



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 10:12 PM UTC

PDB ID : 7VKJ / pdb_00007vkj
Title : Structure of ESRP1 qRRM3 domain
Authors : Wu, B.X.; Patel, D.J.
Deposited on : 2021-09-30
Resolution : 1.45 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

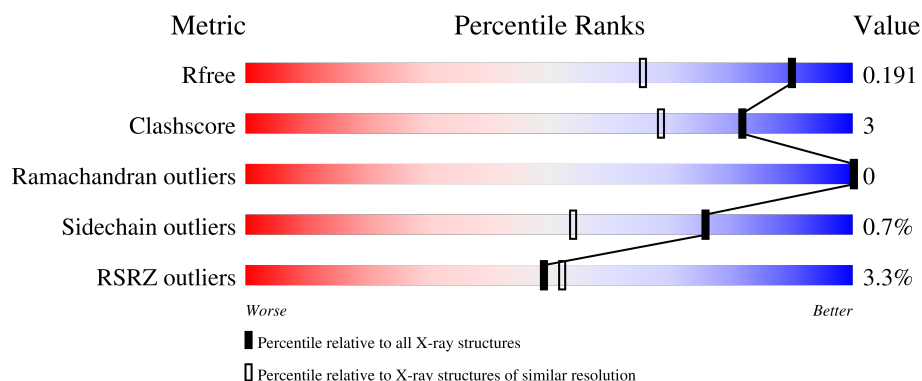
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.45 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	1756 (1.46-1.46)
Clashscore	190562	1795 (1.46-1.46)
Ramachandran outliers	187476	1776 (1.46-1.46)
Sidechain outliers	187428	1776 (1.46-1.46)
RSRZ outliers	180081	1756 (1.46-1.46)

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	110	2% 82% 13% 5%
1	B	110	5% 85% 9% 5%
1	C	110	3% 89% 5% 5%
1	D	110	2% 86% 7% 5%
1	E	110	2% 85% 6% 8%

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Mol	Chain	Length	Quality of chain
1	F	110	5% 90% 5% 5%
1	G	110	% 85% 9% 5%
1	H	110	5% 86% 8% 5%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 7513 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 Epithelial splicing regulatory protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	104	Total	C	N	O	S	0	1	0
			833	521	153	150	9			
1	B	104	Total	C	N	O	S	0	0	0
			824	516	151	148	9			
1	C	104	Total	C	N	O	S	0	0	0
			825	516	151	149	9			
1	D	104	Total	C	N	O	S	0	0	0
			825	516	151	149	9			
1	E	101	Total	C	N	O	S	0	0	0
			797	502	143	143	9			
1	F	104	Total	C	N	O	S	0	0	0
			825	516	151	149	9			
1	G	104	Total	C	N	O	S	0	0	0
			825	516	151	149	9			
1	H	104	Total	C	N	O	S	0	0	0
			825	516	151	149	9			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	139	Total	O	0	0
			139	139		
2	B	116	Total	O	0	0
			116	116		
2	C	118	Total	O	0	0
			118	118		
2	D	122	Total	O	0	0
			122	122		
2	E	99	Total	O	0	0
			99	99		
2	F	107	Total	O	0	0
			107	107		

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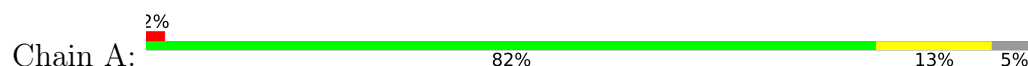
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	G	126	Total 126	O 126	0	0
2	H	107	Total 107	O 107	0	0

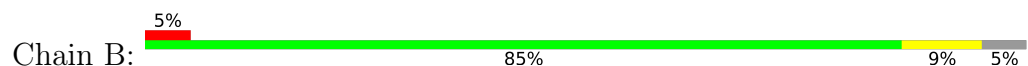
3 Residue-property plots [i](#)

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 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.

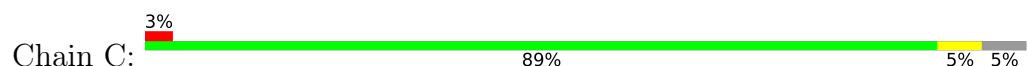
- Molecule 1: Epithelial splicing regulatory protein 1



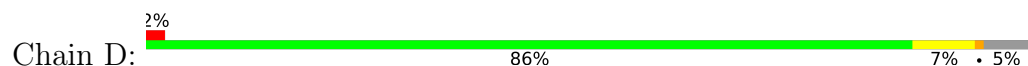
- Molecule 1: Epithelial splicing regulatory protein 1



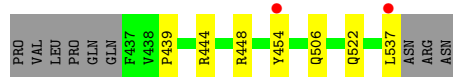
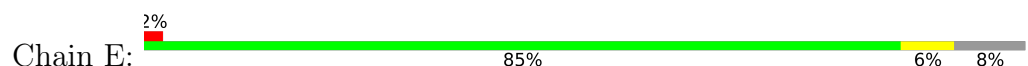
- Molecule 1: Epithelial splicing regulatory protein 1



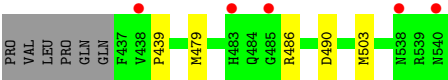
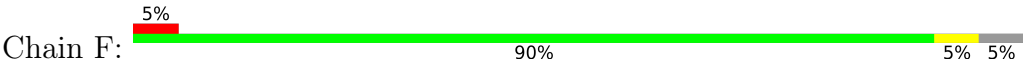
- Molecule 1: Epithelial splicing regulatory protein 1



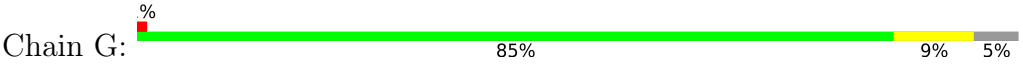
- Molecule 1: Epithelial splicing regulatory protein 1



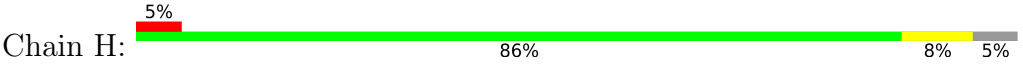
- Molecule 1: Epithelial splicing regulatory protein 1



● Molecule 1: Epithelial splicing regulatory protein 1



● Molecule 1: Epithelial splicing regulatory protein 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	89.57Å 102.81Å 107.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.35 – 1.45 29.35 – 1.45	Depositor EDS
% Data completeness (in resolution range)	93.2 (29.35-1.45) 93.2 (29.35-1.45)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.11 (at 1.45Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.171 , 0.190 0.171 , 0.191	Depositor DCC
R_{free} test set	8155 reflections (4.66%)	wwPDB-VP
Wilson B-factor (Å ²)	13.9	Xtriage
Anisotropy	0.032	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 30.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.012 for -h,l,k	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7513	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.82% 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	1.02	1/849 (0.1%)	1.21	6/1141 (0.5%)
1	B	1.05	0/840	1.21	1/1129 (0.1%)
1	C	1.07	1/841 (0.1%)	1.20	2/1129 (0.2%)
1	D	1.05	1/841 (0.1%)	1.18	4/1129 (0.4%)
1	E	1.08	0/813	1.17	1/1093 (0.1%)
1	F	1.09	0/841	1.18	2/1129 (0.2%)
1	G	1.08	1/841 (0.1%)	1.17	2/1129 (0.2%)
1	H	1.07	2/841 (0.2%)	1.27	5/1129 (0.4%)
All	All	1.07	6/6707 (0.1%)	1.20	23/9008 (0.3%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	478	HIS	CE1-NE2	6.24	1.38	1.32
1	G	478	HIS	CE1-NE2	5.59	1.38	1.32
1	A	478	HIS	CE1-NE2	5.43	1.38	1.32
1	D	477	VAL	C-O	5.24	1.29	1.24
1	H	453	PRO	C-O	-5.20	1.17	1.23
1	H	509	HIS	CE1-NE2	5.06	1.37	1.32

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	453	PRO	CB-CA-C	7.24	120.76	111.64
1	H	454	TYR	CA-C-O	-6.74	112.65	120.20
1	F	490	ASP	CA-CB-CG	6.40	119.00	112.60
1	G	490	ASP	CA-CB-CG	6.37	118.97	112.60
1	B	439	PRO	N-CA-CB	6.18	106.65	103.19
1	C	490	ASP	CA-CB-CG	6.12	118.72	112.60
1	D	483	HIS	CA-CB-CG	-5.70	108.10	113.80
1	H	453	PRO	N-CA-CB	-5.65	98.18	103.27
1	D	439	PRO	N-CA-CB	5.54	106.30	103.19
1	A	463	ASP	CA-CB-CG	5.53	118.13	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	439	PRO	N-CA-CB	5.51	106.28	103.19
1	D	473	ARG	CA-C-N	5.22	130.47	121.86
1	D	473	ARG	C-N-CA	5.22	130.47	121.86
1	C	515	ASP	CA-CB-CG	5.20	117.80	112.60
1	F	439	PRO	N-CA-CB	5.18	108.11	103.08
1	A	521	PHE	CA-CB-CG	5.15	118.95	113.80
1	A	464	PHE	CA-CB-CG	5.14	118.94	113.80
1	A	539	ARG	CA-C-O	-5.07	115.22	120.70
1	A	467	GLU	N-CA-C	-5.06	105.95	111.82
1	A	490	ASP	CA-CB-CG	5.05	117.65	112.60
1	H	473	ARG	CA-C-N	-5.04	112.50	122.02
1	H	473	ARG	C-N-CA	-5.04	112.50	122.02
1	G	521	PHE	CA-CB-CG	5.03	118.83	113.80

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	833	0	818	6	1
1	B	824	0	811	8	0
1	C	825	0	811	2	0
1	D	825	0	811	6	0
1	E	797	0	786	4	1
1	F	825	0	811	5	0
1	G	825	0	811	4	0
1	H	825	0	811	4	0
2	A	139	0	0	2	0
2	B	116	0	0	5	1
2	C	118	0	0	0	1
2	D	122	0	0	4	1
2	E	99	0	0	0	0
2	F	107	0	0	3	1
2	G	126	0	0	2	0
2	H	107	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7513	0	6470	33	3

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 3.

All (33) 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:B:503:MET:HG3	2:B:626:HOH:O	1.10	1.26
1:D:473:ARG:O	2:D:601:HOH:O	1.75	1.02
1:F:503:MET:HG3	2:F:616:HOH:O	1.63	0.95
1:B:540:ASN:O	2:B:601:HOH:O	1.84	0.92
1:E:448:ARG:NH1	1:E:537:LEU:HD12	1.90	0.87
1:A:540:ASN:OD1	2:A:601:HOH:O	1.94	0.85
1:F:479:MET:HE3	2:F:652:HOH:O	1.77	0.83
1:A:486:ARG:NH2	1:D:459:GLU:OE2	2.16	0.77
1:H:464:PHE:O	1:H:511:LYS:HE3	1.88	0.73
1:G:503:MET:HG3	2:G:601:HOH:O	1.88	0.72
1:D:478:HIS:HE1	2:D:703:HOH:O	1.74	0.70
1:A:519:GLU:OE2	2:A:602:HOH:O	2.11	0.69
1:A:470:THR:HG23	1:B:516:ARG:HH12	1.58	0.68
1:F:503:MET:HE3	2:F:665:HOH:O	1.97	0.64
1:H:464:PHE:O	1:H:511:LYS:CE	2.50	0.59
1:C:454:TYR:HE1	1:F:486:ARG:NH2	2.06	0.54
1:B:513:MET:HE3	1:B:518:VAL:HG21	1.90	0.53
1:C:454:TYR:CE1	1:F:486:ARG:NH2	2.77	0.52
1:E:448:ARG:HH12	1:E:537:LEU:HB2	1.76	0.51
1:D:478:HIS:CE1	2:D:703:HOH:O	2.56	0.51
1:G:500:ARG:NH1	2:G:601:HOH:O	2.33	0.49
1:B:483:HIS:HE1	1:B:534:GLY:O	1.96	0.48
1:D:511:LYS:NZ	2:D:603:HOH:O	2.41	0.47
1:B:514:LYS:HD2	2:B:637:HOH:O	2.15	0.46
1:G:449:LEU:HD22	1:G:520:VAL:HG22	1.98	0.45
1:B:514:LYS:HE3	2:B:708:HOH:O	2.19	0.42
1:E:444:ARG:HB3	1:E:522:GLN:HG2	2.00	0.42
1:B:470:THR:HG23	2:B:663:HOH:O	2.20	0.42
1:A:459:GLU:HG3	1:D:487:PRO:HG2	2.01	0.41
1:H:475:HIS:CD2	2:H:688:HOH:O	2.74	0.41
1:H:444:ARG:HB3	1:H:522:GLN:HG2	2.03	0.41
1:G:450:ARG:HB3	1:G:519:GLU:HB2	2.03	0.41
1:A:540:ASN:HB2	1:E:454:TYR:CE2	2.55	0.41

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:636:HOH:O	2:F:617:HOH:O[4_445]	1.63	0.57
1:A:506[B]:GLN:NE2	1:E:506:GLN:OE1[4_555]	2.16	0.04
2:B:703:HOH:O	2:D:719:HOH:O[3_545]	2.18	0.02

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	103/110 (94%)	100 (97%)	3 (3%)	0	100	100
1	B	102/110 (93%)	101 (99%)	1 (1%)	0	100	100
1	C	102/110 (93%)	100 (98%)	2 (2%)	0	100	100
1	D	102/110 (93%)	100 (98%)	2 (2%)	0	100	100
1	E	99/110 (90%)	96 (97%)	3 (3%)	0	100	100
1	F	102/110 (93%)	101 (99%)	1 (1%)	0	100	100
1	G	102/110 (93%)	99 (97%)	3 (3%)	0	100	100
1	H	102/110 (93%)	98 (96%)	4 (4%)	0	100	100
All	All	814/880 (92%)	795 (98%)	19 (2%)	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	89/94 (95%)	88 (99%)	1 (1%)	65	38
1	B	88/94 (94%)	88 (100%)	0	100	100
1	C	88/94 (94%)	86 (98%)	2 (2%)	44	13
1	D	88/94 (94%)	87 (99%)	1 (1%)	65	38
1	E	85/94 (90%)	85 (100%)	0	100	100
1	F	88/94 (94%)	88 (100%)	0	100	100
1	G	88/94 (94%)	87 (99%)	1 (1%)	65	38
1	H	88/94 (94%)	88 (100%)	0	100	100
All	All	702/752 (93%)	697 (99%)	5 (1%)	76	54

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

Mol	Chain	Res	Type
1	A	441	THR
1	C	474	THR
1	C	514	LYS
1	D	441	THR
1	G	507	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	540	ASN
1	B	483	HIS
1	B	494	GLN
1	B	506	GLN
1	C	478	HIS
1	D	442	ASN
1	D	478	HIS
1	D	506	GLN
1	E	442	ASN
1	E	484	GLN
1	E	494	GLN
1	F	506	GLN
1	G	442	ASN
1	G	475	HIS
1	H	442	ASN
1	H	483	HIS

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 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	104/110 (94%)	-0.21	2 (1%) 66 68	7, 12, 22, 38	1 (0%)
1	B	104/110 (94%)	0.18	6 (5%) 29 28	10, 15, 28, 45	0
1	C	104/110 (94%)	-0.06	3 (2%) 53 56	9, 12, 26, 33	0
1	D	104/110 (94%)	-0.02	2 (1%) 66 68	10, 14, 26, 43	0
1	E	101/110 (91%)	0.05	2 (1%) 65 67	9, 14, 25, 33	0
1	F	104/110 (94%)	0.08	5 (4%) 35 37	9, 14, 30, 45	0
1	G	104/110 (94%)	-0.15	1 (0%) 79 83	10, 13, 24, 32	0
1	H	104/110 (94%)	0.16	6 (5%) 29 28	11, 15, 28, 47	0
All	All	829/880 (94%)	0.00	27 (3%) 49 52	7, 14, 27, 47	1 (0%)

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	454	TYR	3.6
1	F	538	ASN	3.3
1	A	540	ASN	3.2
1	F	438	VAL	3.1
1	E	537	LEU	3.0
1	B	438	VAL	2.9
1	H	517	TYR	2.8
1	F	483	HIS	2.8
1	H	540	ASN	2.7
1	F	485	GLY	2.7
1	A	454	TYR	2.7
1	E	454	TYR	2.6
1	H	538	ASN	2.6
1	F	540	ASN	2.6
1	D	483	HIS	2.6
1	B	517	TYR	2.5

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Mol	Chain	Res	Type	RSRZ
1	G	540	ASN	2.5
1	B	540	ASN	2.4
1	B	515	ASP	2.4
1	C	438	VAL	2.3
1	B	537	LEU	2.2
1	H	453	PRO	2.2
1	C	540	ASN	2.1
1	B	442	ASN	2.1
1	H	437	PHE	2.1
1	C	538	ASN	2.1
1	D	538	ASN	2.1

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.