



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 09:46 AM GMT

PDB ID : 2J4W
Title : STRUCTURE OF A PLASMODIUM VIVAX APICAL MEMBRANE ANTI-GEN 1-FAB F8.12.19 COMPLEX
Authors : Igonet, S.; Vulliez-Le Normand, B.; Faure, G.; Riottot, M.M.; Kocken, C.H.M.; Thomas, A.W.; Bentley, G.A.
Deposited on : 2006-09-07
Resolution : 2.50 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

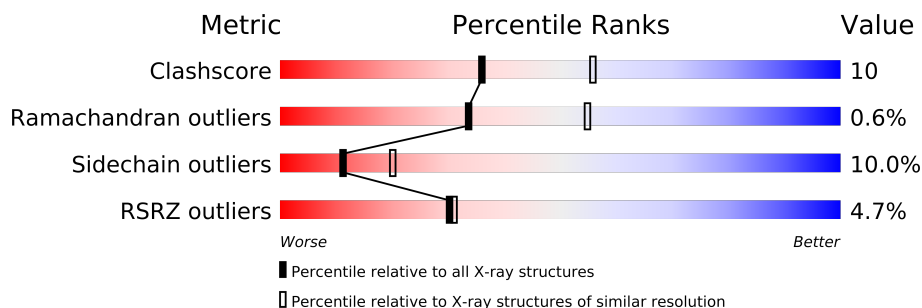
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.50 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))
Clashscore	79885	3562 (2.50-2.50)
Ramachandran outliers	78287	3480 (2.50-2.50)
Sidechain outliers	78261	3482 (2.50-2.50)
RSRZ outliers	66119	2785 (2.50-2.50)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	D	445	
2	H	225	
3	L	213	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3773 atoms, of which 0 are hydrogen and 0 are deuterium.

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 APICAL MEMBRANE ANTIGEN 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	D	34	Total	C	N	O	S	0	0	0
			270	167	43	55	5			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	178	ASN	SER	ENGINEERED MUTATION	UNP Q9TY14
D	226	ASP	ASN	ENGINEERED MUTATION	UNP Q9TY14
D	441	GLU	ASN	ENGINEERED MUTATION	UNP Q9TY14

- Molecule 2 is a protein called FAB FRAGMENT OF MONOCLONAL ANTIBODY F8.12.19.

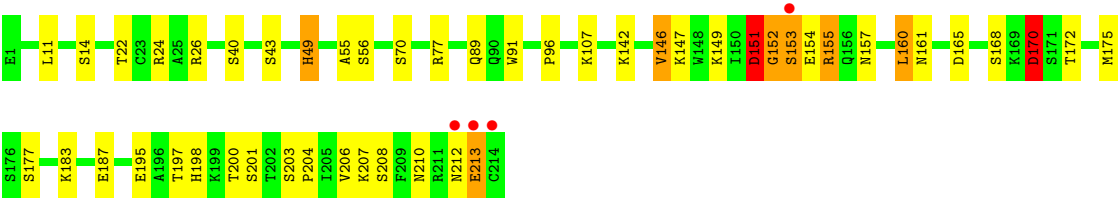
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	225	Total	C	N	O	S	0	0	0
			1701	1075	278	340	8			

- Molecule 3 is a protein called FAB FRAGMENT OF MONOCLONAL ANTIBODY F8.12.19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	213	Total	C	N	O	S	0	2	0
			1647	1019	286	334	8			

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	4	Total	O	0	0
			4	4		
4	H	61	Total	O	0	0
			61	61		
4	L	90	Total	O	0	0
			90	90		



4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α , β , γ	171.79Å 171.79Å 44.75Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.50 19.84 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.7 (20.00-2.50) 98.7 (19.84-2.50)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.25 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.2.0003	Depositor
R, R_{free}	0.187 , 0.241 0.189 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	40.1	Xtriage
Anisotropy	0.665	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 28.4	EDS
Estimated twinning fraction	0.039 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 26193 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3773	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.06% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PCA

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	D	0.82	0/274	0.73	0/368
2	H	0.85	1/1745 (0.1%)	0.93	6/2381 (0.3%)
3	L	5.28	4/1691 (0.2%)	2.07	11/2298 (0.5%)
All	All	3.62	5/3710 (0.1%)	1.55	17/5047 (0.3%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	L	49[A]	HIS	CD2-NE2	131.22	4.26	1.38
3	L	49[B]	HIS	CD2-NE2	131.22	4.26	1.38
3	L	49[A]	HIS	CG-CD2	76.12	2.65	1.35
3	L	49[B]	HIS	CG-CD2	76.12	2.65	1.35
2	H	208	CYS	CB-SG	-8.39	1.68	1.82

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	49[A]	HIS	CG-CD2-NE2	-44.05	25.50	109.20
3	L	49[B]	HIS	CG-CD2-NE2	-44.05	25.50	109.20
3	L	49[A]	HIS	ND1-CG-CD2	-33.39	59.25	106.00
3	L	49[B]	HIS	ND1-CG-CD2	-33.39	59.25	106.00
3	L	49[A]	HIS	CE1-NE2-CD2	-24.26	45.95	106.60
3	L	49[B]	HIS	CE1-NE2-CD2	-24.26	45.95	106.60
3	L	49[A]	HIS	CB-CG-CD2	-20.56	67.06	130.80
3	L	49[B]	HIS	CB-CG-CD2	-20.56	67.06	130.80
2	H	71	ARG	NE-CZ-NH2	6.82	123.71	120.30
3	L	11	LEU	CA-CB-CG	6.75	130.83	115.30
2	H	66	ARG	NE-CZ-NH2	-6.66	116.97	120.30
2	H	199	ARG	NE-CZ-NH1	-6.63	116.98	120.30
3	L	170	ASP	CB-CA-C	-6.22	97.97	110.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	71	ARG	NE-CZ-NH1	-5.94	117.33	120.30
2	H	66	ARG	NE-CZ-NH1	5.64	123.12	120.30
3	L	152	GLY	N-CA-C	-5.63	99.03	113.10
2	H	18	LEU	CA-CB-CG	5.12	127.09	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	270	0	254	9	0
2	H	1701	0	1649	36	0
3	L	1647	0	1566	36	0
4	D	4	0	0	0	0
4	H	61	0	0	0	0
4	L	90	0	0	2	0
All	All	3773	0	3469	74	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 10.

All (74) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
3:L:49[B]:HIS:CD2	3:L:49[B]:HIS:HB2	1.58	1.37
3:L:49[A]:HIS:CD2	3:L:49[A]:HIS:HB3	1.71	1.25
3:L:49[A]:HIS:CD2	3:L:49[A]:HIS:ND1	2.28	1.02
3:L:49[B]:HIS:CD2	3:L:49[B]:HIS:CB	2.44	1.01
3:L:49[A]:HIS:CD2	3:L:49[A]:HIS:CB	2.48	0.97
2:H:150:GLU:HG3	2:H:151:PRO:HA	1.48	0.94
2:H:156:THR:HG22	2:H:209:ASN:OD1	1.75	0.87
3:L:49[A]:HIS:CD2	3:L:49[A]:HIS:CG	2.65	0.83
3:L:152:GLY:O	3:L:154:GLU:N	2.15	0.79
2:H:196:SER:HB2	2:H:198:PRO:CD	2.17	0.74

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
3:L:149:LYS:HD3	3:L:153:SER:HB2	1.70	0.74
2:H:179:GLN:HG3	3:L:160:LEU:HD11	1.71	0.72
2:H:179:GLN:CG	3:L:160:LEU:HD11	2.20	0.71
2:H:150:GLU:HG3	2:H:151:PRO:CA	2.18	0.71
3:L:195:GLU:HG2	3:L:206:VAL:HG12	1.74	0.69
3:L:161:ASN:HB3	3:L:175:MET:CE	2.22	0.69
3:L:183:LYS:O	3:L:187:GLU:HG2	1.94	0.67
2:H:194:PRO:HD2	2:H:198:PRO:HG2	1.77	0.67
2:H:196:SER:HB2	2:H:198:PRO:HD2	1.78	0.64
1:D:430:ILE:HG21	1:D:449:CYS:HB2	1.80	0.62
2:H:71:ARG:HD3	2:H:73:ASN:OD1	1.99	0.62
2:H:199:ARG:HD2	2:H:200:PRO:HA	1.81	0.62
1:D:443:THR:O	1:D:443:THR:HG22	2.00	0.62
2:H:97:PRO:HD2	2:H:100:SER:HB2	1.82	0.61
3:L:26:ARG:HD3	4:L:2013:HOH:O	2.00	0.61
2:H:91:TYR:CE1	3:L:43:SER:HB3	2.36	0.61
3:L:170:ASP:HB3	3:L:172:THR:H	1.70	0.56
2:H:91:TYR:HE1	3:L:43:SER:HB3	1.73	0.53
1:D:423:ILE:HG12	1:D:424:SER:N	2.24	0.53
2:H:63:VAL:HG13	2:H:67:PHE:HB2	1.91	0.52
3:L:157:ASN:C	3:L:157:ASN:OD1	2.48	0.52
3:L:40:SER:HB3	3:L:165:ASP:OD2	2.11	0.51
3:L:152:GLY:C	3:L:154:GLU:N	2.63	0.51
3:L:14:SER:HB3	3:L:107:LYS:HB2	1.91	0.51
2:H:91:TYR:CE1	3:L:43:SER:CB	2.94	0.51
2:H:12:VAL:O	2:H:111:VAL:HA	2.11	0.50
1:D:423:ILE:HG12	1:D:424:SER:H	1.77	0.50
2:H:196:SER:CB	2:H:198:PRO:CD	2.89	0.49
2:H:36:TRP:HD1	2:H:69:ILE:HD12	1.77	0.49
2:H:179:GLN:HG3	3:L:160:LEU:HD21	1.96	0.48
1:D:423:ILE:HD11	1:D:446:PHE:HB3	1.96	0.47
2:H:156:THR:HG22	2:H:209:ASN:HB2	1.95	0.47
3:L:210:ASN:O	3:L:213:GLU:HB2	2.15	0.47
1:D:430:ILE:CG2	1:D:449:CYS:HB2	2.45	0.47
2:H:66:ARG:NH2	2:H:86:ASP:OD2	2.47	0.46
2:H:166:LEU:HD13	2:H:191:VAL:HG21	1.98	0.46
2:H:127:GLY:HA2	2:H:228:ARG:HD2	1.98	0.46
3:L:161:ASN:ND2	3:L:177:SER:OG	2.49	0.46
2:H:204:THR:OG1	2:H:222:LYS:HE3	2.16	0.45
2:H:11:LEU:HD23	2:H:116:THR:HG22	1.98	0.45
3:L:146:VAL:HA	3:L:195:GLU:O	2.16	0.45
3:L:161:ASN:HB3	3:L:175:MET:HE2	1.99	0.45

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:H:133:GLN:NE2	2:H:134:THR:HG22	2.31	0.45
3:L:203:SER:HB2	3:L:204:PRO:HD2	1.98	0.44
2:H:199:ARG:CD	2:H:200:PRO:HA	2.46	0.44
2:H:42:GLU:O	2:H:43:LYS:HB2	2.18	0.43
3:L:77[B]:ARG:HG3	4:L:2039:HOH:O	2.18	0.43
3:L:55:ALA:O	3:L:56:SER:C	2.58	0.43
3:L:203:SER:HB2	3:L:204:PRO:CD	2.48	0.43
2:H:217:THR:HG22	2:H:219:VAL:HG23	2.01	0.43
3:L:91:TRP:CG	3:L:96:PRO:HB3	2.53	0.43
1:D:425:ASN:HB2	1:D:445:ASN:O	2.20	0.42
1:D:430:ILE:HD11	1:D:447:TYR:HB2	2.01	0.42
1:D:430:ILE:HD11	1:D:447:TYR:CB	2.49	0.42
2:H:67:PHE:N	2:H:67:PHE:CD1	2.87	0.42
2:H:71:ARG:CD	2:H:73:ASN:OD1	2.66	0.41
2:H:196:SER:HB2	2:H:198:PRO:HD3	2.00	0.41
3:L:198:HIS:HD2	3:L:200:THR:OG1	2.03	0.41
2:H:156:THR:HG22	2:H:209:ASN:CG	2.40	0.41
2:H:100:SER:OG	3:L:49[B]:HIS:CE1	2.74	0.41
2:H:133:GLN:O	2:H:134:THR:HB	2.21	0.41
3:L:147:LYS:HZ3	3:L:155:ARG:NH1	2.19	0.41
2:H:135:ASN:ND2	2:H:135:ASN:N	2.68	0.41
3:L:151:ASP:O	3:L:152:GLY:C	2.55	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	D	32/445 (7%)	28 (88%)	4 (12%)	0	100	100
2	H	223/225 (99%)	209 (94%)	13 (6%)	1 (0%)	43	66
3	L	213/213 (100%)	201 (94%)	10 (5%)	2 (1%)	25	42
All	All	468/883 (53%)	438 (94%)	27 (6%)	3 (1%)	33	55

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	128	SER
3	L	153	SER
3	L	151	ASP

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	D	34/397 (9%)	32 (94%)	2 (6%)	28	48
2	H	192/192 (100%)	170 (88%)	22 (12%)	8	15
3	L	188/186 (101%)	171 (91%)	17 (9%)	14	25
All	All	414/775 (53%)	373 (90%)	41 (10%)	11	21

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	441	GLU
1	D	448	VAL
2	H	1	GLU
2	H	4	LEU
2	H	18	LEU
2	H	43	LYS
2	H	48	VAL
2	H	108	LEU
2	H	115	LYS
2	H	116	THR
2	H	124	LEU
2	H	133	GLN
2	H	135	ASN
2	H	138	VAL
2	H	140	LEU
2	H	142	CYS
2	H	156	THR
2	H	179	GLN
2	H	198	PRO
2	H	199	ARG

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Mol	Chain	Res	Type
2	H	204	THR
2	H	210	VAL
2	H	218	LYS
2	H	233	CYS
3	L	22	THR
3	L	24	ARG
3	L	70	SER
3	L	89	GLN
3	L	142	LYS
3	L	146	VAL
3	L	151	ASP
3	L	155	ARG
3	L	160	LEU
3	L	168	SER
3	L	170	ASP
3	L	197	THR
3	L	201	SER
3	L	207	LYS
3	L	208	SER
3	L	212	ASN
3	L	213	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
2	H	3	GLN
2	H	77	ASN
2	H	133	GLN
2	H	135	ASN
3	L	89	GLN
3	L	124	GLN
3	L	161	ASN
3	L	190	ASN
3	L	198	HIS
3	L	210	ASN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

1 non-standard protein/DNA/RNA residue is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	PCA	L	1	3	8,8,9	6.58	2 (25%)	8,10,12	21.27	4 (50%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PCA	L	1	3	-	0/0/11/13	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	L	1	PCA	O-C	17.52	1.23	1.11
3	L	1	PCA	CD-N	5.93	1.47	1.34

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	1	PCA	C-CA-N	44.12	120.68	110.71
3	L	1	PCA	CA-N-CD	-40.50	82.71	114.37
3	L	1	PCA	CB-CG-CD	-4.14	97.62	104.30
3	L	1	PCA	OE-CD-CG	-2.77	122.35	126.70

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

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	D	34/445 (7%)	1.01	9 (26%) 1 1	37, 57, 91, 94	0
2	H	225/225 (100%)	-0.24	9 (4%) 36 37	25, 38, 67, 99	0
3	L	213/213 (100%)	-0.35	4 (1%) 64 66	23, 36, 61, 100	1 (0%)
All	All	472/883 (53%)	-0.20	22 (4%) 30 31	23, 38, 72, 100	1 (0%)

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	233	CYS	9.7
3	L	214	CYS	7.8
1	D	443	THR	7.2
1	D	422	PHE	7.1
2	H	130	ALA	6.7
1	D	444	CYS	5.1
2	H	129	ALA	5.0
1	D	421	ILE	4.5
2	H	128	SER	4.3
1	D	454	LYS	3.9
1	D	440	SER	3.9
3	L	153	SER	3.8
1	D	442	SER	3.8
1	D	441	GLU	3.7
2	H	133	GLN	3.5
3	L	213	GLU	3.4
3	L	212	ASN	3.3
2	H	134	THR	3.2
2	H	135	ASN	2.9
2	H	136	SER	2.2
2	H	196	SER	2.1
1	D	446	PHE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(Å ²)	Q<0.9
3	PCA	L	1	8/9	0.21	-	57,59,61,61	0

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.