



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 20, 2020 – 09:56 PM BST

PDB ID : 5F9W
Title : Crystal structure of broadly neutralizing VH1-46 germline-derived CD4-binding site-directed antibody CH235 in complex with HIV-1 clade A/E 93TH057 gp120
Authors : Chen, L.; Zhou, T.; Kwong, P.D.
Deposited on : 2015-12-10
Resolution : 2.89 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 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	:	2.13.1
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

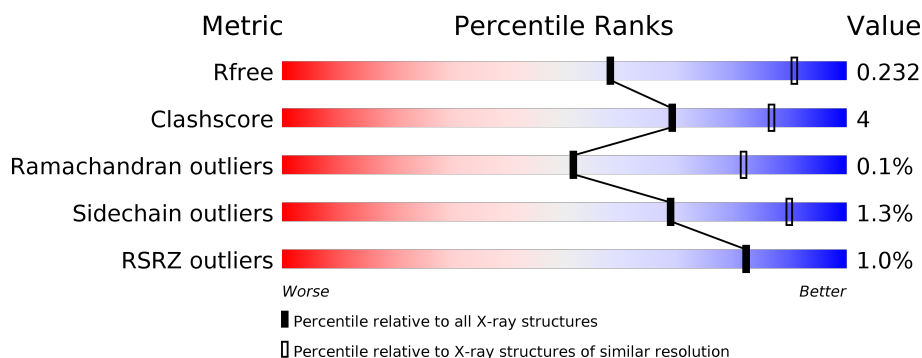
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.89 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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 $\leq 5\%$. 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	353	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 85% 11% .. </div> </div>
1	G	353	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 88% 8% . </div> </div>
2	B	225	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 82% 15% .. </div> </div>
2	H	225	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 85% 12% . </div> </div>
3	C	213	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 91% 7% . </div> </div>
3	L	213	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green, grey);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> % 95% .. </div> </div>

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 12399 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 clade A/E 93TH057 HIV-1 gp120 core.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	342	Total	C	N	O	S	0	0	0
			2673	1677	466	507	23			
1	G	343	Total	C	N	O	S	0	0	0
			2677	1679	467	508	23			

- Molecule 2 is a protein called Heavy chain of CH235-lineage antibody CH235.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	220	Total	C	N	O	S	0	0	0
			1668	1049	285	326	8			
2	H	219	Total	C	N	O	S	0	0	0
			1662	1046	284	324	8			

- Molecule 3 is a protein called Light chain of CH235-lineage antibody CH235.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	210	Total	C	N	O	S	0	0	0
			1626	1017	283	321	5			
3	L	210	Total	C	N	O	S	0	0	0
			1626	1017	283	321	5			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	H	1	Total	O	P	0	0
			5	4	1		

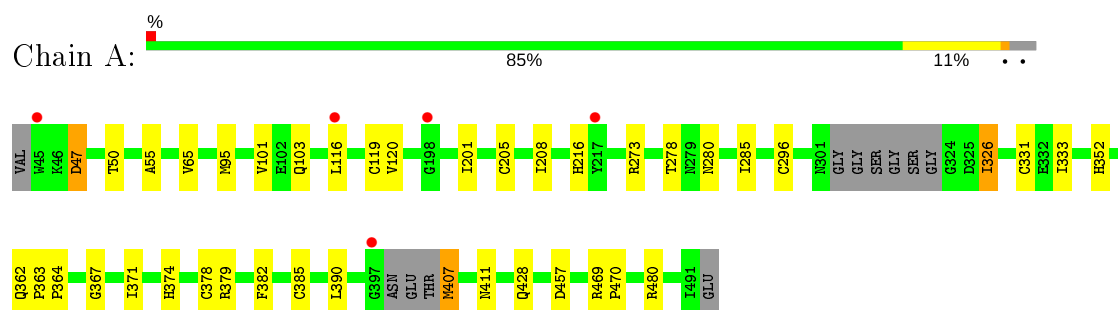
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	17	Total	O	0	0
			17	17		
6	B	8	Total	O	0	0
			8	8		
6	C	18	Total	O	0	0
			18	18		
6	G	14	Total	O	0	0
			14	14		
6	H	6	Total	O	0	0
			6	6		
6	L	11	Total	O	0	0
			11	11		

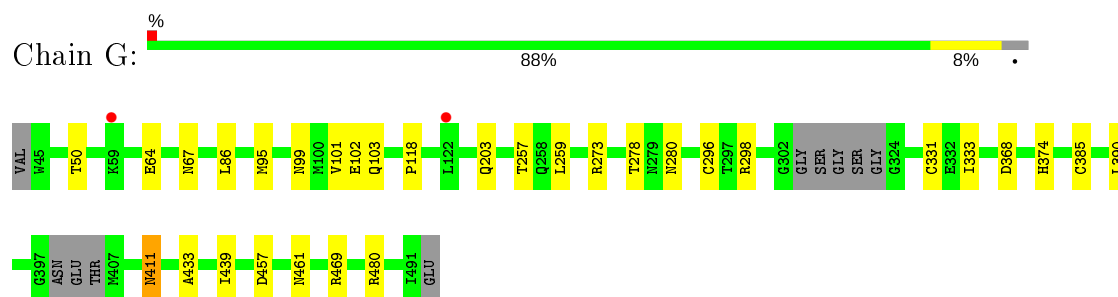
3 Residue-property plots [i](#)

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.

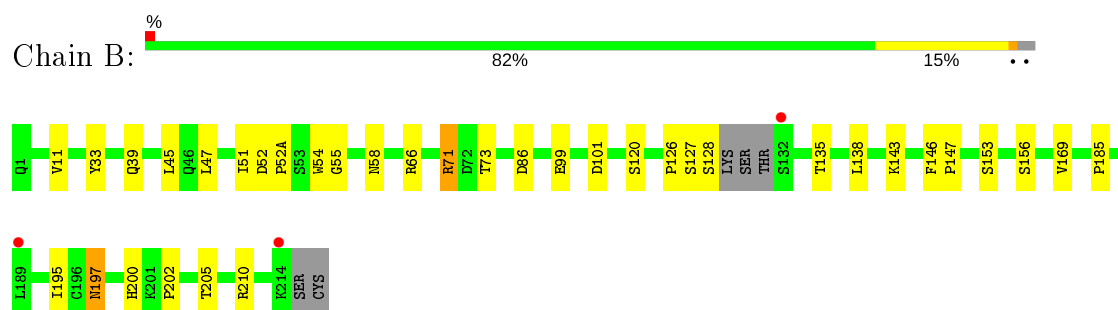
- Molecule 1: clade A/E 93TH057 HIV-1 gp120 core



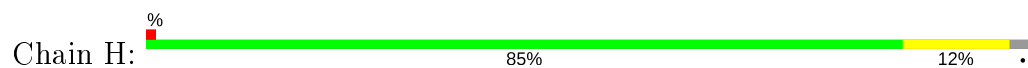
- Molecule 1: clade A/E 93TH057 HIV-1 gp120 core

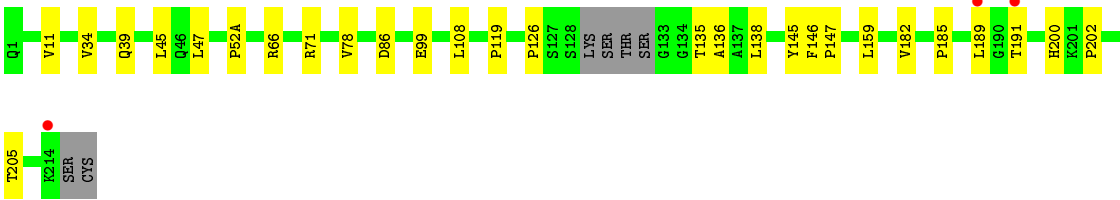


- Molecule 2: Heavy chain of CH235-lineage antibody CH235

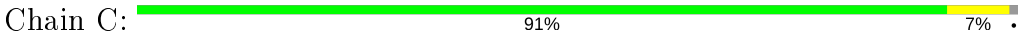


- Molecule 2: Heavy chain of CH235-lineage antibody CH235

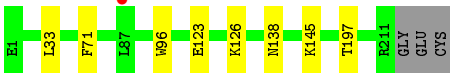




● Molecule 3: Light chain of CH235-lineage antibody CH235



● Molecule 3: Light chain of CH235-lineage antibody CH235



4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	123.43Å 123.43Å 127.33Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	40.94 – 2.89 40.93 – 2.89	Depositor EDS
% Data completeness (in resolution range)	99.7 (40.94-2.89) 96.2 (40.93-2.89)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.05 (at 2.90Å)	Xtriage
Refinement program	PHENIX dev_1965	Depositor
R, R_{free}	0.180 , 0.232 0.180 , 0.232	Depositor DCC
R_{free} test set	2441 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	81.7	Xtriage
Anisotropy	0.216	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 37.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.017 for -h,-k,l 0.459 for h,-h-k,-l 0.019 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12399	wwPDB-VP
Average B, all atoms (Å ²)	93.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, 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	A	0.22	0/2729	0.38	0/3702
1	G	0.21	0/2733	0.37	0/3707
2	B	0.22	0/1709	0.40	0/2333
2	H	0.21	0/1703	0.38	0/2325
3	C	0.22	0/1661	0.38	0/2257
3	L	0.22	0/1661	0.37	0/2257
All	All	0.22	0/12196	0.38	0/16581

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	A	2673	0	2603	27	0
1	G	2677	0	2608	17	0
2	B	1668	0	1622	23	0
2	H	1662	0	1613	16	0
3	C	1626	0	1591	9	0
3	L	1626	0	1591	4	0
4	A	196	0	182	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	G	182	0	169	0	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
5	H	5	0	0	0	0
6	A	17	0	0	0	0
6	B	8	0	0	2	0
6	C	18	0	0	1	0
6	G	14	0	0	0	0
6	H	6	0	0	0	0
6	L	11	0	0	0	0
All	All	12399	0	11979	90	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 (90) 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:G:278:THR:HG22	1:G:280:ASN:H	1.32	0.92
1:A:278:THR:HG22	1:A:280:ASN:H	1.43	0.82
2:B:156:SER:H	2:B:197:ASN:HD21	1.38	0.72
1:A:457:ASP:OD1	1:A:469:ARG:NH1	2.28	0.67
2:H:52(A):PRO:HA	2:H:71:ARG:HD2	1.79	0.64
1:A:407:MET:SD	1:A:407:MET:N	2.72	0.63
1:G:457:ASP:OD1	1:G:469:ARG:NH1	2.33	0.62
2:B:39:GLN:HB2	2:B:45:LEU:HD23	1.83	0.61
1:A:65:VAL:HG11	1:A:208:ILE:HD12	1.82	0.61
2:H:34:VAL:HG11	2:H:78:VAL:HG21	1.83	0.60
2:H:200:HIS:HB3	2:H:205:THR:HB	1.83	0.60
1:A:101:VAL:HG21	1:A:480:ARG:HG2	1.85	0.59
1:A:50:THR:O	1:A:103:GLN:NE2	2.32	0.59
1:G:411:ASN:N	1:G:411:ASN:OD1	2.34	0.59
2:B:143:LYS:N	6:B:401:HOH:O	2.35	0.58
1:A:278:THR:HG22	1:A:280:ASN:N	2.17	0.58
1:A:374:HIS:HB3	1:A:385:CYS:HB2	1.86	0.57
1:A:273:ARG:HB2	1:A:285:ILE:HB	1.85	0.57
2:B:54:TRP:H	2:B:55:GLY:HA2	1.70	0.56
4:A:508:NAG:H3	4:A:508:NAG:H83	1.87	0.56
2:H:39:GLN:HB2	2:H:45:LEU:HD23	1.87	0.56
1:G:480:ARG:NH2	2:H:99:GLU:OE1	2.38	0.55
2:B:200:HIS:HB3	2:B:205:THR:HB	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:101:VAL:HG21	1:G:480:ARG:HG2	1.89	0.54
2:B:153:SER:OG	2:B:197:ASN:OD1	2.16	0.54
3:C:124:GLN:NE2	6:C:301:HOH:O	2.42	0.53
2:B:52(A):PRO:HA	2:B:71:ARG:HG2	1.90	0.52
2:H:11:VAL:HG21	2:H:147:PRO:HG3	1.92	0.51
2:B:47:LEU:HD22	3:C:96:TRP:HB2	1.92	0.51
1:A:47:ASP:OD2	1:A:47:ASP:N	2.42	0.51
3:L:145:LYS:HB3	3:L:197:THR:HB	1.93	0.51
2:H:159:LEU:HD21	2:H:182:VAL:HG21	1.93	0.51
1:A:367:GLY:HA3	1:A:371:ILE:HD11	1.92	0.50
1:A:364:PRO:HG3	1:A:470:PRO:HG2	1.93	0.50
1:A:333:ILE:HD12	1:A:390:LEU:HD11	1.94	0.50
2:B:66:ARG:NH1	2:B:86:ASP:OD2	2.44	0.50
2:H:126:PRO:HD3	2:H:138:LEU:HB3	1.93	0.50
1:G:368:ASP:OD2	2:H:71:ARG:NH2	2.36	0.50
2:B:51:ILE:HD11	2:B:71:ARG:HG3	1.94	0.49
3:C:145:LYS:HB3	3:C:197:THR:HB	1.93	0.49
3:C:128:GLY:HA2	3:C:183:LYS:HD3	1.94	0.48
1:A:326:ILE:HD13	1:A:326:ILE:H	1.78	0.48
1:A:116:LEU:HD21	1:A:382:PHE:HZ	1.78	0.47
1:A:95:MET:SD	1:A:273:ARG:HD3	2.53	0.47
2:H:47:LEU:HD22	3:L:96:TRP:HB2	1.97	0.47
1:A:367:GLY:HA2	2:B:55:GLY:H	1.79	0.47
1:A:119:CYS:HB3	1:A:205:CYS:SG	2.55	0.47
1:G:278:THR:HG22	1:G:280:ASN:N	2.15	0.47
1:G:333:ILE:HD12	1:G:390:LEU:HD11	1.97	0.47
3:C:37:GLN:HB2	3:C:47:LEU:HD11	1.97	0.46
2:B:200:HIS:CD2	2:B:202:PRO:HD2	2.51	0.46
2:H:119:PRO:HB3	2:H:145:TYR:HB3	1.98	0.46
1:A:296:CYS:HA	1:A:331:CYS:HA	1.98	0.46
2:B:126:PRO:HG3	2:B:138:LEU:HD23	1.99	0.45
2:B:135:THR:HG22	2:B:185:PRO:HA	1.99	0.45
1:A:55:ALA:HB3	1:A:216:HIS:HB2	1.99	0.45
2:B:11:VAL:HG21	2:B:147:PRO:HG3	1.99	0.44
1:A:480:ARG:NH2	2:B:99:GLU:OE1	2.51	0.44
3:L:123:GLU:O	3:L:126:LYS:HG2	2.17	0.44
2:H:66:ARG:NH2	2:H:86:ASP:OD2	2.47	0.44
2:B:120:SER:N	6:B:401:HOH:O	2.51	0.43
1:G:118:PRO:HG3	1:G:433:ALA:HB1	2.00	0.43
1:A:362:GLN:HG3	1:A:363:PRO:HD2	1.99	0.43
2:B:101:ASP:OD1	2:B:101:ASP:N	2.50	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:296:CYS:HA	1:G:331:CYS:HA	2.00	0.43
1:G:50:THR:O	1:G:103:GLN:NE2	2.43	0.43
1:A:120:VAL:HA	1:A:201:ILE:O	2.19	0.43
1:A:116:LEU:HD21	1:A:382:PHE:CZ	2.54	0.43
2:H:135:THR:HG22	2:H:185:PRO:HA	2.01	0.43
1:A:428:GLN:OE1	1:A:428:GLN:N	2.51	0.42
1:G:95:MET:SD	1:G:273:ARG:HD3	2.59	0.42
2:B:33:TYR:CE2	2:B:52:ASP:HB2	2.55	0.42
3:C:152:ASN:OD1	3:C:152:ASN:N	2.53	0.42
3:C:123:GLU:O	3:C:126:LYS:HG2	2.19	0.42
1:G:298:ARG:NH2	1:G:439:ILE:O	2.52	0.42
2:H:136:ALA:HB3	2:H:189:LEU:HD11	2.02	0.42
1:G:257:THR:O	1:G:259:LEU:N	2.52	0.42
2:H:200:HIS:CD2	2:H:202:PRO:HD2	2.55	0.42
1:G:99:ASN:HA	1:G:102:GLU:HG2	2.02	0.42
2:H:146:PHE:HA	2:H:147:PRO:HA	1.78	0.42
3:L:33:LEU:HD22	3:L:71:PHE:CG	2.55	0.41
3:C:120:PRO:HD3	3:C:132:VAL:HG22	2.02	0.41
1:A:378:CYS:SG	1:A:379:ARG:HG2	2.61	0.41
2:B:169:VAL:HG11	3:C:160:GLN:HB3	2.02	0.41
1:G:374:HIS:HB3	1:G:385:CYS:HB2	2.03	0.41
1:A:352:HIS:O	4:A:505:NAG:O3	2.37	0.41
1:G:64:GLU:HB3	1:G:67:ASN:HD22	1.86	0.41
2:B:127:SER:OG	2:B:128:SER:N	2.50	0.41
2:B:146:PHE:HA	2:B:147:PRO:HA	1.77	0.40
2:B:210:ARG:H	2:B:210:ARG:HG2	1.74	0.40

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	A	336/353 (95%)	323 (96%)	13 (4%)	0	100	100
1	G	337/353 (96%)	323 (96%)	14 (4%)	0	100	100
2	B	216/225 (96%)	202 (94%)	14 (6%)	0	100	100
2	H	215/225 (96%)	204 (95%)	11 (5%)	0	100	100
3	C	208/213 (98%)	201 (97%)	7 (3%)	0	100	100
3	L	208/213 (98%)	200 (96%)	7 (3%)	1 (0%)	29	61
All	All	1520/1582 (96%)	1453 (96%)	66 (4%)	1 (0%)	51	82

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	L	138	ASN

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	304/311 (98%)	300 (99%)	4 (1%)	69	90
1	G	304/311 (98%)	300 (99%)	4 (1%)	69	90
2	B	186/191 (97%)	181 (97%)	5 (3%)	44	77
2	H	185/191 (97%)	183 (99%)	2 (1%)	73	92
3	C	182/184 (99%)	179 (98%)	3 (2%)	62	86
3	L	182/184 (99%)	182 (100%)	0	100	100
All	All	1343/1372 (98%)	1325 (99%)	18 (1%)	69	90

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	47	ASP
1	A	326	ILE
1	A	407	MET
1	A	411	ASN

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Mol	Chain	Res	Type
2	B	58	ASN
2	B	71	ARG
2	B	73	THR
2	B	195	ILE
2	B	197	ASN
3	C	33	LEU
3	C	152	ASN
3	C	176	SER
1	G	86	LEU
1	G	203	GLN
1	G	411	ASN
1	G	461	ASN
2	H	108	LEU
2	H	191	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

30 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
5	PO4	H	301	-	4,4,4	0.91	0	6,6,6	0.43	0
4	NAG	A	504	1	14,14,15	0.22	0	17,19,21	0.50	0
4	NAG	A	505	1	14,14,15	0.20	0	17,19,21	0.38	0
4	NAG	G	512	1	14,14,15	0.25	0	17,19,21	0.44	0
4	NAG	G	508	1	14,14,15	0.36	0	17,19,21	0.53	0
4	NAG	G	501	1	14,14,15	0.28	0	17,19,21	0.37	0
4	NAG	A	511	1	14,14,15	0.20	0	17,19,21	0.44	0
4	NAG	A	503	1	14,14,15	0.28	0	17,19,21	0.58	0
4	NAG	A	509	1	14,14,15	0.35	0	17,19,21	0.55	0
4	NAG	A	507	1	14,14,15	0.21	0	17,19,21	0.44	0
4	NAG	G	504	1	14,14,15	0.19	0	17,19,21	0.39	0
4	NAG	G	507	1	14,14,15	0.31	0	17,19,21	0.49	0
4	NAG	A	508	1	14,14,15	0.48	0	17,19,21	1.31	1 (5%)
4	NAG	A	502	1	14,14,15	0.26	0	17,19,21	0.40	0
4	NAG	G	506	1	14,14,15	0.22	0	17,19,21	0.40	0
4	NAG	G	502	1	14,14,15	0.26	0	17,19,21	0.57	0
4	NAG	G	509	1	14,14,15	0.26	0	17,19,21	0.40	0
4	NAG	G	503	1	14,14,15	0.24	0	17,19,21	0.55	0
4	NAG	A	513	1	14,14,15	0.22	0	17,19,21	0.45	0
4	NAG	A	512	1	14,14,15	0.19	0	17,19,21	0.39	0
4	NAG	G	505	1	14,14,15	0.20	0	17,19,21	0.48	0
4	NAG	A	506	1	14,14,15	0.24	0	17,19,21	0.47	0
5	PO4	A	515	1,2	4,4,4	0.92	0	6,6,6	0.43	0
5	PO4	B	301	-	4,4,4	0.93	0	6,6,6	0.44	0
4	NAG	A	514	1	14,14,15	0.31	0	17,19,21	0.38	0
4	NAG	A	510	1	14,14,15	0.23	0	17,19,21	0.41	0
4	NAG	G	513	1	14,14,15	0.23	0	17,19,21	0.40	0
4	NAG	G	510	1	14,14,15	0.20	0	17,19,21	0.44	0
4	NAG	G	511	1	14,14,15	0.32	0	17,19,21	0.59	0
4	NAG	A	501	1	14,14,15	0.51	0	17,19,21	0.81	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
4	NAG	A	504	1	-	2/6/23/26	0/1/1/1
4	NAG	A	505	1	-	2/6/23/26	0/1/1/1
4	NAG	G	512	1	-	0/6/23/26	0/1/1/1
4	NAG	G	508	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	G	501	1	-	2/6/23/26	0/1/1/1
4	NAG	A	511	1	-	4/6/23/26	0/1/1/1
4	NAG	A	503	1	-	1/6/23/26	0/1/1/1
4	NAG	A	509	1	-	0/6/23/26	0/1/1/1
4	NAG	A	507	1	-	2/6/23/26	0/1/1/1
4	NAG	G	504	1	-	2/6/23/26	0/1/1/1
4	NAG	G	507	1	-	1/6/23/26	0/1/1/1
4	NAG	A	508	1	-	4/6/23/26	0/1/1/1
4	NAG	A	502	1	-	2/6/23/26	0/1/1/1
4	NAG	G	506	1	-	2/6/23/26	0/1/1/1
4	NAG	G	502	1	-	1/6/23/26	0/1/1/1
4	NAG	G	509	1	-	0/6/23/26	0/1/1/1
4	NAG	G	503	1	-	2/6/23/26	0/1/1/1
4	NAG	A	513	1	-	0/6/23/26	0/1/1/1
4	NAG	A	512	1	-	3/6/23/26	0/1/1/1
4	NAG	G	505	1	-	1/6/23/26	0/1/1/1
4	NAG	A	506	1	-	0/6/23/26	0/1/1/1
4	NAG	A	514	1	-	3/6/23/26	0/1/1/1
4	NAG	A	510	1	-	0/6/23/26	0/1/1/1
4	NAG	G	513	1	-	4/6/23/26	0/1/1/1
4	NAG	G	510	1	-	3/6/23/26	0/1/1/1
4	NAG	G	511	1	-	4/6/23/26	0/1/1/1
4	NAG	A	501	1	-	3/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	508	NAG	C2-N2-C7	4.32	129.06	122.90
4	A	501	NAG	C1-O5-C5	2.67	115.81	112.19

There are no chirality outliers.

All (50) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	G	506	NAG	O5-C5-C6-O6
4	A	501	NAG	O5-C5-C6-O6
4	A	505	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
4	A	507	NAG	O5-C5-C6-O6
4	A	501	NAG	C4-C5-C6-O6
4	G	504	NAG	O5-C5-C6-O6
4	G	513	NAG	O5-C5-C6-O6
4	A	507	NAG	C4-C5-C6-O6
4	A	504	NAG	O5-C5-C6-O6
4	G	511	NAG	O5-C5-C6-O6
4	A	505	NAG	C4-C5-C6-O6
4	G	503	NAG	O5-C5-C6-O6
4	G	506	NAG	C4-C5-C6-O6
4	A	504	NAG	C4-C5-C6-O6
4	G	504	NAG	C4-C5-C6-O6
4	G	503	NAG	C4-C5-C6-O6
4	G	501	NAG	C8-C7-N2-C2
4	G	501	NAG	O7-C7-N2-C2
4	A	511	NAG	C8-C7-N2-C2
4	A	511	NAG	O7-C7-N2-C2
4	A	508	NAG	C8-C7-N2-C2
4	A	508	NAG	O7-C7-N2-C2
4	A	512	NAG	C8-C7-N2-C2
4	A	512	NAG	O7-C7-N2-C2
4	A	514	NAG	C8-C7-N2-C2
4	A	514	NAG	O7-C7-N2-C2
4	G	513	NAG	C8-C7-N2-C2
4	G	513	NAG	O7-C7-N2-C2
4	G	510	NAG	C8-C7-N2-C2
4	G	510	NAG	O7-C7-N2-C2
4	G	513	NAG	C4-C5-C6-O6
4	A	502	NAG	O5-C5-C6-O6
4	G	508	NAG	O5-C5-C6-O6
4	G	511	NAG	C4-C5-C6-O6
4	A	514	NAG	O5-C5-C6-O6
4	G	508	NAG	C4-C5-C6-O6
4	A	511	NAG	O5-C5-C6-O6
4	G	507	NAG	O5-C5-C6-O6
4	A	508	NAG	O5-C5-C6-O6
4	A	512	NAG	O5-C5-C6-O6
4	G	511	NAG	C1-C2-N2-C7
4	A	503	NAG	C3-C2-N2-C7
4	G	502	NAG	C3-C2-N2-C7
4	A	501	NAG	C3-C2-N2-C7
4	G	510	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
4	A	502	NAG	C4-C5-C6-O6
4	A	511	NAG	C4-C5-C6-O6
4	G	505	NAG	C4-C5-C6-O6
4	A	508	NAG	C3-C2-N2-C7
4	G	511	NAG	C3-C2-N2-C7

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	505	NAG	1	0
4	A	508	NAG	1	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 ⓘ

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	342/353 (96%)	0.04	5 (1%)	73 73	56, 92, 149, 187	0
1	G	343/353 (97%)	0.03	2 (0%)	89 89	59, 93, 144, 170	0
2	B	220/225 (97%)	-0.09	3 (1%)	75 75	56, 91, 140, 172	0
2	H	219/225 (97%)	-0.11	3 (1%)	75 75	55, 89, 135, 172	0
3	C	210/213 (98%)	-0.04	1 (0%)	91 91	54, 84, 117, 143	0
3	L	210/213 (98%)	-0.04	1 (0%)	91 91	55, 84, 120, 140	0
All	All	1544/1582 (97%)	-0.02	15 (0%)	82 82	54, 89, 139, 187	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	397	GLY	5.4
2	H	189	LEU	3.1
1	A	45	TRP	2.6
2	H	191	THR	2.5
1	A	198	GLY	2.3
2	B	189	LEU	2.2
2	H	214	LYS	2.2
2	B	132	SER	2.1
1	G	122	LEU	2.1
3	C	183	LYS	2.1
3	L	87	LEU	2.1
2	B	214	LYS	2.1
1	A	116	LEU	2.0
1	A	217	TYR	2.0
1	G	59	LYS	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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
4	NAG	A	512	14/15	0.71	0.29	155,166,173,177	0
4	NAG	G	513	14/15	0.80	0.33	142,156,161,164	0
4	NAG	G	508	14/15	0.83	0.27	119,135,138,141	0
4	NAG	G	511	14/15	0.83	0.22	160,169,177,180	0
4	NAG	G	502	14/15	0.84	0.22	119,129,142,143	0
5	PO4	A	515	5/5	0.84	0.16	174,192,201,204	0
4	NAG	A	501	14/15	0.86	0.24	151,168,174,176	0
4	NAG	A	505	14/15	0.88	0.17	99,118,126,133	0
4	NAG	A	503	14/15	0.88	0.20	105,128,134,139	0
4	NAG	G	504	14/15	0.88	0.19	103,117,128,130	0
4	NAG	A	514	14/15	0.89	0.33	130,147,148,148	0
4	NAG	G	507	14/15	0.91	0.17	91,114,119,121	0
4	NAG	A	509	14/15	0.91	0.22	118,130,140,141	0
4	NAG	A	511	14/15	0.92	0.20	105,121,125,127	0
4	NAG	A	508	14/15	0.93	0.14	94,111,118,119	0
4	NAG	G	512	14/15	0.93	0.16	104,118,136,137	0
4	NAG	A	513	14/15	0.94	0.18	101,117,133,137	0
4	NAG	G	506	14/15	0.94	0.19	83,101,121,123	0
4	NAG	G	510	14/15	0.94	0.23	100,120,128,129	0
4	NAG	G	501	14/15	0.94	0.16	79,101,106,112	0
5	PO4	B	301	5/5	0.94	0.15	143,145,147,148	0
4	NAG	A	502	14/15	0.95	0.13	75,96,105,108	0
4	NAG	A	507	14/15	0.95	0.19	82,102,116,118	0
5	PO4	H	301	5/5	0.95	0.10	135,137,139,140	0
4	NAG	G	505	14/15	0.96	0.15	66,81,84,87	0
4	NAG	A	510	14/15	0.96	0.16	75,91,105,109	0
4	NAG	A	504	14/15	0.97	0.18	70,87,98,99	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	NAG	G	509	14/15	0.97	0.14	76,93,102,105	0
4	NAG	G	503	14/15	0.97	0.15	64,84,91,92	0
4	NAG	A	506	14/15	0.97	0.13	63,76,80,82	0

6.5 Other polymers [i](#)

There are no such residues in this entry.