



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 11:38 AM UTC

PDB ID : 1NR0 / pdb_00001nr0
Title : Two Seven-Bladed Beta-Propeller Domains Revealed By The Structure Of A C. elegans Homologue Of Yeast Actin Interacting Protein 1 (AIP1).
Authors : Vorobiev, S.M.; Mohri, K.; Ono, S.; Almo, S.C.; Burley, S.K.; New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2003-01-23
Resolution : 1.70 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

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)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

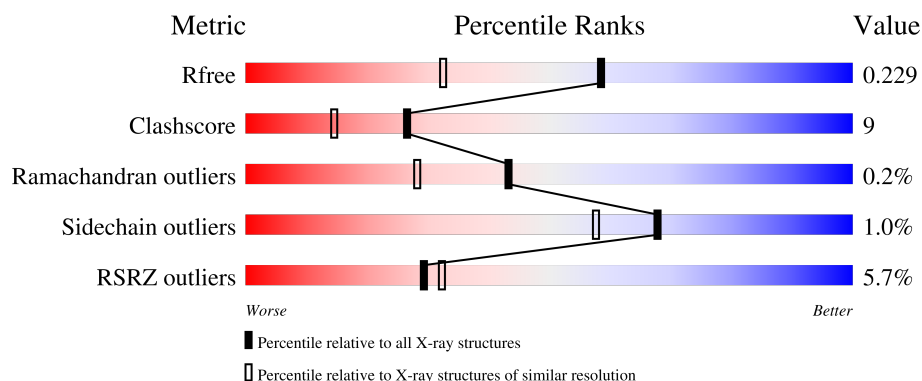
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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))
R_{free}	180053	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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 ≥ 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	611	6% 80% 18% .

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5291 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 Actin interacting protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	610	Total	C	N	O	S	0	0	0
			4581	2892	786	894	9			

- Molecule 2 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mn	0	0
			1	1		

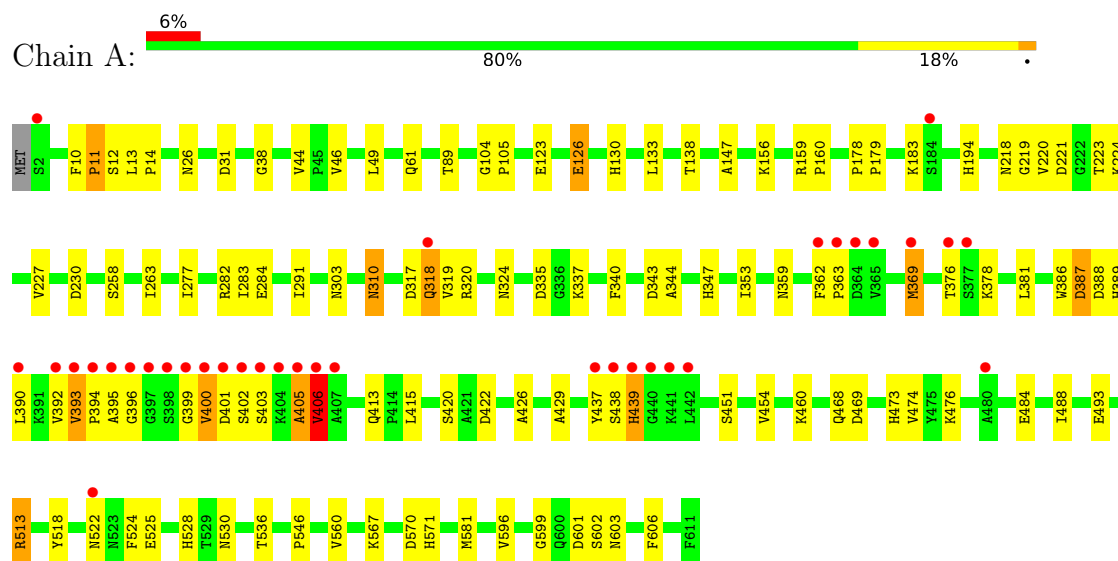
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	709	Total	O	0	0
			709	709		

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 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: Actin interacting protein 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	64.84Å 65.17Å 69.24Å 90.00° 98.28° 90.00°	Depositor
Resolution (Å)	23.59 – 1.70 23.59 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.4 (23.59-1.70) 98.4 (23.59-1.70)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.44 (at 1.71Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.199 , 0.230 0.198 , 0.229	Depositor DCC
R_{free} test set	2503 reflections (4.05%)	wwPDB-VP
Wilson B-factor (Å ²)	14.9	Xtriage
Anisotropy	0.203	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 51.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	5291	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.97% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MN

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	0.52	3/4690 (0.1%)	1.10	36/6397 (0.6%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	318	GLN	C-O	7.14	1.32	1.23
1	A	369	MET	SD-CE	-7.04	1.61	1.79
1	A	369	MET	CG-SD	-5.03	1.68	1.80

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	402	SER	N-CA-C	-10.48	100.17	113.16
1	A	318	GLN	CA-C-N	-9.74	110.38	123.14
1	A	318	GLN	C-N-CA	-9.74	110.38	123.14
1	A	395	ALA	N-CA-C	9.71	125.44	113.50
1	A	393	VAL	CA-C-N	8.86	130.92	119.84
1	A	393	VAL	C-N-CA	8.86	130.92	119.84
1	A	318	GLN	CA-C-O	-8.58	110.30	120.60
1	A	317	ASP	N-CA-C	8.49	121.75	111.40
1	A	156	LYS	N-CA-C	-7.85	99.76	109.65
1	A	11	PRO	N-CA-C	7.66	122.90	111.41
1	A	263	ILE	N-CA-C	-7.21	98.02	108.11
1	A	396	GLY	N-CA-C	7.12	130.06	113.18
1	A	353	ILE	N-CA-C	7.12	117.88	110.62
1	A	10	PHE	N-CA-C	-6.92	94.68	109.01
1	A	560	VAL	N-CA-C	-6.92	98.52	108.48
1	A	369	MET	N-CA-C	6.39	119.25	110.24
1	A	319	VAL	N-CA-C	-6.29	99.31	108.11
1	A	599	GLY	N-CA-C	6.12	120.11	111.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	400	VAL	N-CA-C	-6.05	98.76	107.78
1	A	439	HIS	N-CA-C	5.80	119.25	111.24
1	A	387	ASP	N-CA-C	-5.80	106.43	112.93
1	A	258	SER	N-CA-C	5.75	118.43	109.52
1	A	89	THR	N-CA-C	5.74	118.48	111.82
1	A	277	ILE	N-CA-C	5.73	113.83	108.15
1	A	44	VAL	N-CA-C	5.56	114.00	107.77
1	A	476	LYS	N-CA-C	-5.53	100.28	109.46
1	A	406	VAL	N-CA-C	5.47	120.72	109.34
1	A	571	HIS	N-CA-C	-5.39	102.98	109.83
1	A	230	ASP	N-CA-C	-5.28	99.80	108.41
1	A	219	GLY	N-CA-C	5.16	120.00	113.24
1	A	468	GLN	N-CA-C	-5.14	107.03	113.15
1	A	413	GLN	N-CA-C	5.12	116.86	109.48
1	A	105	PRO	N-CA-C	5.12	119.22	111.19
1	A	147	ALA	N-CA-C	5.11	119.52	113.28
1	A	405	ALA	N-CA-C	5.08	115.85	108.14
1	A	324	ASN	N-CA-C	-5.03	105.95	113.89

There are no chirality outliers.

There are no planarity outliers.

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	4581	0	4447	84	0
2	A	1	0	0	0	0
3	A	709	0	0	17	0
All	All	5291	0	4447	84	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 9.

All (84) 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:218:ASN:HD21	1:A:220:VAL:HG12	1.39	0.86
1:A:381:LEU:HB3	1:A:393:VAL:CG2	2.15	0.77
1:A:26:ASN:HD22	1:A:291:ILE:HD11	1.51	0.76
1:A:394:PRO:O	1:A:401:ASP:N	2.19	0.75
1:A:394:PRO:HD2	1:A:401:ASP:O	1.88	0.74
1:A:528:HIS:HD2	1:A:530:ASN:H	1.42	0.66
1:A:194:HIS:HD2	3:A:863:HOH:O	1.79	0.65
1:A:381:LEU:HB3	1:A:393:VAL:HG22	1.79	0.63
1:A:310:ASN:C	1:A:310:ASN:HD22	2.08	0.62
1:A:318:GLN:NE2	1:A:320:ARG:HE	2.00	0.60
1:A:546:PRO:HG3	3:A:1450:HOH:O	2.01	0.59
1:A:49:LEU:HD21	1:A:318:GLN:HE22	1.67	0.58
1:A:581:MET:HE2	3:A:1447:HOH:O	2.03	0.57
1:A:218:ASN:HD22	1:A:221:ASP:H	1.52	0.57
1:A:26:ASN:ND2	1:A:291:ILE:HD11	2.19	0.56
1:A:359:ASN:HB2	3:A:1362:HOH:O	2.03	0.56
1:A:38:GLY:HA2	1:A:61:GLN:HE22	1.71	0.55
1:A:567:LYS:HE3	1:A:570:ASP:CG	2.31	0.55
1:A:282:ARG:HD3	3:A:1222:HOH:O	2.08	0.54
1:A:401:ASP:C	1:A:403:SER:H	2.16	0.54
1:A:130:HIS:HD2	3:A:1180:HOH:O	1.91	0.53
1:A:378:LYS:HD3	3:A:1387:HOH:O	2.08	0.53
1:A:381:LEU:O	1:A:393:VAL:HG22	2.08	0.53
1:A:126:GLU:H	1:A:126:GLU:CD	2.17	0.52
1:A:26:ASN:HD22	1:A:291:ILE:CD1	2.22	0.52
1:A:429:ALA:HB2	1:A:454:VAL:HB	1.91	0.52
1:A:49:LEU:HD21	1:A:318:GLN:NE2	2.23	0.52
1:A:392:VAL:HB	1:A:406:VAL:CG1	2.39	0.52
1:A:318:GLN:HG3	3:A:1384:HOH:O	2.08	0.52
1:A:513:ARG:HH11	1:A:513:ARG:HB2	1.75	0.52
1:A:415:LEU:HD12	1:A:451:SER:O	2.10	0.51
1:A:394:PRO:HD3	1:A:405:ALA:CB	2.41	0.51
1:A:223:THR:HG22	3:A:1516:HOH:O	2.11	0.50
1:A:513:ARG:HD3	1:A:536:THR:C	2.36	0.50
1:A:178:PRO:HA	1:A:179:PRO:C	2.37	0.50
1:A:12:SER:H	1:A:603:ASN:ND2	2.10	0.50
1:A:473:HIS:HD2	1:A:484:GLU:OE2	1.95	0.50
1:A:392:VAL:HB	1:A:406:VAL:HG13	1.93	0.50
1:A:394:PRO:CG	1:A:405:ALA:HB2	2.42	0.49
1:A:596:VAL:HG22	1:A:606:PHE:CD2	2.47	0.49
1:A:362:PHE:HA	1:A:363:PRO:C	2.37	0.49
1:A:390:LEU:C	1:A:390:LEU:HD23	2.37	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:522:ASN:O	1:A:525:GLU:HG2	2.12	0.49
1:A:567:LYS:HE3	1:A:570:ASP:OD1	2.13	0.49
1:A:194:HIS:HE1	3:A:926:HOH:O	1.96	0.48
1:A:601:ASP:O	1:A:602:SER:HB2	2.13	0.48
1:A:344:ALA:CB	1:A:369:MET:HE2	2.44	0.48
1:A:159:ARG:HA	1:A:160:PRO:C	2.38	0.48
1:A:474:VAL:HG11	1:A:524:PHE:CZ	2.48	0.48
1:A:61:GLN:NE2	3:A:1261:HOH:O	2.47	0.47
1:A:469:ASP:OD2	1:A:473:HIS:HE1	1.98	0.47
1:A:420:SER:HB2	1:A:460:LYS:HE2	1.97	0.47
1:A:183:LYS:HE3	3:A:1058:HOH:O	2.15	0.46
1:A:528:HIS:HD2	1:A:530:ASN:N	2.11	0.46
1:A:426:ALA:HB3	1:A:437:TYR:HB3	1.96	0.46
1:A:283:ILE:HD11	3:A:1195:HOH:O	2.15	0.46
1:A:400:VAL:HG22	3:A:1237:HOH:O	2.16	0.45
1:A:335:ASP:OD1	1:A:337:LYS:HB2	2.16	0.45
1:A:133:LEU:HD12	1:A:138:THR:HB	1.99	0.45
1:A:473:HIS:CD2	1:A:484:GLU:OE2	2.70	0.45
1:A:488:ILE:HG21	1:A:518:TYR:CZ	2.51	0.45
1:A:438:SER:C	1:A:439:HIS:ND1	2.76	0.44
1:A:12:SER:HB2	1:A:602:SER:HB2	1.98	0.44
1:A:343:ASP:OD2	1:A:347:HIS:HB2	2.18	0.43
1:A:401:ASP:C	1:A:403:SER:N	2.73	0.43
1:A:224:LYS:HE3	1:A:227:VAL:HG13	2.00	0.43
1:A:400:VAL:HG23	1:A:400:VAL:O	2.18	0.43
1:A:344:ALA:HB1	1:A:369:MET:HE2	2.01	0.42
1:A:376:THR:C	1:A:378:LYS:H	2.27	0.42
1:A:422:ASP:HB3	3:A:1405:HOH:O	2.18	0.42
1:A:194:HIS:CD2	3:A:863:HOH:O	2.64	0.42
1:A:394:PRO:HD3	1:A:405:ALA:HB2	2.02	0.42
1:A:394:PRO:CD	1:A:405:ALA:HB2	2.49	0.42
1:A:284:GLU:HB3	1:A:303:ASN:HB3	2.02	0.42
1:A:218:ASN:ND2	1:A:221:ASP:H	2.16	0.41
1:A:387:ASP:O	1:A:389:HIS:HD2	2.03	0.41
1:A:420:SER:CB	1:A:460:LYS:HE2	2.50	0.41
1:A:493:GLU:HG3	3:A:1413:HOH:O	2.19	0.41
1:A:340:PHE:CE2	1:A:400:VAL:HG11	2.56	0.41
1:A:13:LEU:HB3	1:A:14:PRO:HD2	2.02	0.41
1:A:393:VAL:HA	1:A:394:PRO:HD3	1.60	0.41
1:A:104:GLY:HA3	1:A:123:GLU:O	2.21	0.40
1:A:31:ASP:O	1:A:46:VAL:HG22	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:386:TRP:C	1:A:388:ASP:H	2.29	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	608/611 (100%)	588 (97%)	19 (3%)	1 (0%)	43 28

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	399	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	501/511 (98%)	496 (99%)	5 (1%)	68 58

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	PRO
1	A	126	GLU

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Mol	Chain	Res	Type
1	A	310	ASN
1	A	406	VAL
1	A	513	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	6	GLN
1	A	26	ASN
1	A	34	GLN
1	A	61	GLN
1	A	90	GLN
1	A	130	HIS
1	A	142	ASN
1	A	146	GLN
1	A	194	HIS
1	A	218	ASN
1	A	310	ASN
1	A	318	GLN
1	A	359	ASN
1	A	389	HIS
1	A	458	ASN
1	A	461	GLN
1	A	473	HIS
1	A	522	ASN
1	A	528	HIS
1	A	603	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	610/611 (99%)	0.21	35 (5%)	29 32	8, 16, 33, 58	0

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	397	GLY	9.7
1	A	396	GLY	7.3
1	A	406	VAL	6.1
1	A	395	ALA	6.0
1	A	399	GLY	5.8
1	A	405	ALA	5.7
1	A	403	SER	5.5
1	A	400	VAL	5.3
1	A	401	ASP	4.7
1	A	404	LYS	4.6
1	A	402	SER	4.5
1	A	393	VAL	4.1
1	A	441	LYS	4.1
1	A	440	GLY	4.0
1	A	407	ALA	3.9
1	A	394	PRO	3.9
1	A	363	PRO	3.7
1	A	398	SER	3.5
1	A	439	HIS	3.2
1	A	2	SER	3.1
1	A	438	SER	3.0
1	A	362	PHE	2.8
1	A	442	LEU	2.6
1	A	376	THR	2.5
1	A	318	GLN	2.5
1	A	365	VAL	2.5
1	A	392	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	184	SER	2.3
1	A	437	TYR	2.3
1	A	369	MET	2.3
1	A	522	ASN	2.2
1	A	390	LEU	2.2
1	A	377	SER	2.2
1	A	480	ALA	2.2
1	A	364	ASP	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MN	A	700	1/1	0.98	0.13	42,42,42,42	0

6.5 Other polymers [i](#)

There are no such residues in this entry.