



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 12:25 pm GMT

PDB ID : 3RZ9
Title : Mouse importin alpha-Ku80 NLS peptide complex
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Deposited on : 2011-05-11
Resolution : 2.29 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.9-1692
EDS : trunk28620
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : recalc28949

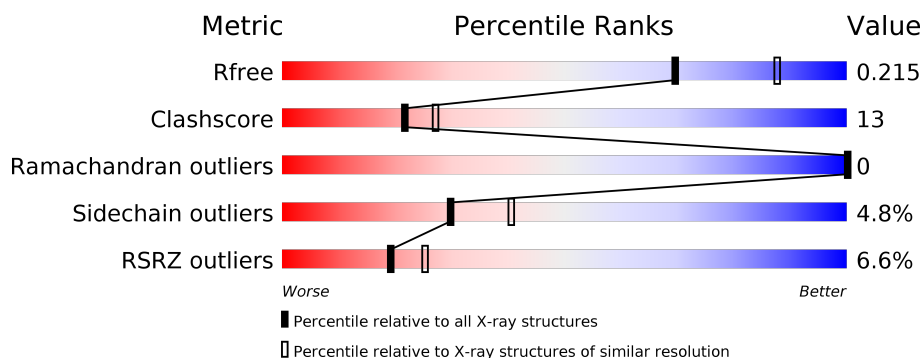
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 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}	100719	4130 (2.30-2.30)
Clashscore	112137	4751 (2.30-2.30)
Ramachandran outliers	110173	4705 (2.30-2.30)
Sidechain outliers	110143	4704 (2.30-2.30)
RSRZ outliers	101464	4156 (2.30-2.30)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	510	<div> <div>5%</div> <div> <div>61%</div> <div>20%</div> <div>•</div> <div>17%</div> </div> </div>
2	B	13	<div> <div>15%</div> <div> <div>38%</div> <div>54%</div> <div>8%</div> </div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3511 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 Importin subunit alpha-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	425	3207	2045	544	608	10	0	0	0

There are 50 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	20	MET	-	EXPRESSION TAG	UNP P52293
A	21	HIS	-	EXPRESSION TAG	UNP P52293
A	22	HIS	-	EXPRESSION TAG	UNP P52293
A	23	HIS	-	EXPRESSION TAG	UNP P52293
A	24	HIS	-	EXPRESSION TAG	UNP P52293
A	25	HIS	-	EXPRESSION TAG	UNP P52293
A	26	HIS	-	EXPRESSION TAG	UNP P52293
A	27	SER	-	EXPRESSION TAG	UNP P52293
A	28	SER	-	EXPRESSION TAG	UNP P52293
A	29	GLY	-	EXPRESSION TAG	UNP P52293
A	30	LEU	-	EXPRESSION TAG	UNP P52293
A	31	VAL	-	EXPRESSION TAG	UNP P52293
A	32	PRO	-	EXPRESSION TAG	UNP P52293
A	33	ARG	-	EXPRESSION TAG	UNP P52293
A	34	GLY	-	EXPRESSION TAG	UNP P52293
A	35	SER	-	EXPRESSION TAG	UNP P52293
A	36	GLY	-	EXPRESSION TAG	UNP P52293
A	37	MET	-	EXPRESSION TAG	UNP P52293
A	38	LYS	-	EXPRESSION TAG	UNP P52293
A	39	GLU	-	EXPRESSION TAG	UNP P52293
A	40	THR	-	EXPRESSION TAG	UNP P52293
A	41	ALA	-	EXPRESSION TAG	UNP P52293
A	42	ALA	-	EXPRESSION TAG	UNP P52293
A	43	ALA	-	EXPRESSION TAG	UNP P52293
A	44	LYS	-	EXPRESSION TAG	UNP P52293
A	45	PHE	-	EXPRESSION TAG	UNP P52293
A	46	GLU	-	EXPRESSION TAG	UNP P52293

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Chain	Residue	Modelled	Actual	Comment	Reference
A	47	ARG	-	EXPRESSION TAG	UNP P52293
A	48	GLN	-	EXPRESSION TAG	UNP P52293
A	49	HIS	-	EXPRESSION TAG	UNP P52293
A	50	MET	-	EXPRESSION TAG	UNP P52293
A	51	ASP	-	EXPRESSION TAG	UNP P52293
A	52	SER	-	EXPRESSION TAG	UNP P52293
A	53	PRO	-	EXPRESSION TAG	UNP P52293
A	54	ASP	-	EXPRESSION TAG	UNP P52293
A	55	LEU	-	EXPRESSION TAG	UNP P52293
A	56	GLY	-	EXPRESSION TAG	UNP P52293
A	57	THR	-	EXPRESSION TAG	UNP P52293
A	58	ASP	-	EXPRESSION TAG	UNP P52293
A	59	ASP	-	EXPRESSION TAG	UNP P52293
A	60	ASP	-	EXPRESSION TAG	UNP P52293
A	61	ASP	-	EXPRESSION TAG	UNP P52293
A	62	LYS	-	EXPRESSION TAG	UNP P52293
A	63	ALA	-	EXPRESSION TAG	UNP P52293
A	64	MET	-	EXPRESSION TAG	UNP P52293
A	65	ALA	-	EXPRESSION TAG	UNP P52293
A	66	ASP	-	EXPRESSION TAG	UNP P52293
A	67	ILE	-	EXPRESSION TAG	UNP P52293
A	68	GLY	-	EXPRESSION TAG	UNP P52293
A	69	SER	-	EXPRESSION TAG	UNP P52293

- Molecule 2 is a protein called Ku80 NLS peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	12	Total	C	N	O	0	0	0
			88	55	16	17			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	208	Total	O	0	0
			208	208		
3	B	8	Total	O	0	0
			8	8		

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	77.36Å 88.30Å 98.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	26.49 – 2.29 26.49 – 2.29	Depositor EDS
% Data completeness (in resolution range)	98.7 (26.49-2.29) 98.7 (26.49-2.29)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.50 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.177 , 0.218 0.177 , 0.215	Depositor DCC
R_{free} test set	1541 reflections (5.31%)	DCC
Wilson B-factor (Å ²)	40.0	Xtriage
Anisotropy	0.096	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 37.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3511	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.09% 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	1.02	5/3265 (0.2%)	0.93	6/4456 (0.1%)
2	B	1.33	0/88	1.18	0/116
All	All	1.03	5/3353 (0.1%)	0.94	6/4572 (0.1%)

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	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	223	CYS	CB-SG	-9.29	1.66	1.82
1	A	272	CYS	CB-SG	-7.37	1.69	1.82
1	A	419	CYS	CB-SG	-6.68	1.71	1.82
1	A	350	ASN	CB-CG	5.88	1.64	1.51
1	A	132	ASP	CB-CG	5.18	1.62	1.51

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	260	LEU	CB-CG-CD2	-8.28	96.92	111.00
1	A	240	LYS	C-N-CA	-6.94	104.34	121.70
1	A	101	ARG	NE-CZ-NH2	-5.93	117.33	120.30
1	A	101	ARG	NE-CZ-NH1	5.55	123.07	120.30
1	A	298	LEU	CB-CG-CD1	-5.34	101.91	111.00
1	A	491	LEU	CA-CB-CG	5.29	127.46	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	107	GLU	Peptide

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	3207	0	3260	84	0
2	B	88	0	94	9	0
3	A	208	0	0	12	0
3	B	8	0	0	0	0
All	All	3511	0	3354	89	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 13.

All (89) 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:106:ARG:O	1:A:106:ARG:HD2	1.52	1.10
1:A:107:GLU:HB2	1:A:110:PRO:HD3	1.48	0.96
1:A:75:ASN:CB	3:A:705:HOH:O	2.16	0.92
1:A:371:GLN:HE21	1:A:375:ASN:HD21	1.23	0.86
1:A:106:ARG:O	1:A:106:ARG:CD	2.30	0.79
1:A:426:MET:HE2	1:A:444:ILE:HD11	1.64	0.78
1:A:386:LEU:HD21	1:A:425:LEU:HD13	1.67	0.77
1:A:107:GLU:CB	1:A:110:PRO:HD3	2.17	0.73
1:A:477:GLN:HE21	1:A:489:LEU:HA	1.51	0.73
1:A:426:MET:CE	1:A:444:ILE:CD1	2.72	0.68
1:A:106:ARG:HG2	1:A:106:ARG:HH11	1.58	0.68
1:A:426:MET:CE	1:A:444:ILE:HD11	2.23	0.68
1:A:207:ASP:OD2	3:A:708:HOH:O	2.13	0.65
1:A:371:GLN:HE21	1:A:375:ASN:ND2	1.94	0.65
1:A:101:ARG:HD3	1:A:139:GLU:OE1	2.00	0.62
1:A:106:ARG:HB3	3:A:589:HOH:O	1.99	0.61
1:A:434:THR:HG22	3:A:617:HOH:O	2.01	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:284:GLU:O	1:A:288:MET:HG3	2.01	0.61
1:A:346:ASN:HD22	1:A:348:LYS:H	1.47	0.60
1:A:285:ARG:HD2	3:A:546:HOH:O	2.04	0.58
2:B:568:LYS:HE2	2:B:570:GLU:O	2.03	0.58
1:A:150:GLY:HA3	1:A:154:GLN:OE1	2.06	0.56
1:A:257:VAL:HG22	1:A:294:VAL:CG1	2.37	0.55
1:A:307:LEU:HD21	1:A:348:LYS:HG2	1.88	0.55
1:A:80:ASP:OD2	3:A:697:HOH:O	2.18	0.54
1:A:438:GLN:O	1:A:442:ASP:HB2	2.06	0.54
1:A:106:ARG:HG2	1:A:106:ARG:NH1	2.21	0.54
1:A:385:VAL:HG12	1:A:397:ALA:HB2	1.90	0.54
1:A:434:THR:O	1:A:438:GLN:HG3	2.08	0.54
1:A:426:MET:HE1	1:A:444:ILE:CD1	2.38	0.53
1:A:106:ARG:CG	1:A:106:ARG:O	2.57	0.53
3:A:646:HOH:O	2:B:562:PRO:CG	2.56	0.53
1:A:371:GLN:NE2	1:A:375:ASN:HD21	2.01	0.52
1:A:401:ILE:HD12	1:A:416:LEU:HD11	1.92	0.52
1:A:273:TRP:CD2	1:A:312:PRO:HB3	2.44	0.52
1:A:346:ASN:ND2	1:A:348:LYS:H	2.08	0.51
1:A:180:GLU:HB2	1:A:225:TYR:CD1	2.45	0.50
1:A:282:PRO:HD2	1:A:285:ARG:HG3	1.92	0.50
1:A:405:THR:HB	1:A:446:ASN:HB3	1.94	0.50
1:A:78:VAL:O	1:A:82:VAL:HG23	2.11	0.50
3:A:646:HOH:O	2:B:562:PRO:CB	2.60	0.50
1:A:366:ARG:HD2	1:A:368:ASP:OD1	2.12	0.50
1:A:420:GLY:O	1:A:424:PRO:HD2	2.12	0.50
1:A:426:MET:HE2	1:A:444:ILE:CD1	2.33	0.49
1:A:101:ARG:CD	1:A:139:GLU:OE1	2.59	0.49
1:A:180:GLU:HB2	1:A:225:TYR:CE1	2.46	0.49
1:A:371:GLN:NE2	1:A:375:ASN:ND2	2.60	0.49
1:A:315:ARG:HH12	2:B:560:ASP:N	2.11	0.49
1:A:426:MET:HE1	1:A:444:ILE:HD12	1.94	0.49
1:A:107:GLU:HB3	2:B:567:LEU:HD22	1.94	0.48
1:A:107:GLU:HB2	1:A:110:PRO:CD	2.31	0.47
1:A:179:SER:O	1:A:183:VAL:HG23	2.13	0.47
1:A:83:LYS:HE3	3:A:19:HOH:O	2.13	0.47
1:A:392:LYS:HA	1:A:392:LYS:HD2	1.60	0.47
1:A:452:GLU:HG3	1:A:457:THR:HG21	1.96	0.47
1:A:360:SER:HA	1:A:400:ALA:HA	1.97	0.47
1:A:341:PRO:HD3	1:A:378:LEU:HD21	1.97	0.46
3:A:646:HOH:O	2:B:562:PRO:HB2	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:374:VAL:HG13	1:A:415:TYR:CE2	2.51	0.46
1:A:184:TRP:CH2	2:B:568:LYS:HG3	2.50	0.45
1:A:125:VAL:O	1:A:128:LEU:HB2	2.16	0.45
1:A:272:CYS:HB3	1:A:312:PRO:HB2	1.99	0.45
1:A:330:LYS:HD3	3:A:645:HOH:O	2.16	0.45
1:A:422:ILE:O	1:A:426:MET:HG2	2.16	0.45
1:A:448:PHE:HB3	1:A:495:TYR:CZ	2.52	0.44
1:A:321:VAL:HG23	1:A:361:ASN:HB2	1.99	0.44
1:A:409:THR:H	1:A:412:GLN:NE2	2.15	0.44
1:A:425:LEU:HG	1:A:440:ILE:HG23	2.00	0.44
1:A:448:PHE:CD1	1:A:460:LEU:HD23	2.53	0.43
1:A:73:THR:HA	1:A:76:TRP:NE1	2.33	0.43
1:A:147:ILE:HG22	1:A:158:VAL:HG23	2.00	0.43
1:A:299:VAL:O	1:A:302:LEU:HB3	2.18	0.43
3:A:618:HOH:O	2:B:571:GLN:HG3	2.19	0.43
1:A:260:LEU:HD13	1:A:271:SER:HB3	1.99	0.43
1:A:484:VAL:O	1:A:488:SER:HB2	2.19	0.43
1:A:257:VAL:O	1:A:261:HIS:HD2	2.03	0.42
1:A:385:VAL:CG1	1:A:393:THR:HG22	2.49	0.42
1:A:401:ILE:HG23	1:A:416:LEU:HD21	2.01	0.42
1:A:134:SER:O	1:A:137:GLN:HB2	2.19	0.42
1:A:142:TRP:CE2	2:B:568:LYS:HD3	2.55	0.42
1:A:135:PRO:O	1:A:139:GLU:HG2	2.19	0.41
1:A:306:GLU:HB2	1:A:309:ILE:HD12	2.03	0.41
1:A:392:LYS:NZ	1:A:395:LYS:HD3	2.36	0.41
1:A:459:LYS:O	1:A:463:MET:HG3	2.21	0.41
1:A:490:ASN:O	1:A:494:LYS:HB2	2.21	0.41
1:A:282:PRO:HD2	1:A:285:ARG:CG	2.51	0.41
1:A:301:LEU:HD23	1:A:301:LEU:HA	1.87	0.41
1:A:121:ILE:HD11	1:A:147:ILE:HG21	2.02	0.40
1:A:275:ILE:O	1:A:279:THR:HG23	2.22	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	423/510 (83%)	411 (97%)	12 (3%)	0	100	100
2	B	10/13 (77%)	9 (90%)	1 (10%)	0	100	100
All	All	433/523 (83%)	420 (97%)	13 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	348/426 (82%)	332 (95%)	16 (5%)	31	42
2	B	9/11 (82%)	8 (89%)	1 (11%)	7	8
All	All	357/437 (82%)	340 (95%)	17 (5%)	30	40

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	101	ARG
1	A	106	ARG
1	A	134	SER
1	A	228	ASN
1	A	342	SER
1	A	348	LYS
1	A	350	ASN
1	A	406	SER
1	A	434	THR
1	A	442	ASP
1	A	453	LYS
1	A	457	THR
1	A	459	LYS
1	A	478	ARG
1	A	480	GLU

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Mol	Chain	Res	Type
1	A	493	GLU
2	B	563	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	86	ASN
1	A	175	HIS
1	A	177	HIS
1	A	263	ASN
1	A	283	ASN
1	A	346	ASN
1	A	352	GLN
1	A	375	ASN
1	A	412	GLN
1	A	438	GLN
1	A	477	GLN
1	A	479	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

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	425/510 (83%)	0.16	27 (6%) 20 26	24, 35, 81, 101	0
2	B	12/13 (92%)	0.86	2 (16%) 2 2	20, 39, 62, 70	0
All	All	437/523 (83%)	0.18	29 (6%) 19 25	20, 35, 81, 101	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	560	ASP	5.9
1	A	485	TYR	5.5
1	A	107	GLU	4.9
1	A	480	GLU	4.8
1	A	496	PHE	4.4
1	A	482	GLU	4.2
1	A	489	LEU	4.2
1	A	478	ARG	3.8
1	A	74	VAL	3.7
2	B	561	GLY	3.4
1	A	455	GLY	3.1
1	A	106	ARG	3.1
1	A	493	GLU	3.0
1	A	275	ILE	2.8
1	A	462	ILE	2.7
1	A	483	SER	2.5
1	A	454	LEU	2.5
1	A	432	LYS	2.5
1	A	465	GLU	2.4
1	A	382	LEU	2.4
1	A	88	ASN	2.4
1	A	434	THR	2.2
1	A	466	GLU	2.1
1	A	108	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	456	GLU	2.0
1	A	144	LEU	2.0
1	A	73	THR	2.0
1	A	233	LEU	2.0
1	A	143	ALA	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 carbohydrates 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.