



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 02:07 PM EDT

PDB ID : 5E04 / pdb_00005e04
Title : Crystal structure of Andes virus nucleoprotein
Authors : Guo, Y.; Wang, W.M.; Lou, Z.Y.
Deposited on : 2015-09-28
Resolution : 2.25 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

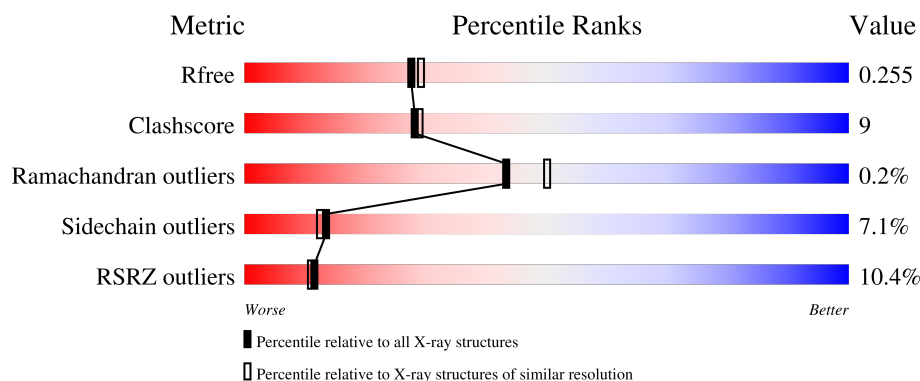
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	284	11% 76% 17% 5% ..
1	B	284	9% 73% 18% • 7%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4436 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 Nucleoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	281	Total	C	N	O	S	0	0	0
			2230	1437	380	399	14			
1	B	265	Total	C	N	O	S	0	0	0
			2114	1370	356	374	14			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	116	SER	-	expression tag	UNP O36307
B	116	SER	-	expression tag	UNP O36307

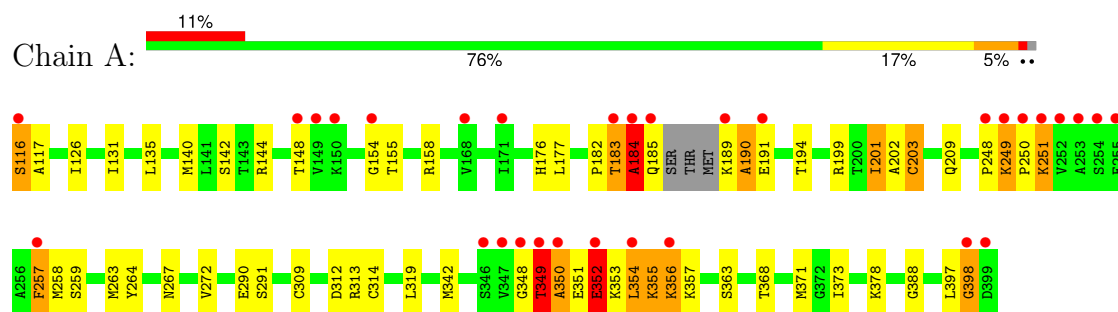
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	43	Total	O	0	0
			43	43		
2	B	49	Total	O	0	0
			49	49		

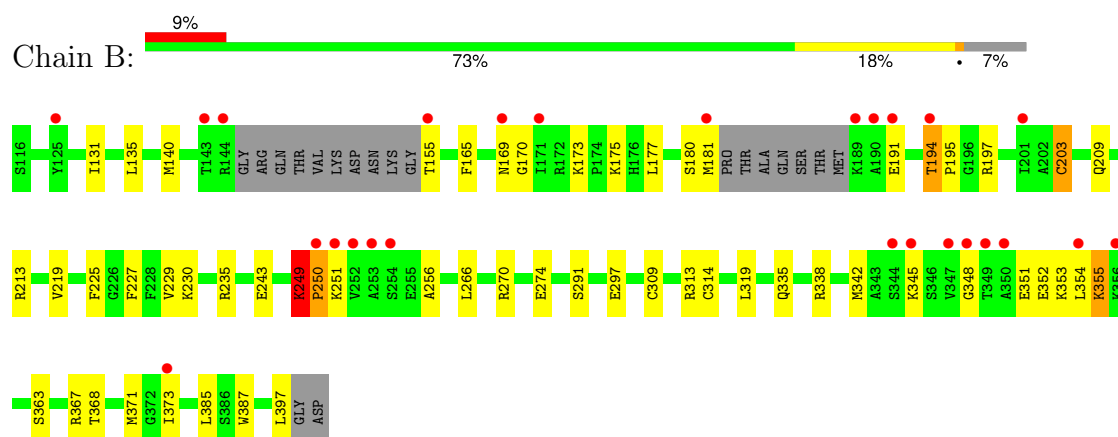
3 Residue-property plots [i](#)

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: Nucleoprotein



• Molecule 1: Nucleoprotein



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	52.53Å 99.65Å 136.39Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.02 – 2.25 49.02 – 2.25	Depositor EDS
% Data completeness (in resolution range)	96.8 (49.02-2.25) 92.5 (49.02-2.25)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.99 (at 2.24Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.215 , 0.252 0.221 , 0.255	Depositor DCC
R_{free} test set	2000 reflections (5.74%)	wwPDB-VP
Wilson B-factor (Å ²)	38.3	Xtriage
Anisotropy	0.844	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 27.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4436	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.28% 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

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	0.54	0/2281	1.33	20/3078 (0.6%)
1	B	0.55	1/2163 (0.0%)	0.89	5/2918 (0.2%)
All	All	0.54	1/4444 (0.0%)	1.14	25/5996 (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	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	250	PRO	N-CD	5.06	1.54	1.47

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	182	PRO	CB-CA-C	-22.14	81.71	110.27
1	A	349	THR	N-CA-C	-20.30	81.92	110.35
1	A	356	LYS	CB-CA-C	-16.78	82.58	111.45
1	A	349	THR	CB-CA-C	16.04	134.96	109.61
1	A	184	ALA	CB-CA-C	15.74	134.11	110.50
1	A	249	LYS	CB-CA-C	13.18	135.15	110.10
1	A	398	GLY	N-CA-C	-12.53	76.96	113.30
1	A	183	THR	N-CA-CB	-11.90	90.37	110.49
1	A	249	LYS	N-CA-C	-11.73	78.17	111.00
1	A	350	ALA	N-CA-CB	-11.57	89.35	110.18
1	A	355	LYS	CB-CA-C	-10.67	88.71	109.95
1	A	355	LYS	N-CA-C	9.58	124.77	113.18
1	A	185	GLN	N-CA-CB	-8.87	95.42	110.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	182	PRO	N-CA-C	8.50	126.88	114.80
1	A	184	ALA	N-CA-C	-7.76	89.26	111.00
1	A	251	LYS	N-CA-C	-7.65	94.50	110.80
1	A	154	GLY	N-CA-C	7.53	120.71	111.45
1	A	398	GLY	CA-C-N	7.53	135.25	121.70
1	A	398	GLY	C-N-CA	7.53	135.25	121.70
1	B	352	GLU	N-CA-C	-6.55	105.20	113.72
1	A	190	ALA	N-CA-C	5.89	117.70	111.28
1	B	170	GLY	N-CA-C	5.49	119.32	112.73
1	B	169	ASN	CB-CA-C	-5.20	110.60	116.63
1	B	249	LYS	CA-C-N	-5.18	113.30	119.05
1	B	249	LYS	C-N-CA	-5.18	113.30	119.05

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	184	ALA	Mainchain
1	A	397	LEU	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	2230	0	2257	49	0
1	B	2114	0	2143	30	0
2	A	43	0	0	1	0
2	B	49	0	0	1	0
All	All	4436	0	4400	78	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 (78) 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:351:GLU:HA	1:A:354:LEU:HD23	1.21	1.16
1:A:351:GLU:HA	1:A:354:LEU:CD2	1.83	1.08
1:A:349:THR:HG23	1:A:352:GLU:HB3	1.13	1.07
1:A:351:GLU:O	1:A:353:LYS:N	1.98	0.97
1:A:349:THR:CG2	1:A:352:GLU:HB3	1.95	0.96
1:A:351:GLU:HG2	1:A:354:LEU:HD21	1.48	0.94
1:A:349:THR:HG23	1:A:352:GLU:CB	1.97	0.93
1:A:348:GLY:O	1:A:349:THR:C	2.11	0.92
1:A:351:GLU:O	1:A:354:LEU:N	2.02	0.91
1:A:348:GLY:C	1:A:349:THR:O	2.04	0.84
1:A:351:GLU:CA	1:A:354:LEU:HD23	2.05	0.83
1:A:356:LYS:HG2	1:A:356:LYS:O	1.77	0.83
1:A:356:LYS:O	1:A:356:LYS:CG	2.18	0.79
1:A:351:GLU:C	1:A:353:LYS:N	2.46	0.73
1:A:368:THR:HA	1:A:371:MET:HE2	1.72	0.72
1:B:131:ILE:HD11	1:B:291:SER:HB2	1.73	0.70
1:B:243:GLU:OE1	1:B:249:LYS:HE2	1.91	0.70
1:A:351:GLU:CA	1:A:354:LEU:CD2	2.68	0.69
1:B:194:THR:HG22	1:B:197:ARG:H	1.56	0.68
1:A:351:GLU:C	1:A:353:LYS:H	1.99	0.67
1:A:351:GLU:CG	1:A:354:LEU:HD21	2.23	0.67
1:B:368:THR:HA	1:B:371:MET:HE2	1.77	0.67
1:B:250:PRO:O	1:B:251:LYS:HB2	1.96	0.66
1:B:342:MET:HE1	1:B:397:LEU:HA	1.80	0.63
1:B:219:VAL:HG12	1:B:335:GLN:NE2	2.15	0.61
1:A:135:LEU:HD11	1:A:209:GLN:HB3	1.82	0.60
1:B:227:PHE:HA	1:B:230:LYS:HE3	1.83	0.59
1:B:173:LYS:NZ	2:B:403:HOH:O	2.36	0.59
1:B:135:LEU:HD11	1:B:209:GLN:HB3	1.87	0.57
1:B:219:VAL:HG12	1:B:335:GLN:HE21	1.71	0.56
1:A:351:GLU:HA	1:A:354:LEU:HD21	1.80	0.55
1:A:349:THR:CG2	1:A:352:GLU:HG2	2.37	0.55
1:A:354:LEU:HG	1:A:355:LYS:N	2.21	0.54
1:B:250:PRO:CG	1:B:256:ALA:HA	2.38	0.54
1:B:135:LEU:HD13	1:B:213:ARG:NE	2.23	0.53
1:B:314:CYS:O	1:B:371:MET:HE1	2.08	0.53
1:B:313:ARG:HD3	1:B:371:MET:SD	2.49	0.53
1:A:312:ASP:OD1	1:A:313:ARG:HG2	2.09	0.53
1:A:248:PRO:HA	1:A:249:LYS:HB2	1.90	0.52
1:B:165:PHE:HA	1:B:175:LYS:H	1.73	0.52
1:B:338:ARG:O	1:B:342:MET:HG2	2.10	0.51
1:A:349:THR:HG23	1:A:352:GLU:CG	2.42	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:313:ARG:HD3	1:A:371:MET:SD	2.54	0.48
1:A:351:GLU:O	1:A:353:LYS:CA	2.62	0.47
1:B:180:SER:C	1:B:181:MET:HE2	2.39	0.47
1:A:140:MET:HG3	1:A:148:THR:HG21	1.96	0.47
1:B:351:GLU:O	1:B:355:LYS:HB2	2.14	0.47
1:A:116:SER:HB3	1:A:117:ALA:H	1.50	0.47
1:B:203:CYS:SG	1:B:309:CYS:HB2	2.55	0.46
1:A:126:ILE:HD12	1:A:201:ILE:HG21	1.97	0.46
1:A:349:THR:CG2	1:A:352:GLU:CB	2.76	0.46
1:B:351:GLU:HG2	1:B:354:LEU:HD12	1.96	0.46
1:A:263:MET:HE3	1:A:267:ASN:OD1	2.17	0.45
1:A:203:CYS:SG	1:A:309:CYS:HB2	2.56	0.45
1:B:235:ARG:HD3	1:B:387:TRP:CE2	2.52	0.45
1:A:249:LYS:HD2	1:A:249:LYS:HA	1.99	0.44
1:A:131:ILE:HD13	1:A:209:GLN:HE21	1.81	0.44
1:A:257:PHE:CD1	1:A:258:MET:HG2	2.52	0.44
1:A:388:GLY:C	1:B:385:LEU:HD13	2.42	0.44
1:A:342:MET:HE1	1:A:398:GLY:HA3	1.99	0.44
1:B:363:SER:HB3	1:B:367:ARG:NH1	2.32	0.44
1:B:165:PHE:HA	1:B:175:LYS:N	2.32	0.43
1:B:348:GLY:HA3	1:B:353:LYS:HG2	2.00	0.43
1:B:180:SER:O	1:B:195:PRO:HD3	2.18	0.43
1:B:270:ARG:NH2	1:B:274:GLU:OE2	2.51	0.43
1:A:348:GLY:O	1:A:350:ALA:N	2.51	0.43
1:A:264:TYR:OH	1:A:378:LYS:HE3	2.19	0.43
1:A:142:SER:OG	1:A:199:ARG:HD2	2.18	0.43
1:A:158:ARG:HD2	1:A:158:ARG:C	2.44	0.43
1:A:314:CYS:O	1:A:371:MET:HE1	2.20	0.42
1:A:183:THR:HA	1:A:184:ALA:HB2	2.01	0.42
1:A:250:PRO:O	1:A:251:LYS:C	2.62	0.41
1:A:176:HIS:HD2	2:A:407:HOH:O	2.04	0.41
1:B:250:PRO:HG2	1:B:256:ALA:HA	2.02	0.41
1:A:189:LYS:HB3	1:A:190:ALA:H	1.74	0.41
1:A:349:THR:CG2	1:A:352:GLU:CG	2.99	0.40
1:A:201:ILE:HG22	1:A:202:ALA:N	2.36	0.40
1:B:225:PHE:CZ	1:B:229:VAL:HG11	2.56	0.40

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	277/284 (98%)	254 (92%)	22 (8%)	1 (0%)	30	31
1	B	259/284 (91%)	243 (94%)	16 (6%)	0	100	100
All	All	536/568 (94%)	497 (93%)	38 (7%)	1 (0%)	43	50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	352	GLU

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	239/242 (99%)	219 (92%)	20 (8%)	10	8
1	B	227/242 (94%)	214 (94%)	13 (6%)	18	19
All	All	466/484 (96%)	433 (93%)	33 (7%)	13	12

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

Mol	Chain	Res	Type
1	A	116	SER
1	A	144	ARG
1	A	155	THR
1	A	177	LEU
1	A	191	GLU

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Mol	Chain	Res	Type
1	A	194	THR
1	A	201	ILE
1	A	203	CYS
1	A	257	PHE
1	A	259	SER
1	A	272	VAL
1	A	290	GLU
1	A	291	SER
1	A	319	LEU
1	A	349	THR
1	A	352	GLU
1	A	354	LEU
1	A	357	LYS
1	A	363	SER
1	A	373	ILE
1	B	140	MET
1	B	155	THR
1	B	177	LEU
1	B	191	GLU
1	B	194	THR
1	B	203	CYS
1	B	249	LYS
1	B	266	LEU
1	B	297	GLU
1	B	319	LEU
1	B	345	LYS
1	B	355	LYS
1	B	373	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	169	ASN
1	A	214	ASN
1	A	302	HIS

5.3.3 RNA ⓘ

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 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

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	281/284 (98%)	0.70	31 (11%)	10 10	33, 48, 97, 118	0
1	B	265/284 (93%)	0.54	26 (9%)	13 12	32, 47, 88, 108	0
All	All	546/568 (96%)	0.62	57 (10%)	11 11	32, 48, 92, 118	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	252	VAL	5.7
1	A	184	ALA	5.4
1	B	350	ALA	5.3
1	A	250	PRO	5.3
1	B	354	LEU	5.2
1	A	248	PRO	4.5
1	A	189	LYS	4.4
1	A	253	ALA	4.2
1	A	354	LEU	4.0
1	A	183	THR	3.8
1	A	398	GLY	3.8
1	A	251	LYS	3.7
1	A	350	ALA	3.6
1	B	201	ILE	3.6
1	A	356	LYS	3.5
1	A	255	GLU	3.4
1	B	253	ALA	3.4
1	A	399	ASP	3.4
1	A	171	ILE	3.3
1	A	168	VAL	3.3
1	B	345	LYS	3.2
1	A	254	SER	3.2
1	A	347	VAL	3.2
1	A	185	GLN	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	155	THR	3.0
1	A	348	GLY	2.8
1	B	181	MET	2.8
1	A	191	GLU	2.8
1	B	171	ILE	2.7
1	A	150	LYS	2.7
1	B	252	VAL	2.7
1	A	116	SER	2.7
1	B	347	VAL	2.7
1	A	249	LYS	2.6
1	A	154	GLY	2.6
1	A	349	THR	2.6
1	B	189	LYS	2.5
1	A	149	VAL	2.5
1	B	344	SER	2.5
1	A	148	THR	2.4
1	A	257	PHE	2.4
1	B	144	ARG	2.4
1	B	356	LYS	2.4
1	A	352	GLU	2.3
1	B	250	PRO	2.3
1	A	346	SER	2.2
1	B	194	THR	2.2
1	B	251	LYS	2.2
1	B	190	ALA	2.2
1	B	125	TYR	2.1
1	B	348	GLY	2.1
1	B	143	THR	2.1
1	B	349	THR	2.1
1	B	254	SER	2.1
1	B	169	ASN	2.1
1	B	191	GLU	2.1
1	B	373	ILE	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.