



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 02:47 AM EDT

PDB ID : 7MYT
Title : Crystal Structure of HPV L1-directed B25.M05 Fab
Authors : Singh, S.; Pancera, M.
Deposited on : 2021-05-21
Resolution : 2.10 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 : 2.35.1
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) : 2.35.1

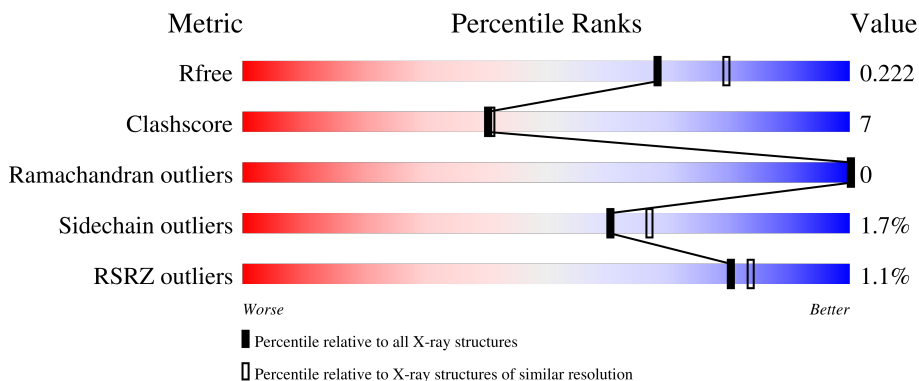
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	274	 2% 72% 11% 17%
1	H	274	 0% 62% 16% 21%
2	B	235	 79% 11% 9%
2	L	235	 78% 12% 9%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12975 atoms, of which 6163 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 B25.M05 Fab Heavy Chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	228	3302	1078	1600	290	328	6	0	0	0
1	H	217	3206	1035	1577	274	314	6	0	1	0

- Molecule 2 is a protein called B25.M05 Fab Light Chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	214	3070	984	1491	258	333	4	0	0	0
2	L	213	3066	981	1495	255	331	4	0	0	0

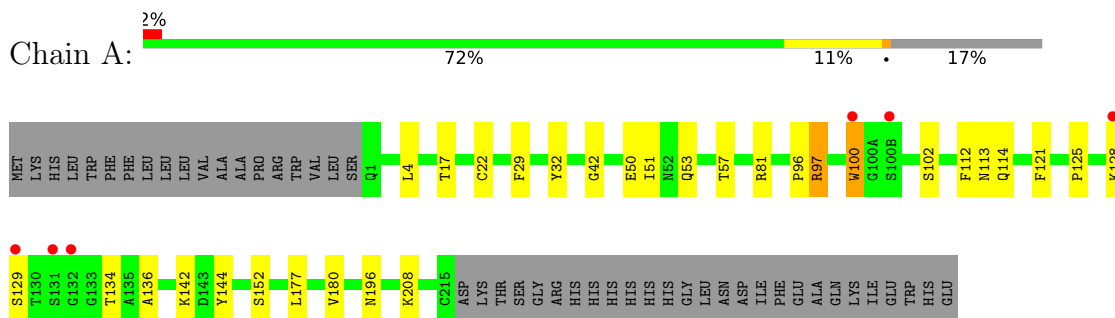
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	103	Total 103	O 103	0	0
3	B	77	Total 77	O 77	0	0
3	H	65	Total 65	O 65	0	0
3	L	86	Total 86	O 86	0	0

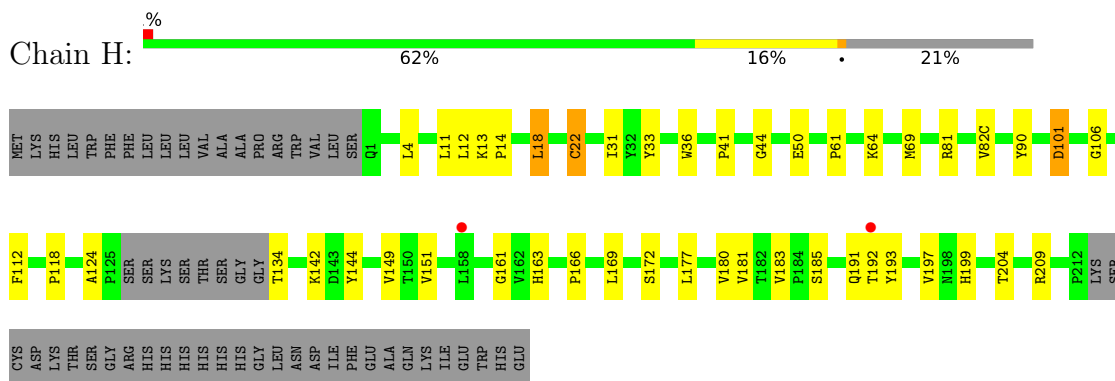
3 Residue-property plots [i](#)

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.

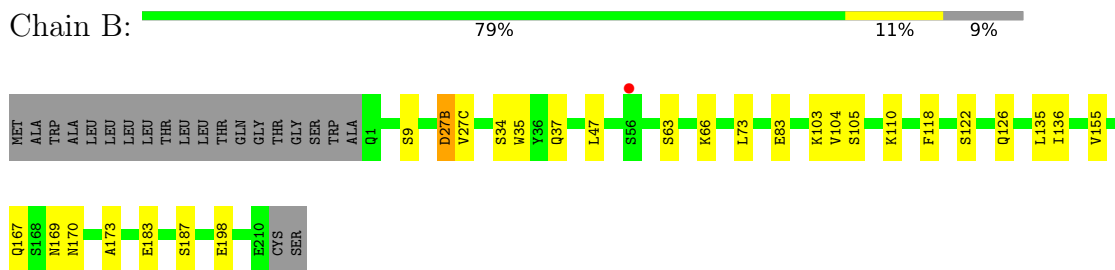
- Molecule 1: B25.M05 Fab Heavy Chain



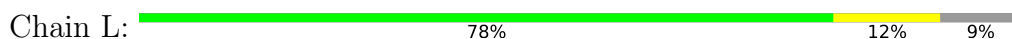
- Molecule 1: B25.M05 Fab Heavy Chain



- Molecule 2: B25.M05 Fab Light Chain



- Molecule 2: B25.M05 Fab Light Chain





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	52.95Å 64.47Å 72.79Å 94.41° 97.12° 93.31°	Depositor
Resolution (Å)	45.98 – 2.10 45.98 – 2.10	Depositor EDS
% Data completeness (in resolution range)	93.9 (45.98-2.10) 93.9 (45.98-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.90 (at 2.10Å)	Xtrriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.173 , 0.223 0.171 , 0.222	Depositor DCC
R_{free} test set	2679 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å ²)	33.4	Xtrriage
Anisotropy	0.680	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 46.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12975	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.18% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.57	0/1746	0.78	2/2386 (0.1%)
1	H	0.65	2/1670 (0.1%)	0.84	4/2284 (0.2%)
2	B	0.52	0/1617	0.69	0/2213
2	L	0.55	0/1609	0.69	0/2201
All	All	0.57	2/6642 (0.0%)	0.75	6/9084 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	82(C)	VAL	CB-CG2	7.46	1.68	1.52
1	H	22	CYS	CB-SG	-5.94	1.72	1.81

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	82(C)	VAL	CG1-CB-CG2	-8.87	96.71	110.90
1	A	97	ARG	NE-CZ-NH2	-6.99	116.80	120.30
1	H	101	ASP	CB-CG-OD1	5.93	123.64	118.30
1	H	101	ASP	N-CA-C	5.43	125.67	111.00
1	H	18	LEU	CA-CB-CG	5.40	127.73	115.30
1	A	97	ARG	NE-CZ-NH1	5.07	122.84	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	128	LYS	Peptide

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	A	1702	1600	1652	22	0
1	H	1629	1577	1583	34	0
2	B	1579	1491	1494	18	0
2	L	1571	1495	1495	22	0
3	A	103	0	0	2	1
3	B	77	0	0	5	0
3	H	65	0	0	3	1
3	L	86	0	0	9	0
All	All	6812	6163	6224	91	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 7.

All (91) 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:A:125:PRO:O	3:A:301:HOH:O	1.82	0.97
1:A:129:SER:HB3	1:A:134:THR:HG22	1.49	0.94
2:B:118:PHE:HE2	2:B:135:LEU:HD12	1.42	0.82
1:H:36:TRP:HD1	1:H:69:MET:HE2	1.43	0.81
2:L:63:SER:OG	3:L:301:HOH:O	1.99	0.79
1:H:149:VAL:CG2	1:H:177:LEU:HD21	2.15	0.77
2:L:208:PRO:O	2:L:209:THR:OG1	2.00	0.77
2:B:118:PHE:CE2	2:B:135:LEU:HD12	2.22	0.74
1:H:36:TRP:HD1	1:H:69:MET:CE	2.01	0.73
2:L:209:THR:OG1	3:L:302:HOH:O	2.10	0.69
2:B:34:SER:OG	3:B:302:HOH:O	2.11	0.69
1:A:180:VAL:HG21	2:B:135:LEU:HD13	1.75	0.68
1:H:192:THR:HG21	1:H:209:ARG:HE	1.57	0.68
2:B:155:VAL:O	3:B:303:HOH:O	2.12	0.67
1:H:101:ASP:O	3:H:301:HOH:O	2.11	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:198:GLU:OE2	3:B:304:HOH:O	2.15	0.65
1:H:142:LYS:HZ2	2:L:129:LYS:HE2	1.60	0.64
1:A:50:GLU:OE1	1:A:97:ARG:NH2	2.31	0.64
1:H:36:TRP:CD1	1:H:69:MET:HE2	2.31	0.62
1:H:149:VAL:HG22	1:H:177:LEU:HD21	1.81	0.62
2:L:209:THR:CB	3:L:302:HOH:O	2.47	0.61
2:B:37:GLN:HB2	2:B:47:LEU:HD11	1.81	0.60
2:L:160:GLU:CG	3:L:305:HOH:O	2.51	0.58
2:B:63:SER:OG	3:B:305:HOH:O	2.17	0.58
2:L:38:LEU:HD11	2:L:44:PRO:HB3	1.86	0.58
1:H:33:TYR:CD1	1:H:50:GLU:HG3	2.39	0.57
1:H:44:GLY:HA3	3:L:335:HOH:O	2.05	0.56
1:A:42:GLY:N	3:A:302:HOH:O	2.22	0.55
1:H:61:PRO:O	1:H:64:LYS:HD3	2.06	0.55
2:L:67:SER:HB2	3:L:352:HOH:O	2.06	0.55
1:H:11:LEU:HD22	1:H:112:PHE:CE2	2.42	0.54
2:L:19:ILE:HG12	2:L:78:LEU:HD13	1.88	0.54
1:A:4:LEU:HG	1:A:102:SER:O	2.07	0.54
2:B:103:LYS:HD2	2:B:104:VAL:N	2.23	0.54
1:H:41:PRO:HG3	1:H:169:LEU:HD23	1.90	0.53
2:L:208:PRO:O	2:L:209:THR:CB	2.57	0.53
2:B:122:SER:O	2:B:126:GLN:HG3	2.09	0.52
1:H:4:LEU:HB3	1:H:22:CYS:SG	2.49	0.52
2:L:6:GLN:OE1	2:L:99:GLY:HA3	2.09	0.51
1:H:166:PRO:HG2	3:L:363:HOH:O	2.09	0.51
2:L:37:GLN:OE1	3:L:303:HOH:O	2.19	0.50
2:L:83:GLU:CG	2:L:106:VAL:H	2.24	0.49
1:H:149:VAL:HG12	1:H:199:HIS:CD2	2.47	0.49
2:B:83:GLU:HG3	2:B:105:SER:HA	1.95	0.49
2:L:37:GLN:HB2	2:L:47:LEU:HD11	1.94	0.49
2:L:83:GLU:HG3	2:L:106:VAL:H	1.77	0.49
1:A:17:THR:HG21	1:A:81:ARG:HD3	1.96	0.48
1:H:144:TYR:CE2	1:H:149:VAL:HG13	2.49	0.48
1:A:121:PHE:HE2	1:A:142:LYS:HE2	1.79	0.47
2:L:209:THR:HB	3:L:302:HOH:O	2.13	0.47
1:H:151:VAL:HG22	1:H:197:VAL:HG22	1.96	0.47
1:H:14:PRO:HD3	1:H:112:PHE:O	2.13	0.47
2:B:167:GLN:O	2:B:169:ASN:O	2.33	0.46
1:H:118:PRO:HD2	1:H:204:THR:HG21	1.96	0.46
2:L:38:LEU:CD1	2:L:44:PRO:HB3	2.45	0.46
2:L:83:GLU:HG3	2:L:106:VAL:HG23	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4:LEU:HB3	1:A:22:CYS:SG	2.56	0.46
1:H:180:VAL:HG11	2:L:135:LEU:CD1	2.46	0.46
2:B:136:ILE:O	2:B:173:ALA:HA	2.16	0.46
1:H:161:GLY:O	1:H:181:VAL:HA	2.16	0.45
1:A:51:ILE:HG13	1:A:57:THR:HG22	1.98	0.45
2:B:27(B):ASP:OD1	2:B:27(C):VAL:N	2.37	0.45
1:A:112:PHE:CG	1:A:113:ASN:N	2.82	0.44
1:H:18:LEU:O	1:H:81:ARG:HA	2.18	0.44
1:H:181:VAL:HG22	1:H:183:VAL:HG13	1.99	0.44
1:A:100:TRP:CE3	1:H:31:ILE:CD1	3.01	0.44
1:A:29:PHE:HB3	1:A:53:GLN:HB3	2.00	0.44
1:A:32:TYR:CD2	1:A:96:PRO:HA	2.54	0.43
2:B:110:LYS:NZ	3:B:315:HOH:O	2.51	0.43
1:A:129:SER:HB3	1:A:134:THR:CG2	2.35	0.43
1:A:152:SER:OG	1:A:196:ASN:HB2	2.18	0.43
1:H:172:SER:OG	3:H:302:HOH:O	2.18	0.43
1:A:17:THR:CG2	1:A:81:ARG:HD3	2.49	0.42
2:L:120:PRO:HD2	2:L:185:TRP:CZ2	2.54	0.42
2:L:194:GLN:NE2	2:L:203:GLU:OE2	2.45	0.42
1:H:33:TYR:HD1	1:H:50:GLU:HG3	1.82	0.42
1:A:100:TRP:CE3	1:H:31:ILE:HD13	2.55	0.42
2:B:183:GLU:O	2:B:187:SER:HB3	2.19	0.42
1:H:11:LEU:O	1:H:12:LEU:HD23	2.19	0.42
2:B:35:TRP:CD2	2:B:73:LEU:HB2	2.54	0.42
1:H:13:LYS:HE3	1:H:112:PHE:CZ	2.55	0.42
1:A:208:LYS:HE2	1:A:208:LYS:HB2	1.89	0.42
2:B:27(C):VAL:O	2:B:66:LYS:HD2	2.20	0.41
1:A:125:PRO:HA	1:A:136:ALA:O	2.21	0.41
1:H:124:ALA:O	3:H:303:HOH:O	2.22	0.41
1:H:191:GLN:HG2	1:H:193:TYR:CZ	2.56	0.41
1:A:144:TYR:OH	1:A:177:LEU:HD23	2.21	0.41
2:L:79:GLN:NE2	2:L:81:GLU:OE1	2.55	0.41
1:H:90:TYR:O	1:H:106:GLY:HA2	2.21	0.40
1:H:134:THR:N	1:H:185:SER:HG	2.18	0.40
1:A:50:GLU:CD	1:A:97:ARG:HH22	2.25	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)
3:A:399:HOH:O	3:H:365:HOH:O[1_666]	1.94	0.26

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	226/274 (82%)	216 (96%)	10 (4%)	0	100	100
1	H	214/274 (78%)	204 (95%)	10 (5%)	0	100	100
2	B	212/235 (90%)	203 (96%)	9 (4%)	0	100	100
2	L	211/235 (90%)	204 (97%)	7 (3%)	0	100	100
All	All	863/1018 (85%)	827 (96%)	36 (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	188/238 (79%)	186 (99%)	2 (1%)	73	79
1	H	181/238 (76%)	180 (99%)	1 (1%)	86	90
2	B	178/199 (89%)	175 (98%)	3 (2%)	60	67
2	L	178/199 (89%)	172 (97%)	6 (3%)	37	39
All	All	725/874 (83%)	713 (98%)	12 (2%)	60	67

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	100	TRP
1	A	114	GLN

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Mol	Chain	Res	Type
2	B	9	SER
2	B	27(B)	ASP
2	B	170	ASN
1	H	163	HIS
2	L	2	SER
2	L	27(B)	ASP
2	L	56	SER
2	L	122	SER
2	L	165	SER
2	L	168	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	L	184	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 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

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	228/274 (83%)	0.16	6 (2%) 56 61	27, 37, 64, 94	0
1	H	217/274 (79%)	0.02	2 (0%) 84 86	28, 40, 66, 80	0
2	B	214/235 (91%)	0.09	1 (0%) 91 92	28, 40, 56, 67	0
2	L	213/235 (90%)	-0.07	1 (0%) 91 92	28, 38, 55, 79	0
All	All	872/1018 (85%)	0.05	10 (1%) 80 84	27, 39, 61, 94	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	132	GLY	4.5
2	B	56	SER	3.2
1	A	128	LYS	3.2
1	A	100	TRP	3.1
1	H	158	LEU	2.6
1	A	131	SER	2.5
1	A	100(B)	SER	2.4
1	A	129	SER	2.3
2	L	1	GLN	2.3
1	H	192	THR	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

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.