



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 25, 2026 – 04:57 PM EDT

PDB ID : 9YK6 / pdb_00009yk6
Title : Crystal structure of anti-HCV human neutralizing antibody B107
Authors : Nguyen, T.K.Y.; Wilson, I.A.
Deposited on : 2025-10-06
Resolution : 1.60 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 : 4-5-2 with Phenix2.0
Xtrriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

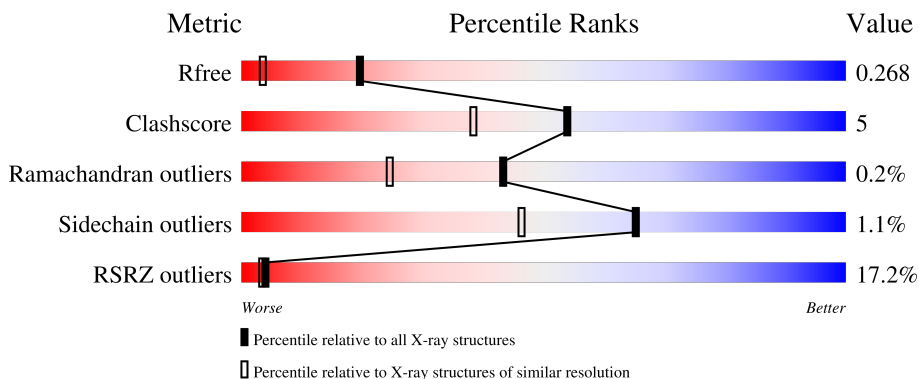
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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}	180053	4673 (1.60-1.60)
Clashscore	190562	4931 (1.60-1.60)
Ramachandran outliers	187476	4831 (1.60-1.60)
Sidechain outliers	187428	4830 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

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	H	233	
2	L	212	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3409 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 K595 fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	223	1674	1057	291	320	6	0	0	0

- Molecule 2 is a protein called K595 fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	212	1614	1008	271	329	6	0	0	0

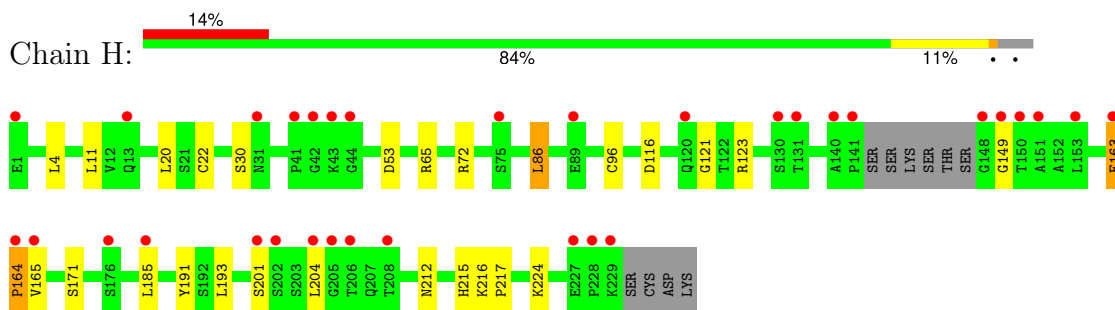
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	H	67	Total	O	0	0
			67	67		
3	L	54	Total	O	0	0
			54	54		

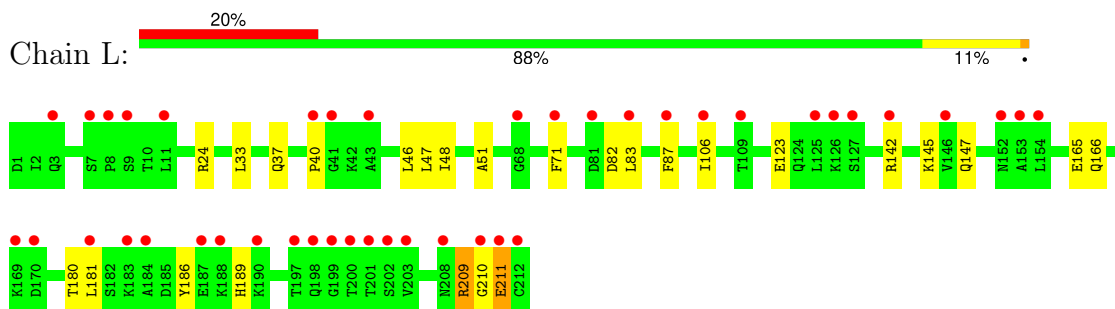
3 Residue-property plots [i](#)

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: K595 fab heavy chain



- Molecule 2: K595 fab light chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	49.74Å 73.32Å 149.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.93 – 1.60 32.93 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (32.93-1.60) 99.9 (32.93-1.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.17 (at 1.60Å)	Xtrriage
Refinement program	PHENIX (1.19.2_4158: ???)	Depositor
R, R_{free}	0.250 , 0.274 0.245 , 0.268	Depositor DCC
R_{free} test set	2000 reflections (2.72%)	wwPDB-VP
Wilson B-factor (Å ²)	25.1	Xtrriage
Anisotropy	0.135	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 21.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	3409	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.68% 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	H	0.65	0/1715	0.99	3/2334 (0.1%)
2	L	1.20	3/1646 (0.2%)	1.02	6/2234 (0.3%)
All	All	0.96	3/3361 (0.1%)	1.01	9/4568 (0.2%)

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	H	0	2
2	L	0	3
All	All	0	5

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	L	211	GLU	C-N	-29.60	0.92	1.33
2	L	210	GLY	C-N	23.60	1.67	1.33
2	L	82	ASP	C-N	-20.00	1.05	1.33

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	211	GLU	O-C-N	18.45	144.87	121.99
2	L	210	GLY	CA-C-N	-8.80	106.53	122.54
2	L	210	GLY	C-N-CA	-8.80	106.53	122.54
2	L	211	GLU	CA-C-N	-7.19	108.76	121.70
2	L	211	GLU	C-N-CA	-7.19	108.76	121.70
1	H	149	GLY	N-CA-C	-7.04	106.10	115.32
1	H	121	GLY	CA-C-O	-5.60	118.58	122.22
2	L	87	PHE	CA-CB-CG	5.26	119.06	113.80
1	H	121	GLY	N-CA-C	5.02	116.72	111.95

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	H	65	ARG	Sidechain
1	H	72	ARG	Sidechain
2	L	142	ARG	Sidechain
2	L	209	ARG	Sidechain
2	L	211	GLU	Mainchain

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	H	1674	0	1638	20	0
2	L	1614	0	1579	14	0
3	H	67	0	0	2	0
3	L	54	0	0	0	0
All	All	3409	0	3217	32	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 5.

All (32) 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:H:171:SER:H	1:H:212:ASN:HD21	1.22	0.83
2:L:40:PRO:HG2	2:L:165:GLU:HG3	1.62	0.82
1:H:11:LEU:HD12	3:H:362:HOH:O	1.94	0.66
2:L:189:HIS:O	2:L:209:ARG:NH1	2.35	0.60
1:H:165:VAL:HG23	1:H:193:LEU:HD21	1.82	0.60
1:H:165:VAL:CG2	1:H:193:LEU:HD21	2.32	0.59
1:H:123:ARG:HD3	1:H:164:PRO:HG3	1.84	0.59
1:H:11:LEU:CD1	3:H:362:HOH:O	2.49	0.59
1:H:123:ARG:HB3	1:H:164:PRO:HG3	1.86	0.58
2:L:83:LEU:HD12	2:L:106:ILE:CG1	2.35	0.56
1:H:171:SER:H	1:H:212:ASN:ND2	2.00	0.56
2:L:33:LEU:HD13	2:L:71:PHE:CD1	2.42	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:83:LEU:HD12	2:L:106:ILE:HG12	1.89	0.54
1:H:216:LYS:N	1:H:217:PRO:HD2	2.26	0.51
1:H:30:SER:O	1:H:53:ASP:HB2	2.12	0.49
2:L:145:LYS:HE3	2:L:147:GLN:CD	2.40	0.46
1:H:4:LEU:HB3	1:H:96:CYS:SG	2.56	0.46
2:L:48:ILE:HG21	2:L:51:ALA:O	2.15	0.45
1:H:224:LYS:NZ	2:L:123:GLU:OE1	2.34	0.45
1:H:215:HIS:NE2	1:H:217:PRO:HG2	2.32	0.44
2:L:83:LEU:CD1	2:L:166:GLN:HB3	2.48	0.44
1:H:163:GLU:O	1:H:164:PRO:C	2.60	0.44
2:L:180:THR:O	2:L:181:LEU:HD23	2.17	0.44
1:H:123:ARG:HD3	1:H:164:PRO:HD3	2.00	0.43
1:H:193:LEU:C	1:H:193:LEU:HD12	2.44	0.43
1:H:116:ASP:HA	2:L:46:LEU:HD22	2.01	0.43
1:H:201:SER:HA	1:H:204:LEU:HD13	2.01	0.42
2:L:186:TYR:CZ	2:L:209:ARG:HG3	2.54	0.42
1:H:86:LEU:HD12	1:H:86:LEU:HA	1.92	0.42
1:H:185:LEU:HD13	1:H:191:TYR:CZ	2.54	0.42
2:L:37:GLN:HB2	2:L:47:LEU:HD11	2.01	0.41
2:L:24:ARG:HG3	2:L:24:ARG:HH11	1.87	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	H	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	24 10
2	L	210/212 (99%)	204 (97%)	6 (3%)	0	100 100
All	All	429/445 (96%)	420 (98%)	8 (2%)	1 (0%)	43 24

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	164	PRO

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	H	185/195 (95%)	181 (98%)	4 (2%)	45	22
2	L	184/184 (100%)	184 (100%)	0	100	100
All	All	369/379 (97%)	365 (99%)	4 (1%)	65	46

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	20	LEU
1	H	22	CYS
1	H	86	LEU
1	H	163	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	H	84	ASN
1	H	207	GLN
1	H	212	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](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides 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 [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	L	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	L	210:GLY	C	211:GLU	N	1.67
1	L	82:ASP	C	83:LEU	N	1.05
1	L	211:GLU	C	212:CYS	N	0.91

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	H	223/233 (95%)	0.97	33 (14%) 5 5	20, 27, 49, 79	0
2	L	212/212 (100%)	1.19	42 (19%) 3 2	19, 29, 51, 88	0
All	All	435/445 (97%)	1.08	75 (17%) 4 3	19, 28, 51, 88	0

All (75) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	202	SER	8.5
2	L	199	GLY	8.1
2	L	201	THR	7.3
1	H	148	GLY	7.3
2	L	212	CYS	6.8
2	L	200	THR	6.6
1	H	164	PRO	6.5
1	H	229	LYS	6.1
2	L	190	LYS	5.5
1	H	204	LEU	4.9
2	L	87	PHE	4.7
2	L	197	THR	4.4
2	L	210	GLY	4.4
1	H	141	PRO	4.3
2	L	7	SER	4.2
1	H	228	PRO	4.1
2	L	170	ASP	4.1
1	H	42	GLY	3.8
1	H	140	ALA	3.7
1	H	165	VAL	3.7
1	H	163	GLU	3.7
2	L	169	LYS	3.6
1	H	201	SER	3.6
2	L	188	LYS	3.6

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Mol	Chain	Res	Type	RSRZ
2	L	68	GLY	3.6
1	H	149	GLY	3.5
2	L	187	GLU	3.5
2	L	125	LEU	3.4
2	L	41	GLY	3.4
1	H	206	THR	3.4
2	L	71	PHE	3.3
2	L	203	VAL	3.3
2	L	40	PRO	3.2
2	L	154	LEU	3.2
2	L	181	LEU	3.2
1	H	205	GLY	3.1
2	L	127	SER	3.1
2	L	211	GLU	3.1
1	H	44	GLY	3.0
2	L	198	GLN	2.9
2	L	83	LEU	2.9
2	L	8	PRO	2.9
1	H	150	THR	2.9
1	H	41	PRO	2.9
1	H	153	LEU	2.8
1	H	131	THR	2.8
2	L	126	LYS	2.8
2	L	184	ALA	2.8
1	H	202	SER	2.7
1	H	227	GLU	2.6
1	H	208	THR	2.6
1	H	151	ALA	2.6
2	L	11	LEU	2.6
2	L	183	LYS	2.6
2	L	81	ASP	2.5
1	H	130	SER	2.5
2	L	153	ALA	2.4
1	H	120	GLN	2.4
2	L	208	ASN	2.3
2	L	109	THR	2.3
2	L	43	ALA	2.3
2	L	142	ARG	2.3
1	H	43	LYS	2.3
1	H	31	ASN	2.3
2	L	9	SER	2.2
1	H	13	GLN	2.2

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Mol	Chain	Res	Type	RSRZ
2	L	106	ILE	2.2
1	H	75	SER	2.1
1	H	89	GLU	2.1
1	H	176	SER	2.1
2	L	3	GLN	2.1
2	L	146	VAL	2.1
1	H	1	GLU	2.1
1	H	185	LEU	2.0
2	L	152	ASN	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.