



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 25, 2024 – 07:40 AM EDT

PDB ID : 6MNS  
Title : Rhesus macaque anti-HIV V3 antibody DH753 with gp120 V3 ZAM18 peptide  
Authors : Nicely, N.I.  
Deposited on : 2018-10-02  
Resolution : 2.70 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) 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 : 2.37.1  
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

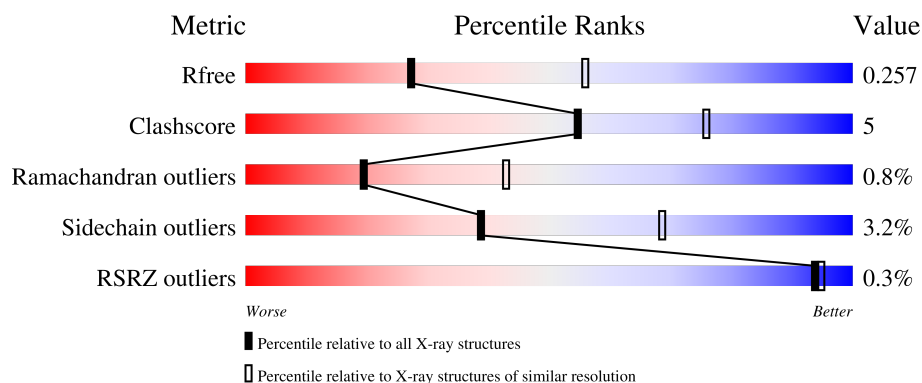
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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  $\geq 3$ , 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	P	23	
1	Q	23	
2	A	227	
2	H	227	
3	B	216	

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Mol	Chain	Length	Quality of chain
3	L	216	 87% 11% .

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	PO4	P	401	-	-	X	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6707 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 Envelope glycoprotein.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	P	14	Total	C	N	O	0	0	0
			114	74	23	17			
1	Q	13	Total	C	N	O	0	0	0
			107	70	22	15			

- Molecule 2 is a protein called Ab DH753 heavy chain Fab fragment.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	222	Total	C	N	O	S	0	1	0
			1662	1050	278	328	6			
2	A	223	Total	C	N	O	S	0	0	0
			1667	1052	280	329	6			

- Molecule 3 is a protein called Ab DH753 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	211	Total	C	N	O	S	0	0	0
			1566	973	262	327	4			
3	B	211	Total	C	N	O	S	0	0	0
			1566	973	262	327	4			

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	P	1	Total	O	P	0	0
			5	4	1		
4	Q	1	Total	O	P	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	P	1	Total	O	0	0
			1	1		
5	H	2	Total	O	0	0
			2	2		
5	L	5	Total	O	0	0
			5	5		
5	B	7	Total	O	0	0
			7	7		

### 3 Residue-property plots

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.

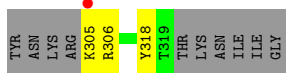
- Molecule 1: Envelope glycoprotein

Chain P: 




- Molecule 1: Envelope glycoprotein

Chain Q: 



- Molecule 2: Ab DH753 heavy chain Fab fragment

Chain H: 



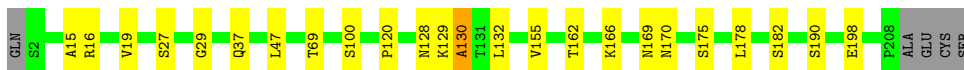
- Molecule 2: Ab DH753 heavy chain Fab fragment

Chain A: 



- Molecule 3: Ab DH753 light chain

Chain L: 



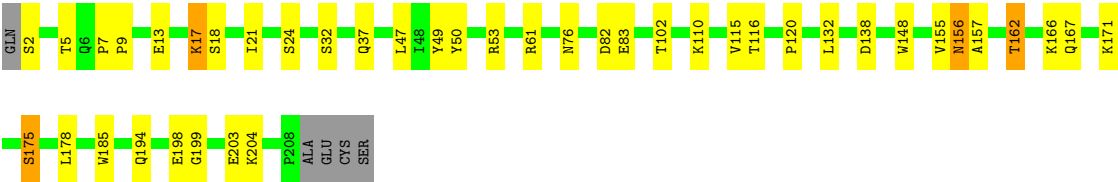
- Molecule 3: Ab DH753 light chain

Chain B: 

78%

18%

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## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	46.92Å 138.31Å 71.68Å 90.00° 91.55° 90.00°	Depositor
Resolution (Å)	38.77 – 2.70 38.77 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.5 (38.77-2.70) 99.5 (38.77-2.70)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.23 (at 2.69Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.170 , 0.256 0.171 , 0.257	Depositor DCC
$R_{free}$ test set	1978 reflections (7.92%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	64.5	Xtriage
Anisotropy	0.260	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 36.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.126 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	6707	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	70.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.44% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

Bond lengths and bond angles in the following residue types are not validated in this section: PO4

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	P	0.53	0/117	0.58	0/156
1	Q	0.40	0/110	0.55	0/146
2	A	0.45	0/1704	0.60	0/2318
2	H	0.47	0/1702	0.62	0/2317
3	B	0.45	0/1600	0.60	0/2181
3	L	0.44	0/1600	0.60	0/2181
All	All	0.45	0/6833	0.60	0/9299

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	P	114	0	117	4	0
1	Q	107	0	110	3	0
2	A	1667	0	1650	13	1
2	H	1662	0	1646	15	1
3	B	1566	0	1505	26	0
3	L	1566	0	1505	10	0
4	P	5	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	Q	5	0	0	0	0
5	B	7	0	0	0	0
5	H	2	0	0	0	0
5	L	5	0	0	0	0
5	P	1	0	0	0	0
All	All	6707	0	6533	69	1

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 5.

All (69) 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)
3:B:17:LYS:HG2	3:B:18:SER:H	1.49	0.77
3:L:132:LEU:HD12	3:L:178:LEU:HD23	1.68	0.74
2:A:150:VAL:HG22	2:A:178:LEU:HD21	1.72	0.71
2:H:200:HIS:ND1	2:H:203:SER:HB3	2.07	0.70
2:H:4:LEU:HG	2:H:24:VAL:HG22	1.76	0.68
3:B:148:TRP:HB2	3:B:155:VAL:HG21	1.75	0.68
3:L:166:LYS:HE2	3:L:170:ASN:HA	1.78	0.66
3:B:156:ASN:OD1	3:B:157:ALA:N	2.21	0.66
2:H:203:SER:OG	2:H:205:THR:OG1	2.15	0.63
3:L:37:GLN:HB2	3:L:47:LEU:HD11	1.82	0.62
3:B:37:GLN:HB2	3:B:47:LEU:HD11	1.81	0.62
2:A:159:LEU:HD21	2:A:182:VAL:HG21	1.82	0.61
3:B:194:GLN:HG2	3:B:203:GLU:HG2	1.83	0.60
2:A:199:ASN:HD21	2:A:201:LYS:HE3	1.67	0.60
3:B:17:LYS:HG2	3:B:18:SER:N	2.18	0.59
3:B:83:GLU:OE2	3:B:166:LYS:NZ	2.34	0.59
3:B:61:ARG:NH1	3:B:82:ASP:OD2	2.36	0.59
3:B:198:GLU:HG2	3:B:199:GLY:H	1.70	0.57
2:A:100(C):ILE:HD12	2:A:101:GLU:H	1.70	0.56
2:A:47:TRP:HZ2	2:A:50:PHE:HD1	1.52	0.56
1:Q:318:TYR:OH	3:B:53:ARG:NH1	2.39	0.56
3:B:148:TRP:HB2	3:B:155:VAL:CG2	2.36	0.55
3:B:21:ILE:HD12	3:B:102:THR:HG21	1.87	0.55
3:B:138:ASP:OD1	3:B:167:GLN:NE2	2.39	0.55
2:H:82:MET:HB3	2:H:82(C):LEU:HD21	1.87	0.54
3:B:32:SER:HB3	3:B:50:TYR:HA	1.90	0.54
2:H:129:ARG:HG2	2:H:129:ARG:NH1	2.23	0.53
2:H:47:TRP:CZ2	2:H:49:GLY:HA2	2.44	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:129:ARG:HG2	2:H:129:ARG:HH11	1.73	0.53
2:A:4:LEU:HD13	2:A:102:ILE:HG22	1.93	0.50
1:P:308:HIS:NE2	4:P:401:PO4:O3	2.39	0.49
3:B:132:LEU:HD12	3:B:178:LEU:HD23	1.94	0.49
3:L:120:PRO:HB3	3:L:130:ALA:HA	1.95	0.49
3:L:128:ASN:HA	3:L:182:SER:HB2	1.95	0.48
2:A:199:ASN:ND2	2:A:201:LYS:HE3	2.27	0.48
3:B:167:GLN:HG2	3:B:171:LYS:O	2.14	0.47
2:H:2:VAL:HG12	2:H:102:ILE:HG21	1.97	0.47
1:P:321:LYS:HB2	1:P:321:LYS:HE3	1.57	0.47
3:L:15:ALA:O	3:L:16:ARG:HB2	2.15	0.47
2:A:5:VAL:HG23	2:A:23:GLU:HG3	1.96	0.46
3:B:13:GLU:HG3	3:B:17:LYS:HD3	1.98	0.46
2:A:184:VAL:HG11	2:A:194:TYR:CE1	2.51	0.46
2:H:47:TRP:HZ2	2:H:50:PHE:HD1	1.64	0.46
2:H:6:GLU:HA	2:H:21:SER:O	2.16	0.46
3:L:27:SER:HA	3:L:29:GLY:HA3	1.97	0.46
2:A:119:PRO:HB3	2:A:145:TYR:HB3	1.98	0.45
2:H:4:LEU:HD23	2:H:92:CYS:SG	2.56	0.45
1:Q:305:LYS:HG2	1:Q:306:ARG:N	2.31	0.45
3:B:132:LEU:HD21	3:B:185:TRP:CZ3	2.51	0.45
2:A:100(B):TYR:HB3	3:B:49:TYR:CE2	2.52	0.44
3:L:129:LYS:HB2	3:L:129:LYS:HE3	1.85	0.43
2:H:82(C):LEU:HB3	2:H:111:VAL:HG21	2.00	0.43
3:B:115:VAL:O	3:B:204:LYS:HE3	2.18	0.43
3:B:61:ARG:HB3	3:B:76:ASN:O	2.19	0.43
2:H:146:PHE:CD1	2:H:147:PRO:HA	2.54	0.43
2:H:195:VAL:HG22	2:H:210:ARG:HA	2.00	0.42
3:B:162:THR:HB	3:B:175:SER:H	1.84	0.42
3:B:32:SER:HG	3:B:50:TYR:HD1	1.63	0.42
1:Q:305:LYS:HB3	1:Q:305:LYS:HE3	1.82	0.42
3:L:132:LEU:HB2	3:L:178:LEU:HB3	2.01	0.42
1:P:308:HIS:HE2	4:P:401:PO4:P	2.43	0.42
3:B:5:THR:OG1	3:B:24:SER:HB2	2.20	0.42
3:B:120:PRO:HD3	3:B:132:LEU:HD23	2.02	0.41
2:A:200:HIS:CD2	2:A:202:PRO:HD2	2.56	0.41
3:L:169:ASN:O	3:L:170:ASN:HB2	2.20	0.41
1:P:319:THR:HG22	1:P:320:THR:N	2.36	0.41
2:H:12:VAL:HG13	2:H:111:VAL:HG22	2.02	0.41
2:A:5:VAL:CG2	2:A:23:GLU:HG3	2.51	0.40
3:B:7:PRO:HA	3:B:9:PRO:HD3	1.93	0.40

All (1) 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:H:129:ARG:NH2	2:A:201:LYS:O[2_556]	1.98	0.22

## 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	P	12/23 (52%)	11 (92%)	1 (8%)	0	100	100
1	Q	11/23 (48%)	9 (82%)	2 (18%)	0	100	100
2	A	221/227 (97%)	207 (94%)	13 (6%)	1 (0%)	29	54
2	H	221/227 (97%)	207 (94%)	11 (5%)	3 (1%)	11	28
3	B	209/216 (97%)	193 (92%)	15 (7%)	1 (0%)	29	54
3	L	209/216 (97%)	196 (94%)	11 (5%)	2 (1%)	15	37
All	All	883/932 (95%)	823 (93%)	53 (6%)	7 (1%)	19	43

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	127	SER
3	L	130	ALA
3	B	156	ASN
2	H	126	PRO
2	A	190	GLY
3	L	198	GLU
2	H	128	SER

### 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	P	11/19 (58%)	11 (100%)	0	100	100
1	Q	10/19 (53%)	10 (100%)	0	100	100
2	A	189/191 (99%)	181 (96%)	8 (4%)	30	58
2	H	189/191 (99%)	186 (98%)	3 (2%)	62	85
3	B	175/179 (98%)	169 (97%)	6 (3%)	37	66
3	L	175/179 (98%)	168 (96%)	7 (4%)	31	60
All	All	749/778 (96%)	725 (97%)	24 (3%)	39	68

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	30	SER
2	H	196	CYS
2	H	203	SER
3	L	19	VAL
3	L	69	THR
3	L	100	SER
3	L	155	VAL
3	L	162	THR
3	L	175	SER
3	L	190	SER
2	A	43	LYS
2	A	52(B)	LYS
2	A	74	SER
2	A	85	GLU
2	A	102	ILE
2	A	196	CYS
2	A	206	LYS
2	A	209	LYS
3	B	2	SER
3	B	17	LYS
3	B	110	LYS
3	B	116	THR
3	B	162	THR
3	B	175	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are

no such sidechains identified.

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

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	$\# Z  > 2$
4	PO4	P	401	-	4,4,4	0.86	0	6,6,6	0.42	0
4	PO4	Q	401	-	4,4,4	0.87	0	6,6,6	0.44	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	P	401	PO4	2	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	P	14/23 (60%)	-0.21	0 <a href="#">100</a> <a href="#">100</a>	42, 69, 100, 102	0
1	Q	13/23 (56%)	0.54	1 (7%) <a href="#">13</a> <a href="#">11</a>	56, 86, 123, 123	0
2	A	223/227 (98%)	-0.38	1 (0%) <a href="#">92</a> <a href="#">93</a>	41, 64, 105, 140	0
2	H	222/227 (97%)	-0.41	1 (0%) <a href="#">91</a> <a href="#">92</a>	40, 59, 92, 142	0
3	B	211/216 (97%)	-0.31	0 <a href="#">100</a> <a href="#">100</a>	42, 71, 106, 129	0
3	L	211/216 (97%)	-0.34	0 <a href="#">100</a> <a href="#">100</a>	43, 71, 103, 134	0
All	All	894/932 (95%)	-0.35	3 (0%) <a href="#">94</a> <a href="#">95</a>	40, 66, 104, 142	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	Q	305	LYS	4.4
2	H	130	SER	2.6
2	A	214	LYS	2.2

### 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](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	PO4	Q	401	5/5	0.83	0.18	147,150,150,150	0
4	PO4	P	401	5/5	0.91	0.11	123,126,128,129	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.