A:904:LEU:HB3	1:A:908:THR:HG22	1.97	0.46
1:A:493:ASN:HD22	1:A:493:ASN:H	1.62	0.46
1:A:554:GLN:HE21	1:A:554:GLN:C	2.19	0.46
1:A:505:LEU:C	1:A:507:HIS:H	2.19	0.45
1:A:570:THR:O	1:A:571:LYS:CB	2.64	0.45
1:A:769:GLY:HA3	1:A:775:GLY:HA2	1.99	0.45
1:A:543:LEU:HD22	1:A:543:LEU:HA	1.71	0.45
1:A:873:TRP:CZ2	1:A:875:GLY:HA3	2.52	0.45
1:A:427:TYR:HA	1:A:428:PRO:HD2	1.75	0.45
1:A:448:LEU:HG	1:A:522:LEU:HD11	1.98	0.45
1:A:896:ASP:O	1:A:897:ASN:HB2	2.17	0.45
1:A:923:GLY:CA	1:A:929:PRO:HB3	2.47	0.45
1:A:923:GLY:HA3	1:A:929:PRO:HB3	1.99	0.45
1:A:867:HIS:HD2	1:A:885:TYR:CE2	2.34	0.45
1:A:1002:ARG:HB3	1:A:1156:TRP:CH2	2.51	0.45
1:A:478:LYS:HB3	1:A:479:MET:H	1.57	0.45
1:A:1021:VAL:CG2	1:A:1140:LYS:HG3	2.47	0.45
1:A:714:LYS:O	1:A:714:LYS:HG3	2.17	0.45
1:A:763:LEU:HD13	1:A:789:ASN:HA	1.99	0.44
1:A:563:PRO:HD3	2:A:68:HOH:O	2.17	0.44
1:A:826:ILE:HG22	2:A:91:HOH:O	2.17	0.44
1:A:1012:HIS:CD2	1:A:1016:ARG:NH2	2.86	0.44
1:A:823:LEU:HB2	1:A:824:PRO:HD2	2.00	0.44
1:A:946:ILE:HD13	1:A:965:PHE:CE1	2.52	0.44
1:A:894:ILE:HG21	1:A:900:GLU:HB2	1.99	0.44
1:A:457:LEU:O	1:A:614:VAL:HG11	2.17	0.44
1:A:505:LEU:HD13	1:A:547:PHE:CE1	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:524:ILE:HD11	1:A:557:LEU:HD11	1.99	0.44
1:A:571:LYS:HB3	1:A:572:PRO:CD	2.48	0.44
1:A:505:LEU:HD23	1:A:517:LEU:CD2	2.48	0.44
1:A:714:LYS:HB3	1:A:728:TYR:CZ	2.53	0.44
1:A:793:ARG:HG3	1:A:798:PRO:HD3	1.99	0.44
1:A:1116:TYR:CZ	1:A:1117:LEU:HD22	2.52	0.44
1:A:533:SER:C	1:A:535:ILE:N	2.70	0.44
1:A:610:LEU:HD23	1:A:613:GLU:HG3	1.99	0.43
1:A:579:PHE:HA	2:A:71:HOH:O	2.18	0.43
1:A:462:LEU:HD23	1:A:462:LEU:HA	1.85	0.43
1:A:747:ILE:O	1:A:751:GLN:HG3	2.18	0.43
1:A:1009:ARG:O	1:A:1013:MET:HG3	2.18	0.43
1:A:842:ILE:HG12	1:A:976:MET:CG	2.49	0.43
1:A:495:GLU:O	1:A:499:ILE:HG13	2.19	0.43
1:A:448:LEU:CD1	1:A:522:LEU:HD11	2.49	0.43
1:A:628:PHE:HD1	1:A:628:PHE:C	2.22	0.43
1:A:693:ILE:HG22	1:A:978:ALA:HA	2.01	0.43
1:A:846:ASN:ND2	1:A:848:LEU:H	2.17	0.43
1:A:867:HIS:CD2	1:A:885:TYR:CE2	3.07	0.42
1:A:733:THR:CA	1:A:814:VAL:HG13	2.42	0.42
1:A:867:HIS:HD2	1:A:885:TYR:OH	2.01	0.42
1:A:963:GLU:H	1:A:963:GLU:HG2	1.42	0.42
1:A:938:HIS:HD2	1:A:943:LYS:H	1.64	0.42
1:A:544:GLU:O	1:A:548:LEU:HG	2.19	0.42
1:A:926:LYS:O	1:A:927:ILE:HG13	2.19	0.42
1:A:1116:TYR:CE1	1:A:1117:LEU:HD22	2.55	0.42
1:A:554:GLN:HG2	1:A:628:PHE:CE2	2.55	0.42
1:A:568:SER:HA	1:A:576:THR:HG22	2.01	0.42
1:A:606:LEU:HG	1:A:607:GLY:N	2.34	0.42
1:A:729:VAL:O	1:A:733:THR:HG23	2.20	0.42
1:A:502:ILE:O	1:A:518:ARG:HD3	2.19	0.42
1:A:716:LEU:HD21	1:A:720:LEU:CD2	2.47	0.42
1:A:523:MET:HE1	1:A:618:PHE:HZ	1.85	0.42
1:A:480:LEU:O	1:A:481:ASN:HB2	2.20	0.42
1:A:523:MET:HE1	1:A:618:PHE:CZ	2.55	0.42
1:A:905:PRO:HB2	1:A:969:SER:OG	2.20	0.42
1:A:696:VAL:HG12	1:A:979:PHE:O	2.20	0.42
1:A:1167:TYR:CE2	1:A:1171:LEU:HD11	2.54	0.41
1:A:985:ILE:H	1:A:985:ILE:CD1	2.32	0.41
1:A:696:VAL:O	1:A:697:LEU:HG	2.19	0.41
1:A:866:MET:HB2	1:A:991:VAL:HG11	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:894:ILE:CG2	1:A:900:GLU:HB2	2.49	0.41
1:A:446:LEU:O	1:A:522:LEU:HD12	2.21	0.41
1:A:720:LEU:HD11	1:A:725:LEU:HB2	2.03	0.41
1:A:571:LYS:CB	1:A:572:PRO:CD	2.98	0.41
1:A:571:LYS:O	1:A:572:PRO:C	2.58	0.41
1:A:1041:VAL:CA	1:A:1049:ILE:HD11	2.51	0.41
1:A:1041:VAL:O	1:A:1043:ASN:O	2.39	0.41
1:A:600:GLN:NE2	1:A:602:TYR:HD1	2.18	0.41
1:A:752:ASN:HD22	1:A:752:ASN:H	1.67	0.41
1:A:900:GLU:CD	1:A:943:LYS:HE2	2.41	0.41
1:A:465:VAL:HG11	1:A:618:PHE:HB3	2.02	0.41
1:A:512:GLU:HB3	1:A:513:ASP:H	1.64	0.41
1:A:543:LEU:HD12	1:A:551:LEU:HD13	2.02	0.41
1:A:693:ILE:CG2	1:A:978:ALA:HA	2.51	0.41
1:A:941:ASN:HB2	1:A:942:ILE:H	1.68	0.41
1:A:489:GLN:O	1:A:493:ASN:ND2	2.54	0.41
1:A:528:GLN:HG3	1:A:529:ASP:OD1	2.21	0.41
1:A:800:ASP:CG	1:A:1002:ARG:HH22	2.25	0.41
1:A:927:ILE:CG2	1:A:928:LYS:HG2	2.51	0.40
1:A:535:ILE:HG21	1:A:535:ILE:HD13	1.74	0.40
1:A:939:ASP:H	1:A:941:ASN:ND2	2.19	0.40
1:A:1116:TYR:CD2	1:A:1117:LEU:HD13	2.56	0.40
1:A:491:LEU:O	1:A:495:GLU:HG3	2.21	0.40
1:A:788:LEU:HA	1:A:788:LEU:HD23	1.74	0.40
1:A:846:ASN:HD22	1:A:847:PRO:HD2	1.86	0.40
1:A:1061:PHE:CZ	1:A:1067:PRO:HB3	2.57	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	674/793 (85%)	569 (84%)	81 (12%)	24 (4%)	<b>3</b> <b>7</b>

All (24) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	479	MET
1	A	488	ASP
1	A	532	GLY
1	A	554	GLN
1	A	571	LYS
1	A	604	LYS
1	A	697	LEU
1	A	813	THR
1	A	923	GLY
1	A	478	LYS
1	A	481	ASN
1	A	763	LEU
1	A	1042	THR
1	A	1043	ASN
1	A	512	GLU
1	A	515	LYS
1	A	926	LYS
1	A	814	VAL
1	A	1037	LYS
1	A	1074	ASP
1	A	572	PRO
1	A	824	PRO
1	A	535	ILE
1	A	983	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	596/701 (85%)	524 (88%)	72 (12%)	<b>5</b> <b>11</b>

All (72) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	420	ARG
1	A	421	LYS
1	A	425	THR
1	A	467	ARG
1	A	476	ARG
1	A	480	LEU
1	A	493	ASN
1	A	497	GLN
1	A	507	HIS
1	A	508	ARG
1	A	514	THR
1	A	515	LYS
1	A	524	ILE
1	A	525	MET
1	A	527	ASP
1	A	538	LEU
1	A	542	PHE
1	A	543	LEU
1	A	547	PHE
1	A	548	LEU
1	A	554	GLN
1	A	557	LEU
1	A	570	THR
1	A	572	PRO
1	A	573	THR
1	A	576	THR
1	A	581	ASN
1	A	597	THR
1	A	602	TYR
1	A	606	LEU
1	A	613	GLU
1	A	619	SER
1	A	624	HIS
1	A	628	PHE
1	A	632	GLN
1	A	683[A]	LEU
1	A	683[B]	LEU
1	A	690	ILE
1	A	715	ASN
1	A	716	LEU
1	A	722	VAL
1	A	730	SER
1	A	740	GLN

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Mol	Chain	Res	Type
1	A	752	ASN
1	A	773	THR
1	A	776	LYS
1	A	785	TYR
1	A	793	ARG
1	A	846	ASN
1	A	848	LEU
1	A	883	LEU
1	A	898	VAL
1	A	908	THR
1	A	919	LEU
1	A	933	ASP
1	A	941	ASN
1	A	953	MET
1	A	959	ILE
1	A	963	GLU
1	A	985	ILE
1	A	1002	ARG
1	A	1018	GLN
1	A	1042	THR
1	A	1047	ASN
1	A	1051	GLN
1	A	1062	ASN
1	A	1064	GLU
1	A	1117	LEU
1	A	1127	LYS
1	A	1128	GLU
1	A	1160	LEU
1	A	1168	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	489	GLN
1	A	493	ASN
1	A	521	HIS
1	A	534	HIS
1	A	554	GLN
1	A	581	ASN
1	A	629	HIS
1	A	632	GLN
1	A	695	ASN

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Mol	Chain	Res	Type
1	A	752	ASN
1	A	757	ASN
1	A	758	ASN
1	A	797	HIS
1	A	846	ASN
1	A	867	HIS
1	A	938	HIS
1	A	941	ASN
1	A	1018	GLN
1	A	1051	GLN
1	A	1055	ASN
1	A	1062	ASN
1	A	1131	GLN
1	A	1136	GLN
1	A	1168	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

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	683[A]:LEU	C	684:PHE	N	2.82

## 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.