



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 07:55 AM UTC

PDB ID : 7ER0 / pdb_00007er0
Title : Crystal structure of capsid P domain of norovirus GI.3 VA115
Authors : Chen, Y.
Deposited on : 2021-05-05
Resolution : 2.18 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

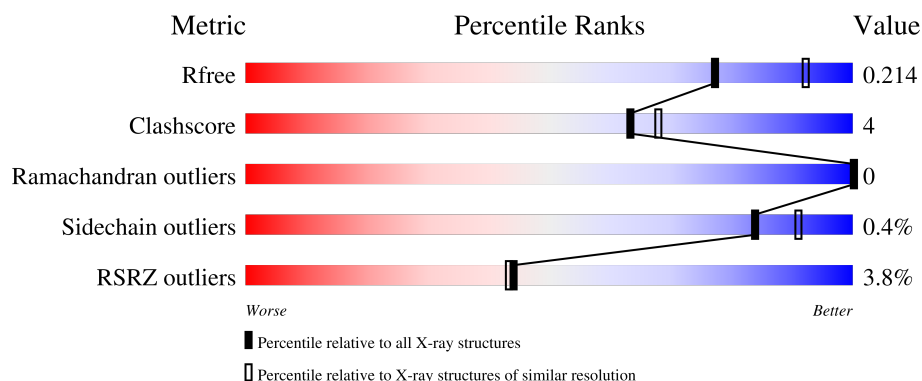
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (2.20-2.16)

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	327	2% 85% 7% 7%
1	B	327	% 85% 6% 8%
1	C	327	5% 83% 9% 7%
1	D	327	6% 83% 9% 8%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 10308 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 capsid P domain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	303	Total	C	N	O	S	0	0	0
			2311	1469	394	437	11			
1	B	300	Total	C	N	O	S	0	0	0
			2292	1458	392	431	11			
1	C	303	Total	C	N	O	S	0	0	0
			2313	1471	395	436	11			
1	D	302	Total	C	N	O	S	0	0	0
			2307	1468	394	434	11			

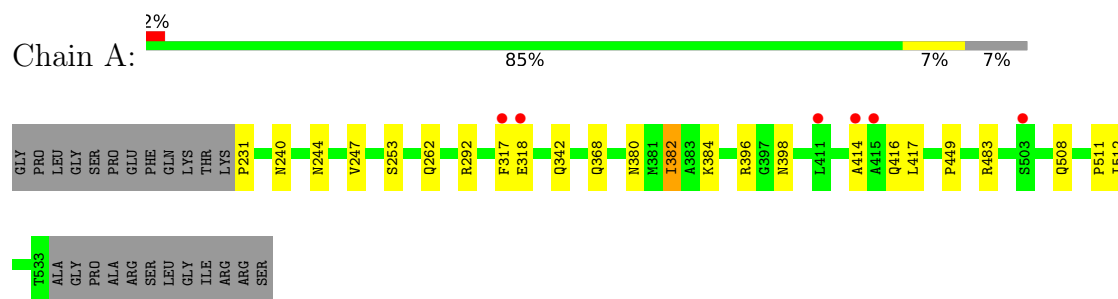
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	291	Total	O	0	0
			291	291		
2	B	266	Total	O	0	0
			266	266		
2	C	276	Total	O	0	0
			276	276		
2	D	252	Total	O	0	0
			252	252		

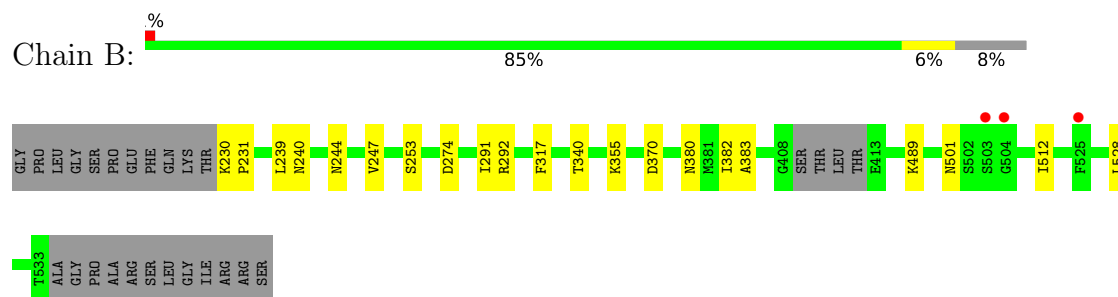
3 Residue-property plots [i](#)

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.

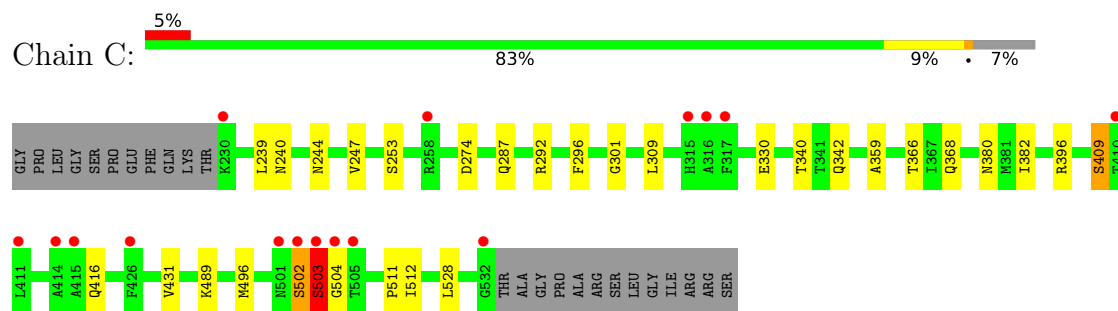
- Molecule 1: capsid P domain



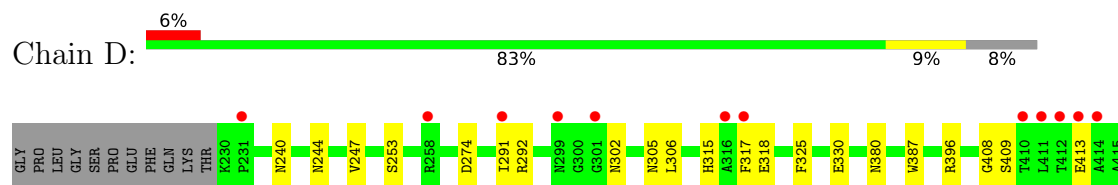
- Molecule 1: capsid P domain

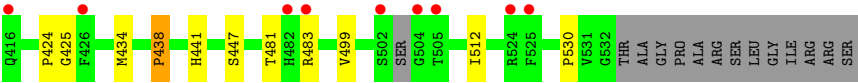


- Molecule 1: capsid P domain



- Molecule 1: capsid P domain





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	58.27Å 60.00Å 92.37Å 101.89° 97.73° 110.10°	Depositor
Resolution (Å)	41.78 – 2.18 41.78 – 2.18	Depositor EDS
% Data completeness (in resolution range)	92.9 (41.78-2.18) 92.9 (41.78-2.18)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.64 (at 2.18Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.186 , 0.226 (Not available) , 0.214	Depositor DCC
R_{free} test set	2846 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	17.2	Xtriage
Anisotropy	0.493	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 29.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.008 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	10308	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 5.41% 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	0.98	1/2381 (0.0%)	1.26	0/3255
1	B	1.00	0/2361	1.27	5/3225 (0.2%)
1	C	1.00	0/2383	1.26	5/3257 (0.2%)
1	D	1.00	0/2376	1.27	6/3246 (0.2%)
All	All	0.99	1/9501 (0.0%)	1.27	16/12983 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	449	PRO	C-O	-5.99	1.17	1.23

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	504	GLY	N-CA-C	8.80	127.38	114.10
1	D	438	PRO	CB-CA-C	8.09	122.22	111.71
1	C	503	SER	CB-CA-C	-7.44	99.35	110.06
1	B	501	ASN	CB-CA-C	6.74	123.61	109.65
1	C	502	SER	CA-C-O	-6.46	114.46	121.44
1	D	424	PRO	N-CA-C	6.10	121.97	114.35
1	B	501	ASN	N-CA-C	-5.75	102.89	110.43
1	B	274	ASP	CA-CB-CG	5.38	117.98	112.60
1	B	501	ASN	CA-C-N	5.37	127.79	120.54
1	B	501	ASN	C-N-CA	5.37	127.79	120.54
1	C	274	ASP	CA-CB-CG	5.27	117.87	112.60
1	D	425	GLY	CA-C-O	-5.23	116.59	122.24
1	C	409	SER	N-CA-C	5.04	120.05	112.94
1	D	302	ASN	N-CA-C	-5.01	100.54	109.06
1	D	408	GLY	CA-C-O	-5.01	118.23	122.29
1	D	274	ASP	CA-CB-CG	5.00	117.60	112.60

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	2311	0	2218	18	0
1	B	2292	0	2199	12	0
1	C	2313	0	2223	27	0
1	D	2307	0	2217	18	0
2	A	291	0	0	9	0
2	B	266	0	0	0	0
2	C	276	0	0	5	0
2	D	252	0	0	2	0
All	All	10308	0	8857	72	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 4.

All (72) 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:481:THR:HG21	1:D:483:ARG:HH22	1.50	0.75
1:D:481:THR:HG21	1:D:483:ARG:NH2	2.06	0.70
1:A:231:PRO:N	2:A:602:HOH:O	2.23	0.70
1:A:317:PHE:CD2	2:A:731:HOH:O	2.45	0.69
1:A:511:PRO:HD3	1:D:317:PHE:CE1	2.28	0.69
1:A:318:GLU:CG	2:A:808:HOH:O	2.44	0.65
1:C:359:ALA:HB3	1:C:368:GLN:HG3	1.80	0.64
1:D:434:MET:HE3	1:D:447:SER:OG	1.97	0.63
1:C:502:SER:O	1:C:503:SER:HB3	1.97	0.63
1:D:292:ARG:HE	1:D:380:ASN:HD21	1.47	0.62
1:A:292:ARG:HE	1:A:380:ASN:HD21	1.47	0.62
1:C:292:ARG:HE	1:C:380:ASN:HD21	1.47	0.61
1:D:315:HIS:HB3	1:D:317:PHE:CE2	2.36	0.61
1:B:292:ARG:HE	1:B:380:ASN:HD21	1.48	0.61
1:A:318:GLU:HG3	2:A:808:HOH:O	2.02	0.60
1:C:431:VAL:HG11	1:C:496:MET:CE	2.33	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:366:THR:HG22	2:C:667:HOH:O	2.03	0.58
1:C:309:LEU:HD23	2:C:763:HOH:O	2.06	0.55
1:C:359:ALA:CB	1:C:368:GLN:HG3	2.36	0.55
1:D:291:ILE:CD1	1:D:325:PHE:CE1	2.91	0.54
1:A:382:ILE:HD13	1:A:384:LYS:HE3	1.89	0.53
1:B:317:PHE:CE1	1:C:511:PRO:HD3	2.43	0.53
1:A:483:ARG:HD2	1:D:318:GLU:OE1	2.09	0.52
1:C:502:SER:O	1:C:503:SER:CB	2.57	0.52
1:D:291:ILE:HG23	1:D:306:LEU:HD22	1.91	0.51
1:D:305:ASN:HB3	2:D:791:HOH:O	2.11	0.51
1:C:409:SER:HB3	2:C:783:HOH:O	2.10	0.50
1:A:396:ARG:HG2	1:A:398:ASN:O	2.11	0.50
1:C:296:PHE:CE2	1:C:366:THR:HG23	2.45	0.50
1:A:342:GLN:NE2	2:A:605:HOH:O	2.34	0.49
1:C:287:GLN:HG3	1:C:309:LEU:HD13	1.94	0.48
1:C:340:THR:CG2	1:C:382:ILE:HG13	2.43	0.48
1:C:240:ASN:HB3	1:C:512:ILE:HG23	1.96	0.47
1:C:309:LEU:HD21	2:D:767:HOH:O	2.13	0.47
1:A:240:ASN:HB3	1:A:512:ILE:HG23	1.96	0.47
1:B:244:ASN:HB3	1:B:247:VAL:O	2.15	0.47
1:C:359:ALA:CB	1:C:368:GLN:CG	2.92	0.47
1:A:508:GLN:HG3	2:A:785:HOH:O	2.15	0.47
1:A:414:ALA:HA	1:A:417:LEU:HD12	1.97	0.46
1:A:318:GLU:HG2	2:A:808:HOH:O	2.13	0.46
1:D:244:ASN:HB3	1:D:247:VAL:O	2.15	0.46
1:A:244:ASN:HB3	1:A:247:VAL:O	2.15	0.46
1:A:262:GLN:HG3	2:A:758:HOH:O	2.15	0.46
1:D:291:ILE:HG12	1:D:325:PHE:CD1	2.51	0.45
1:D:330:GLU:OE1	1:D:396:ARG:NH2	2.49	0.45
1:C:330:GLU:OE1	1:C:396:ARG:NH2	2.49	0.45
1:D:499:VAL:O	1:D:530:PRO:HA	2.17	0.45
1:C:340:THR:HG22	1:C:382:ILE:HG13	1.98	0.45
1:A:253:SER:HA	1:A:512:ILE:HD13	1.99	0.45
1:C:244:ASN:HB3	1:C:247:VAL:O	2.16	0.45
1:C:359:ALA:HB1	1:C:368:GLN:HG2	1.99	0.44
1:C:489:LYS:HG3	1:C:528:LEU:HD21	1.98	0.44
1:B:291:ILE:CG1	1:B:383:ALA:HB3	2.47	0.44
1:B:340:THR:CG2	1:B:382:ILE:HG13	2.48	0.44
1:B:355:LYS:NZ	1:B:370:ASP:OD2	2.50	0.43
1:C:253:SER:HA	1:C:512:ILE:HD13	2.00	0.43
1:B:340:THR:HG22	1:B:382:ILE:HG13	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:416:GLN:HB2	2:C:622:HOH:O	2.18	0.43
1:D:409:SER:HB2	1:D:413:GLU:O	2.19	0.43
1:B:230:LYS:HB3	1:B:231:PRO:HD3	2.00	0.42
1:C:301:GLY:HA3	1:C:368:GLN:HE22	1.84	0.42
1:D:240:ASN:HB3	1:D:512:ILE:HG23	2.01	0.42
1:B:240:ASN:HB3	1:B:512:ILE:HG23	2.01	0.42
1:C:239:LEU:HD23	1:C:239:LEU:HA	1.94	0.42
1:D:253:SER:HA	1:D:512:ILE:HD13	2.02	0.41
1:B:489:LYS:HG3	1:B:528:LEU:HD21	2.02	0.41
1:C:342:GLN:HG3	2:C:819:HOH:O	2.20	0.41
1:A:416:GLN:HB2	2:A:603:HOH:O	2.20	0.41
1:B:253:SER:HA	1:B:512:ILE:HD13	2.03	0.40
1:C:301:GLY:CA	1:C:368:GLN:HE22	2.34	0.40
1:D:387:TRP:HB3	1:D:438:PRO:HB2	2.04	0.40
1:B:239:LEU:HD23	1:B:239:LEU:HA	1.96	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	301/327 (92%)	297 (99%)	4 (1%)	0	100	100
1	B	296/327 (90%)	289 (98%)	7 (2%)	0	100	100
1	C	301/327 (92%)	294 (98%)	7 (2%)	0	100	100
1	D	298/327 (91%)	294 (99%)	4 (1%)	0	100	100
All	All	1196/1308 (91%)	1174 (98%)	22 (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	254/272 (93%)	252 (99%)	2 (1%)	73	83
1	B	251/272 (92%)	251 (100%)	0	100	100
1	C	254/272 (93%)	253 (100%)	1 (0%)	84	91
1	D	253/272 (93%)	252 (100%)	1 (0%)	84	91
All	All	1012/1088 (93%)	1008 (100%)	4 (0%)	84	91

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	368	GLN
1	A	382	ILE
1	C	503	SER
1	D	441	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	380	ASN
1	B	262	GLN
1	B	315	HIS
1	B	368	GLN
1	B	380	ASN
1	B	416	GLN
1	B	482	HIS
1	C	299	ASN
1	C	315	HIS
1	C	368	GLN
1	C	380	ASN
1	D	378	ASN
1	D	380	ASN
1	D	508	GLN

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	303/327 (92%)	-0.00	6 (1%) 65 64	9, 15, 31, 57	0
1	B	300/327 (91%)	0.04	3 (1%) 79 79	9, 17, 34, 55	0
1	C	303/327 (92%)	0.13	16 (5%) 32 31	10, 16, 39, 62	0
1	D	302/327 (92%)	0.25	21 (6%) 22 21	10, 19, 44, 69	0
All	All	1208/1308 (92%)	0.11	46 (3%) 44 43	9, 17, 40, 69	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	525	PHE	4.8
1	C	317	PHE	4.7
1	D	426	PHE	4.5
1	C	414	ALA	4.5
1	A	414	ALA	4.2
1	C	258	ARG	4.2
1	D	412	THR	4.2
1	A	317	PHE	4.0
1	C	501	ASN	3.9
1	D	317	PHE	3.4
1	D	301	GLY	3.2
1	C	411	LEU	3.1
1	D	482	HIS	3.0
1	D	316	ALA	2.9
1	D	504	GLY	2.9
1	A	503	SER	2.9
1	D	411	LEU	2.9
1	D	413	GLU	2.8
1	D	483	ARG	2.8
1	D	502	SER	2.8
1	C	504	GLY	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	411	LEU	2.7
1	D	505	THR	2.5
1	B	504	GLY	2.5
1	C	415	ALA	2.5
1	C	410	THR	2.4
1	C	316	ALA	2.4
1	C	315	HIS	2.4
1	D	258	ARG	2.3
1	B	503	SER	2.3
1	D	299	ASN	2.2
1	A	318	GLU	2.2
1	D	416	GLN	2.2
1	D	231	PRO	2.2
1	D	414	ALA	2.2
1	C	230	LYS	2.2
1	D	410	THR	2.2
1	C	503	SER	2.1
1	D	524	ARG	2.1
1	C	532	GLY	2.1
1	D	291	ILE	2.1
1	C	426	PHE	2.1
1	C	505	THR	2.1
1	C	502	SER	2.1
1	B	525	PHE	2.0
1	A	415	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 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.