



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 17, 2024 – 04:01 pm BST

PDB ID : 8PRA
Title : The structure of v13Bagel4
Authors : Vandebroek, L.; Voet, A.R.D.; Lee, X.Y.
Deposited on : 2023-07-12
Resolution : 2.05 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.37.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

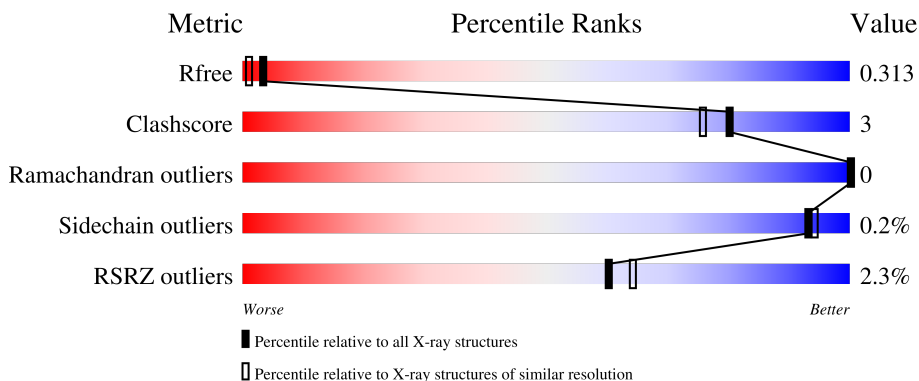
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

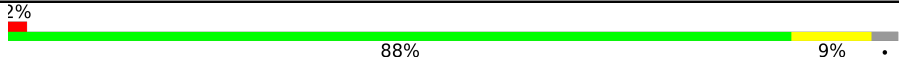
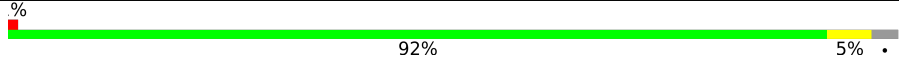

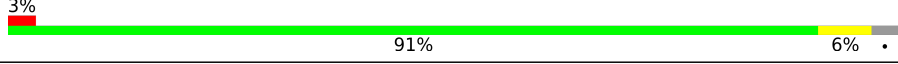
The reported resolution of this entry is 2.05 Å.

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}	130704	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (2.04-2.04)

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	165	 2% 88% 9%
1	B	165	 1% 92% 5%
1	C	165	 3% 88% 9%
1	D	165	 3% 91% 6%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 4988 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 Cell surface protein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	160	1224	780	208	236	1	0	0
1	B	160	1224	780	208	236	0	0	0
1	C	160	1224	780	208	236	0	0	0
1	D	160	1224	780	208	236	1	0	0

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP B5YBJ6
A	-2	SER	-	expression tag	UNP B5YBJ6
A	-1	HIS	-	expression tag	UNP B5YBJ6
A	0	MET	-	expression tag	UNP B5YBJ6
A	1	ASN	ASP	conflict	UNP B5YBJ6
A	3	LYS	THR	conflict	UNP B5YBJ6
A	9	GLU	LYS	conflict	UNP B5YBJ6
A	37	ALA	LYS	conflict	UNP B5YBJ6
A	39	ASN	SER	conflict	UNP B5YBJ6
A	41	ASN	TYR	conflict	UNP B5YBJ6
A	43	LYS	ILE	conflict	UNP B5YBJ6
A	49	GLU	LYS	conflict	UNP B5YBJ6
A	52	GLY	ARG	conflict	UNP B5YBJ6
A	53	SER	ALA	conflict	UNP B5YBJ6
A	55	HIS	LEU	conflict	UNP B5YBJ6
A	71	ASN	MET	conflict	UNP B5YBJ6
A	81	ASN	ASP	conflict	UNP B5YBJ6
A	83	LYS	THR	conflict	UNP B5YBJ6
A	89	GLU	LYS	conflict	UNP B5YBJ6
A	111	ASN	ASP	conflict	UNP B5YBJ6
A	132	GLY	ARG	conflict	UNP B5YBJ6

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Chain	Residue	Modelled	Actual	Comment	Reference
A	133	SER	PRO	conflict	UNP B5YBJ6
A	151	ASN	MET	conflict	UNP B5YBJ6
A	161	GLY	-	expression tag	UNP B5YBJ6
B	-3	GLY	-	expression tag	UNP B5YBJ6
B	-2	SER	-	expression tag	UNP B5YBJ6
B	-1	HIS	-	expression tag	UNP B5YBJ6
B	0	MET	-	expression tag	UNP B5YBJ6
B	1	ASN	ASP	conflict	UNP B5YBJ6
B	3	LYS	THR	conflict	UNP B5YBJ6
B	9	GLU	LYS	conflict	UNP B5YBJ6
B	37	ALA	LYS	conflict	UNP B5YBJ6
B	39	ASN	SER	conflict	UNP B5YBJ6
B	41	ASN	TYR	conflict	UNP B5YBJ6
B	43	LYS	ILE	conflict	UNP B5YBJ6
B	49	GLU	LYS	conflict	UNP B5YBJ6
B	52	GLY	ARG	conflict	UNP B5YBJ6
B	53	SER	ALA	conflict	UNP B5YBJ6
B	55	HIS	LEU	conflict	UNP B5YBJ6
B	71	ASN	MET	conflict	UNP B5YBJ6
B	81	ASN	ASP	conflict	UNP B5YBJ6
B	83	LYS	THR	conflict	UNP B5YBJ6
B	89	GLU	LYS	conflict	UNP B5YBJ6
B	111	ASN	ASP	conflict	UNP B5YBJ6
B	132	GLY	ARG	conflict	UNP B5YBJ6
B	133	SER	PRO	conflict	UNP B5YBJ6
B	151	ASN	MET	conflict	UNP B5YBJ6
B	161	GLY	-	expression tag	UNP B5YBJ6
C	-3	GLY	-	expression tag	UNP B5YBJ6
C	-2	SER	-	expression tag	UNP B5YBJ6
C	-1	HIS	-	expression tag	UNP B5YBJ6
C	0	MET	-	expression tag	UNP B5YBJ6
C	1	ASN	ASP	conflict	UNP B5YBJ6
C	3	LYS	THR	conflict	UNP B5YBJ6
C	9	GLU	LYS	conflict	UNP B5YBJ6
C	37	ALA	LYS	conflict	UNP B5YBJ6
C	39	ASN	SER	conflict	UNP B5YBJ6
C	41	ASN	TYR	conflict	UNP B5YBJ6
C	43	LYS	ILE	conflict	UNP B5YBJ6
C	49	GLU	LYS	conflict	UNP B5YBJ6
C	52	GLY	ARG	conflict	UNP B5YBJ6
C	53	SER	ALA	conflict	UNP B5YBJ6
C	55	HIS	LEU	conflict	UNP B5YBJ6

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Chain	Residue	Modelled	Actual	Comment	Reference
C	71	ASN	MET	conflict	UNP B5YBJ6
C	81	ASN	ASP	conflict	UNP B5YBJ6
C	83	LYS	THR	conflict	UNP B5YBJ6
C	89	GLU	LYS	conflict	UNP B5YBJ6
C	111	ASN	ASP	conflict	UNP B5YBJ6
C	132	GLY	ARG	conflict	UNP B5YBJ6
C	133	SER	PRO	conflict	UNP B5YBJ6
C	151	ASN	MET	conflict	UNP B5YBJ6
C	161	GLY	-	expression tag	UNP B5YBJ6
D	-3	GLY	-	expression tag	UNP B5YBJ6
D	-2	SER	-	expression tag	UNP B5YBJ6
D	-1	HIS	-	expression tag	UNP B5YBJ6
D	0	MET	-	expression tag	UNP B5YBJ6
D	1	ASN	ASP	conflict	UNP B5YBJ6
D	3	LYS	THR	conflict	UNP B5YBJ6
D	9	GLU	LYS	conflict	UNP B5YBJ6
D	37	ALA	LYS	conflict	UNP B5YBJ6
D	39	ASN	SER	conflict	UNP B5YBJ6
D	41	ASN	TYR	conflict	UNP B5YBJ6
D	43	LYS	ILE	conflict	UNP B5YBJ6
D	49	GLU	LYS	conflict	UNP B5YBJ6
D	52	GLY	ARG	conflict	UNP B5YBJ6
D	53	SER	ALA	conflict	UNP B5YBJ6
D	55	HIS	LEU	conflict	UNP B5YBJ6
D	71	ASN	MET	conflict	UNP B5YBJ6
D	81	ASN	ASP	conflict	UNP B5YBJ6
D	83	LYS	THR	conflict	UNP B5YBJ6
D	89	GLU	LYS	conflict	UNP B5YBJ6
D	111	ASN	ASP	conflict	UNP B5YBJ6
D	132	GLY	ARG	conflict	UNP B5YBJ6
D	133	SER	PRO	conflict	UNP B5YBJ6
D	151	ASN	MET	conflict	UNP B5YBJ6
D	161	GLY	-	expression tag	UNP B5YBJ6

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	27	Total O 27 27	0	0
2	B	22	Total O 22 22	0	0
2	C	21	Total O 21 21	0	0

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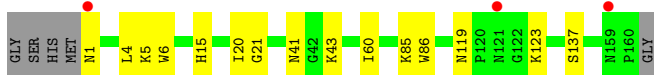
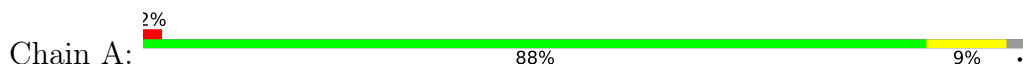
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	22	Total	O	0	0
			22	22		

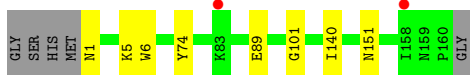
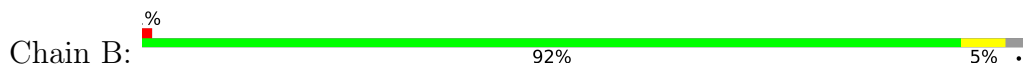
3 Residue-property plots [i](#)

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.

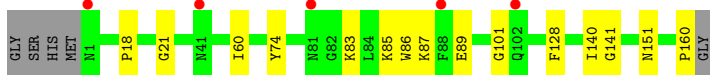
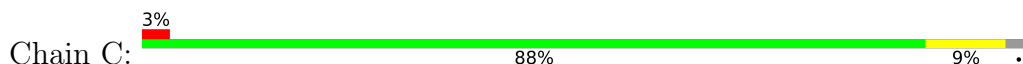
- Molecule 1: Cell surface protein



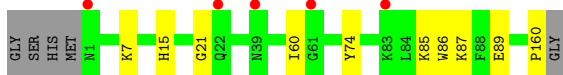
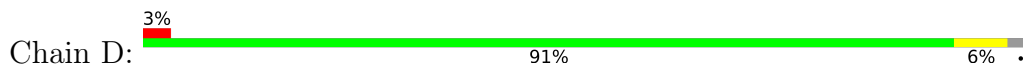
- Molecule 1: Cell surface protein



- Molecule 1: Cell surface protein



- Molecule 1: Cell surface protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	76.71Å 83.50Å 97.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	63.47 – 2.05 63.47 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.8 (63.47-2.05) 100.0 (63.47-2.05)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.05Å)	Xtrriage
Refinement program	PHENIX (1.19.2_4158: ???)	Depositor
R, R_{free}	0.274 , 0.312 0.276 , 0.313	Depositor DCC
R_{free} test set	1940 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	29.8	Xtrriage
Anisotropy	0.177	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 53.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4988	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 57.10 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.4845e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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	0.25	0/1263	0.46	0/1717
1	B	0.25	0/1263	0.45	0/1717
1	C	0.25	0/1263	0.46	0/1717
1	D	0.25	0/1263	0.46	0/1717
All	All	0.25	0/5052	0.46	0/6868

There are no bond length outliers.

There are no bond angle outliers.

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	1224	0	1154	10	0
1	B	1224	0	1154	6	0
1	C	1224	0	1154	10	0
1	D	1224	0	1154	8	0
2	A	27	0	0	0	0
2	B	22	0	0	0	0
2	C	21	0	0	0	0
2	D	22	0	0	1	0
All	All	4988	0	4616	26	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 3.

All (26) 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:D:85:LYS:HG2	1:D:86:TRP:CD1	2.33	0.63
1:D:74:TYR:CZ	1:D:89:GLU:HG3	2.43	0.53
1:D:7:LYS:NZ	2:D:202:HOH:O	2.44	0.50
1:A:119:ASN:HD22	1:A:123:LYS:HB3	1.76	0.50
1:C:101:GLY:HA2	1:C:140:ILE:HD13	1.93	0.50
1:A:1:ASN:H2	1:C:160:PRO:C	2.15	0.49
1:B:1:ASN:H2	1:D:160:PRO:C	2.15	0.49
1:B:151:ASN:ND2	1:D:15:HIS:HE1	2.11	0.48
1:B:5:LYS:HG2	1:B:6:TRP:CD1	2.50	0.47
1:B:74:TYR:CZ	1:B:89:GLU:HG3	2.49	0.47
1:A:85:LYS:HG2	1:A:86:TRP:CD1	2.51	0.45
1:B:101:GLY:HA2	1:B:140:ILE:HD13	1.97	0.45
1:A:21:GLY:HA2	1:A:60:ILE:HD13	1.98	0.45
1:C:74:TYR:CZ	1:C:89:GLU:HG3	2.52	0.45
1:C:85:LYS:HG2	1:C:86:TRP:CD1	2.51	0.45
1:C:83:LYS:HD2	1:C:83:LYS:HA	1.85	0.45
1:D:74:TYR:CE2	1:D:87:LYS:HE2	2.52	0.44
1:A:41:ASN:ND2	1:A:43:LYS:HG3	2.33	0.43
1:A:20:ILE:HD13	1:C:141:GLY:HA2	2.01	0.43
1:B:151:ASN:HD21	1:D:15:HIS:HE1	1.67	0.42
1:C:21:GLY:HA2	1:C:60:ILE:HD13	2.02	0.42
1:A:137:SER:O	1:C:18:PRO:HD2	2.20	0.41
1:D:21:GLY:HA2	1:D:60:ILE:HD13	2.01	0.41
1:A:5:LYS:HG2	1:A:6:TRP:CD1	2.56	0.41
1:A:15:HIS:HE1	1:C:151:ASN:ND2	2.18	0.41
1:A:4:LEU:HB2	1:C:128:PHE:CZ	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	158/165 (96%)	153 (97%)	5 (3%)	0	100	100
1	B	158/165 (96%)	151 (96%)	7 (4%)	0	100	100
1	C	158/165 (96%)	150 (95%)	8 (5%)	0	100	100
1	D	158/165 (96%)	152 (96%)	6 (4%)	0	100	100
All	All	632/660 (96%)	606 (96%)	26 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	128/131 (98%)	128 (100%)	0	100	100
1	B	128/131 (98%)	128 (100%)	0	100	100
1	C	128/131 (98%)	127 (99%)	1 (1%)	81	82
1	D	128/131 (98%)	128 (100%)	0	100	100
All	All	512/524 (98%)	511 (100%)	1 (0%)	93	94

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	87	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	HIS
1	A	73	HIS
1	A	113	HIS
1	A	119	ASN
1	B	15	HIS
1	B	33	HIS

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Mol	Chain	Res	Type
1	B	73	HIS
1	B	151	ASN
1	C	73	HIS
1	C	151	ASN
1	D	15	HIS
1	D	55	HIS
1	D	71	ASN
1	D	73	HIS
1	D	153	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 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 [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	160/165 (96%)	0.21	3 (1%) 66 71	18, 29, 46, 54	2 (1%)
1	B	160/165 (96%)	0.17	2 (1%) 77 79	17, 30, 48, 54	0
1	C	160/165 (96%)	0.29	5 (3%) 49 53	19, 32, 53, 60	1 (0%)
1	D	160/165 (96%)	0.36	5 (3%) 49 53	22, 34, 56, 61	2 (1%)
All	All	640/660 (96%)	0.26	15 (2%) 60 64	17, 31, 52, 61	5 (0%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	121	ASN	3.3
1	D	83	LYS	2.9
1	D	1	ASN	2.8
1	C	1	ASN	2.8
1	C	81	ASN	2.6
1	D	61	GLY	2.5
1	D	22	GLN	2.4
1	D	39	ASN	2.3
1	C	41	ASN	2.3
1	A	159	ASN	2.2
1	C	88	PHE	2.2
1	C	102	GLN	2.2
1	B	83	LYS	2.1
1	A	1	ASN	2.0
1	B	158	ILE	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 monosaccharides 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.