



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 07:50 PM UTC

PDB ID : 6UBI / pdb_00006ubi
Title : N123-VRC34.05 HIV neutralizing antibody in complex with HIV fusion peptide residue 512-519
Authors : Xu, K.; Liu, K.; Kwong, P.D.
Deposited on : 2019-09-11
Resolution : 1.90 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 ⓘ 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
Xtriage (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

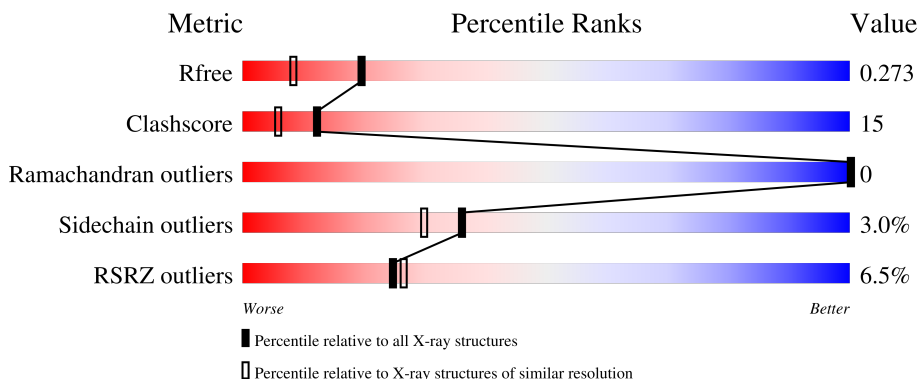
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION


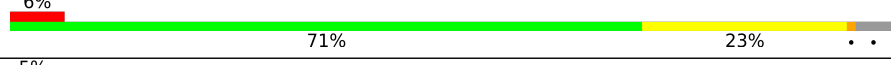



The reported resolution of this entry is 1.90 Å.

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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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 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	229	
1	D	229	
2	B	212	
2	E	212	
3	C	8	

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Mol	Chain	Length	Quality of chain
3	F	8	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a red segment on the left labeled '38%', a green segment in the middle labeled '50%', and a yellow segment on the right labeled '50%'. The segments are stacked horizontally, with the red segment starting from the left and the yellow segment ending at the right.</p>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7527 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 VRC34.05 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	215	Total 1619	C 1021	N 277	O 316	S 5	0	0	0
1	D	220	Total 1653	C 1041	N 284	O 323	S 5	0	0	0

- Molecule 2 is a protein called VRC34.05 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	212	Total 1645	C 1032	N 283	O 326	S 4	0	0	0
2	E	212	Total 1645	C 1032	N 283	O 326	S 4	0	0	0

- Molecule 3 is a protein called HIV fusion peptide 512-519.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	8	Total 51	C 35	N 8	O 8	0	0	0
3	F	8	Total 51	C 35	N 8	O 8	0	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	239	Total 239	O 239	0	0
4	B	206	Total 206	O 206	0	0
4	C	14	Total 14	O 14	0	0
4	D	187	Total 187	O 187	0	0

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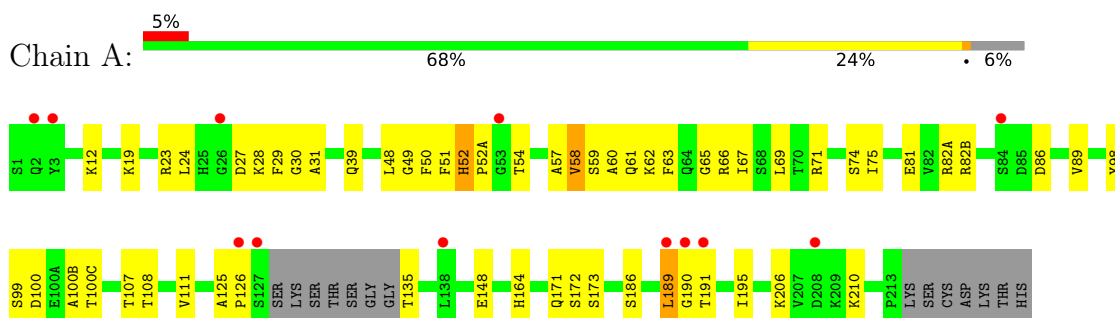
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	215	Total 215	O 215	0	0
4	F	2	Total 2	O 2	0	0

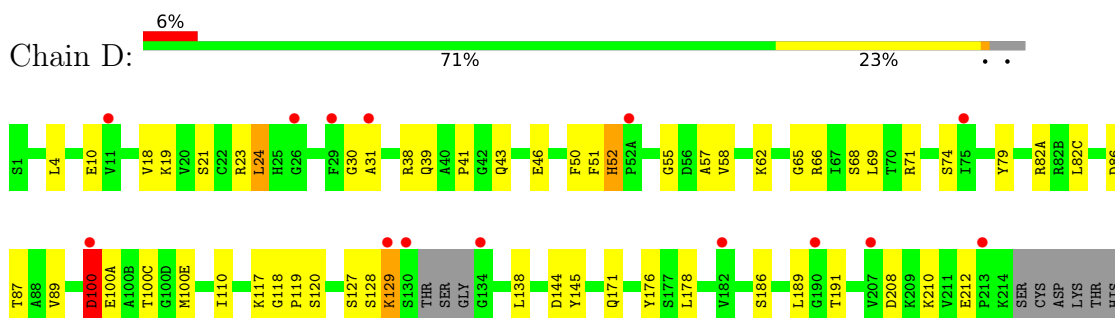
3 Residue-property plots [i](#)

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.

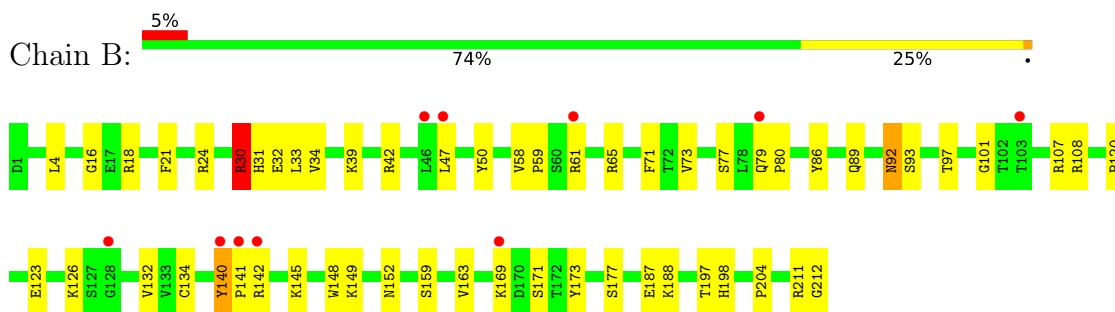
- Molecule 1: VRC34.05 heavy chain



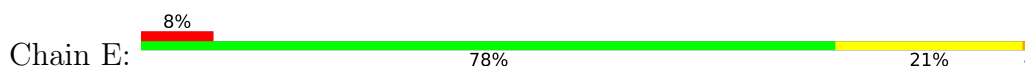
- Molecule 1: VRC34.05 heavy chain

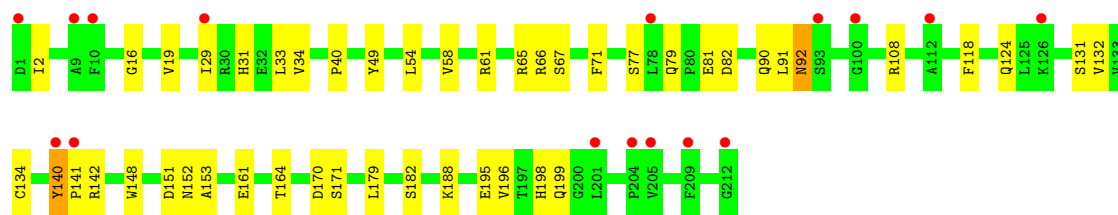


- Molecule 2: VRC34.05 light chain

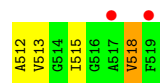


- Molecule 2: VRC34.05 light chain

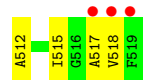
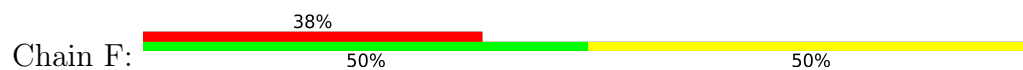




- Molecule 3: HIV fusion peptide 512-519



- Molecule 3: HIV fusion peptide 512-519



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	80.93Å 44.28Å 125.38Å 90.00° 96.20° 90.00°	Depositor
Resolution (Å)	41.72 – 1.90 41.72 – 1.90	Depositor EDS
% Data completeness (in resolution range)	95.8 (41.72-1.90) 89.9 (41.72-1.90)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.58 (at 1.91Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.237 , 0.288 (Not available) , 0.273	Depositor DCC
R_{free} test set	3403 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	18.4	Xtrriage
Anisotropy	0.815	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7527	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.10% 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	0.94	11/1659 (0.7%)	0.87	3/2258 (0.1%)
1	D	0.88	7/1693 (0.4%)	0.90	6/2301 (0.3%)
2	B	0.65	3/1681 (0.2%)	0.96	6/2281 (0.3%)
2	E	0.48	1/1681 (0.1%)	0.87	3/2281 (0.1%)
3	C	1.81	1/51 (2.0%)	1.59	0/68
3	F	1.72	0/51	1.55	0/68
All	All	0.78	23/6816 (0.3%)	0.92	18/9257 (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	D	0	1

The worst 5 of 23 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	52	HIS	C-O	-17.67	1.01	1.24
1	A	52	HIS	C-O	-15.51	1.04	1.24
1	A	100(B)	ALA	C-O	-11.77	1.09	1.24
1	D	100	ASP	CB-CG	-11.76	1.22	1.52
1	A	52	HIS	C-N	11.42	1.55	1.34

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	140	TYR	CA-C-N	-10.65	108.33	119.83
2	B	140	TYR	C-N-CA	-10.65	108.33	119.83
2	E	140	TYR	CA-C-N	-9.13	109.38	119.98
2	E	140	TYR	C-N-CA	-9.13	109.38	119.98
2	B	92	ASN	N-CA-C	8.45	120.27	111.14

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	128	SER	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	1619	0	1581	47	0
1	D	1653	0	1620	43	1
2	B	1645	0	1607	63	0
2	E	1645	0	1607	50	1
3	C	51	0	53	13	0
3	F	51	0	53	8	0
4	A	239	0	0	31	4
4	B	206	0	0	23	7
4	C	14	0	0	0	1
4	D	187	0	0	24	7
4	E	215	0	0	24	5
4	F	2	0	0	0	1
All	All	7527	0	6521	204	14

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 15.

The worst 5 of 204 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)
4:A:471:HOH:O	2:B:50:TYR:HE1	1.43	1.01
1:A:74:SER:O	4:A:301:HOH:O	1.82	0.98
1:A:210:LYS:O	4:A:302:HOH:O	1.86	0.92
2:B:92:ASN:HA	3:C:512:ALA:HB1	1.51	0.92
2:B:123:GLU:HA	2:B:126:LYS:HE2	1.49	0.92

The worst 5 of 14 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)
4:D:467:HOH:O	4:E:423:HOH:O[2_646]	1.79	0.41
4:A:398:HOH:O	4:B:451:HOH:O[2_556]	1.89	0.31
4:A:499:HOH:O	4:E:342:HOH:O[2_656]	2.07	0.13
4:D:409:HOH:O	4:E:315:HOH:O[1_545]	2.09	0.11
4:D:305:HOH:O	4:D:314:HOH:O[2_645]	2.10	0.10

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	211/229 (92%)	207 (98%)	4 (2%)	0	100	100
1	D	216/229 (94%)	210 (97%)	6 (3%)	0	100	100
2	B	210/212 (99%)	206 (98%)	4 (2%)	0	100	100
2	E	210/212 (99%)	206 (98%)	4 (2%)	0	100	100
3	C	6/8 (75%)	6 (100%)	0	0	100	100
3	F	6/8 (75%)	6 (100%)	0	0	100	100
All	All	859/898 (96%)	841 (98%)	18 (2%)	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	180/192 (94%)	175 (97%)	5 (3%)	38	32

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	184/192 (96%)	174 (95%)	10 (5%)	20	12
2	B	186/186 (100%)	180 (97%)	6 (3%)	34	27
2	E	186/186 (100%)	186 (100%)	0	100	100
3	C	4/4 (100%)	3 (75%)	1 (25%)	0	0
3	F	4/4 (100%)	4 (100%)	0	100	100
All	All	744/764 (97%)	722 (97%)	22 (3%)	36	30

5 of 22 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	50	PHE
1	D	100(A)	GLU
1	D	100	ASP
1	D	100(C)	THR
2	B	47	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	192	GLN
2	B	79	GLN
2	B	152	ASN
2	B	189	HIS
2	E	210	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](#)

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	215/229 (93%)	0.84	12 (5%) 30 32	11, 22, 32, 40	0
1	D	220/229 (96%)	0.89	14 (6%) 25 27	14, 24, 33, 41	0
2	B	212/212 (100%)	0.80	10 (4%) 36 39	15, 24, 32, 37	0
2	E	212/212 (100%)	0.91	16 (7%) 20 21	14, 23, 31, 40	0
3	C	8/8 (100%)	1.60	2 (25%) 2 1	25, 27, 33, 36	0
3	F	8/8 (100%)	1.56	3 (37%) 1 0	26, 29, 31, 32	0
All	All	875/898 (97%)	0.87	57 (6%) 25 26	11, 23, 32, 41	0

The worst 5 of 57 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	212	GLY	3.9
2	E	205	VAL	3.8
1	A	190	GLY	3.7
1	A	189	LEU	3.7
2	E	140	TYR	3.7

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.