wwPDB X-ray Structure Validation Summary Report (i)

Aug 10, 2020 – 07:52 AM BST

PDB ID	:	4GW4
Title	:	Crystal structure of 3BNC60 Fab with P61A mutation
Authors	:	Diskin, R.; Fu, B.Z.; Bjorkman, P.J.
Deposited on	:	2012-08-31
Resolution	:	2.65 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

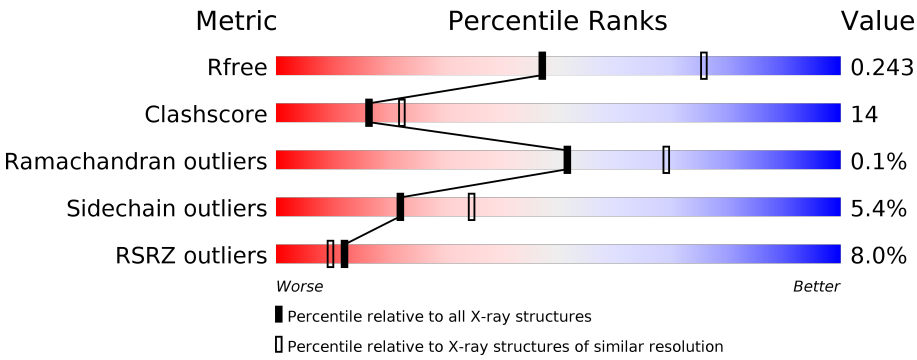
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 2.65 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	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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 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 <=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	B	206	8% 61% 33%
1	L	206	12% 67% 26%
2	A	229	3% 74% 17% 7%
2	H	229	7% 72% 20% 7%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 12825 atoms, of which 6198 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.

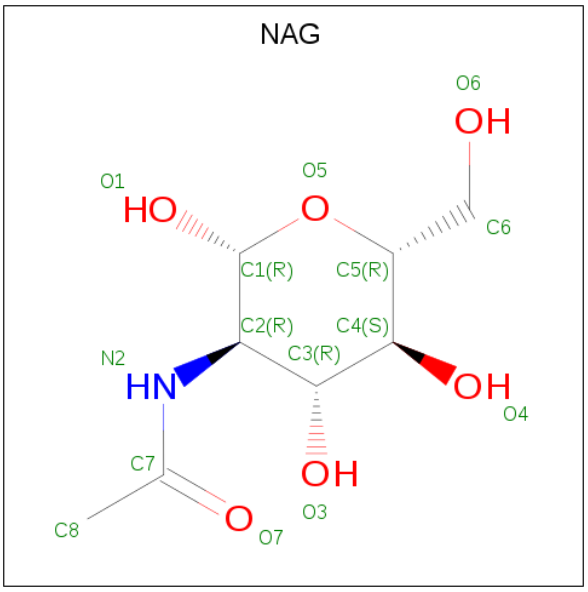
- Molecule 1 is a protein called 3BNC60 Fab Light-chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	L	198	3075	978	1519	269	305	4	0	0	0
1	B	199	3090	982	1526	271	307	4	0	0	0

- Molecule 2 is a protein called 3BNC60 Fab Heavy-chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	H	213	3224	1043	1580	286	310	5	0	0	0
2	A	212	3209	1038	1573	285	308	5	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	L	1	14	8	1	5	0	0
			Total	C	N	O		
3	B	1	14	8	1	5	0	0

- Molecule 4 is water.

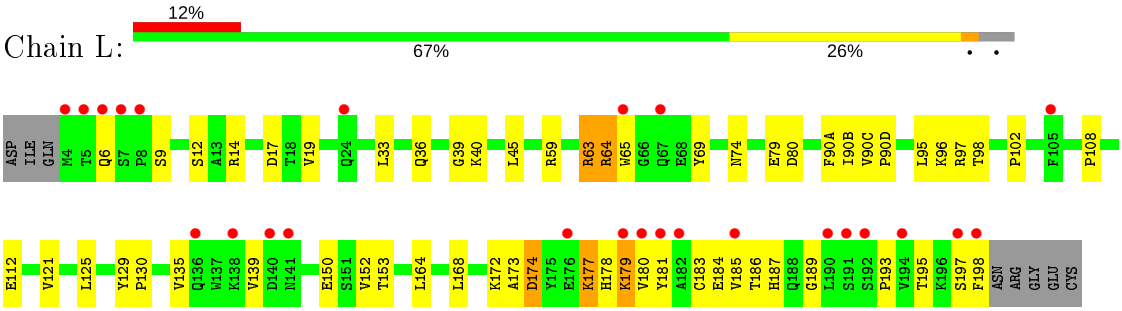
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	L	55	55	55	0	0
			Total	O		
4	H	36	36	36	0	0
			Total	O		
4	A	42	42	42	0	0
			Total	O		
4	B	66	66	66	0	0

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.

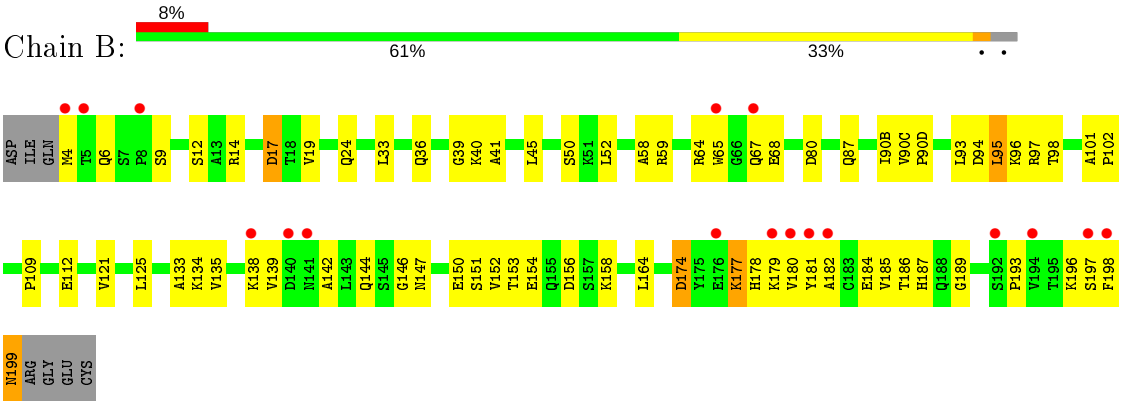
- Molecule 1: 3BNC60 Fab Light-chain

Chain L:



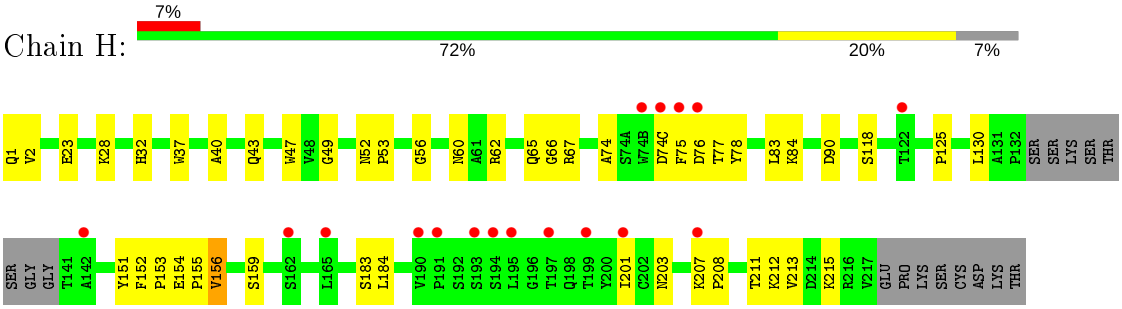
- Molecule 1: 3BNC60 Fab Light-chain

Chain B:



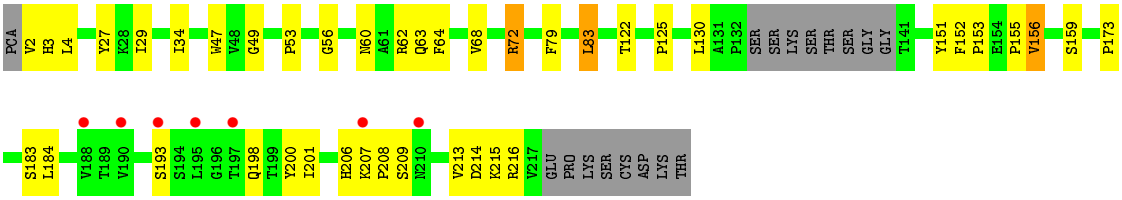
- Molecule 2: 3BNC60 Fab Heavy-chain

Chain H:



- Molecule 2: 3BNC60 Fab Heavy-chain

Chain A:


PCA
V2
H3
L4
Y27
K28
I29
I34
W47
V48
G49
P53
G56
N60
A61
R62
Q63
F64
V68
R72
F79
L83
T122
P125
L130
A131
P132
SER
SER
LYS
SER
THR
SER
GLY
GLY
T141
Y151
F152
P153
E154
P155
V156
S159
P173
S183
L184
V188
T189
V190
S193
S194
L195
G196
T197
Q198
T199
Y200
I201
H206
K207
P208
S209
N210
V213
D214
K215
R216
V217
GLU
PRO
LYS
SER
CYS
ASP
LYS
THR

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	64.57Å 154.88Å 74.24Å 90.00° 109.75° 90.00°	Depositor
Resolution (Å)	39.35 – 2.65 39.69 – 2.65	Depositor EDS
% Data completeness (in resolution range)	98.1 (39.35-2.65) 92.9 (39.69-2.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.15 (at 2.65Å)	Xtriage
Refinement program	PHENIX (phenix.refine: dev_966)	Depositor
R, R_{free}	0.213 , 0.256 0.200 , 0.243	Depositor DCC
R_{free} test set	1954 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	48.9	Xtriage
Anisotropy	0.336	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 76.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	12825	wwPDB-VP
Average B, all atoms (Å^2)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.99% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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)

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

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	B	0.56	0/1598	0.70	0/2171
1	L	0.54	0/1590	0.72	0/2160
2	A	0.49	0/1684	0.62	0/2299
2	H	0.49	0/1685	0.64	0/2302
All	All	0.52	0/6557	0.67	0/8932

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 (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	B	1564	1526	1523	66	0
1	L	1556	1519	1517	58	0
2	A	1636	1573	1568	27	0
2	H	1644	1580	1575	32	0
3	B	14	0	13	4	0
3	L	14	0	13	5	0
4	A	42	0	0	2	0
4	B	66	0	0	15	0
4	H	36	0	0	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	L	55	0	0	8	0
All	All	6627	6198	6209	181	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 14.

The worst 5 of 181 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:97:ARG:NH1	1:B:98:THR:O	2.03	0.92
1:B:52:LEU:O	4:B:439:HOH:O	1.86	0.92
1:L:63:ARG:HD2	3:L:301:NAG:H81	1.54	0.90
1:B:6:GLN:HB2	1:B:90(C):VAL:HG11	1.54	0.89
1:L:97:ARG:NH1	1:L:98:THR:O	2.05	0.87

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	B	197/206 (96%)	184 (93%)	13 (7%)	0	100 100
1	L	196/206 (95%)	182 (93%)	13 (7%)	1 (0%)	29 43
2	A	208/229 (91%)	198 (95%)	10 (5%)	0	100 100
2	H	209/229 (91%)	198 (95%)	11 (5%)	0	100 100
All	All	810/870 (93%)	762 (94%)	47 (6%)	1 (0%)	51 69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	179	LYS

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	B	175/182 (96%)	166 (95%)	9 (5%)	24	37
1	L	174/182 (96%)	165 (95%)	9 (5%)	23	36
2	A	180/194 (93%)	170 (94%)	10 (6%)	21	33
2	H	180/194 (93%)	170 (94%)	10 (6%)	21	33
All	All	709/752 (94%)	671 (95%)	38 (5%)	22	34

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	183	SER
2	A	72	ARG
1	B	174	ASP
2	A	2	VAL
2	A	83	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	65	GLN
1	B	187	HIS
2	A	3	HIS
2	H	3	HIS
2	H	203	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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	$\#\|Z\| > 2$
2	PCA	H	1	2	7,8,9	2.13	2 (28%)	9,10,12	2.12	5 (55%)

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
2	PCA	H	1	2	-	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)
2	H	1	PCA	CD-N	4.60	1.46	1.34
2	H	1	PCA	CA-N	3.04	1.50	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	1	PCA	CA-N-CD	-3.07	103.06	113.58
2	H	1	PCA	CB-CA-C	-2.86	108.76	112.70
2	H	1	PCA	OE-CD-CG	-2.78	121.92	126.76
2	H	1	PCA	CB-CA-N	2.58	110.72	103.30
2	H	1	PCA	CG-CD-N	2.47	114.80	108.39

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands are 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	NAG	L	301	1	14,14,15	0.49	0	17,19,21	1.16	2 (11%)
3	NAG	B	301	1	14,14,15	0.65	0	17,19,21	0.91	1 (5%)

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	NAG	L	301	1	-	3/6/23/26	0/1/1/1
3	NAG	B	301	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	L	301	NAG	C1-O5-C5	2.65	115.78	112.19
3	L	301	NAG	O5-C5-C6	2.49	111.11	107.20
3	B	301	NAG	O5-C5-C6	2.16	110.60	107.20

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	301	NAG	O7-C7-N2-C2
3	B	301	NAG	C8-C7-N2-C2
3	L	301	NAG	C8-C7-N2-C2
3	L	301	NAG	O7-C7-N2-C2
3	L	301	NAG	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	L	301	NAG	5	0
3	B	301	NAG	4	0

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	B	199/206 (96%)	0.41	17 (8%)	10	8	22, 62, 131, 187	0
1	L	198/206 (96%)	0.68	25 (12%)	3	2	24, 62, 126, 192	0
2	A	212/229 (92%)	0.35	7 (3%)	46	43	22, 62, 128, 143	0
2	H	212/229 (92%)	0.50	17 (8%)	12	9	21, 69, 128, 144	0
All	All	821/870 (94%)	0.48	66 (8%)	12	9	21, 64, 129, 192	0

The worst 5 of 66 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	5	THR	6.7
1	L	4	MET	6.2
2	A	195	LEU	6.2
1	L	179	LYS	6.1
2	H	190	VAL	5.5

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

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. 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	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	PCA	H	1	8/9	0.85	0.26	87,111,130,144	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

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. 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	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NAG	L	301	14/15	0.91	0.22	26,64,79,84	0
3	NAG	B	301	14/15	0.91	0.16	49,79,95,104	0

6.5 Other polymers (i)

There are no such residues in this entry.