



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 26, 2024 – 09:32 AM EDT

PDB ID : 5KVE
Title : Zika specific antibody, ZV-48, bound to ZIKA envelope DIII
Authors : Zhao, H.; Nelson, C.A.; Fremont, D.H.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2016-07-14
Resolution : 1.70 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

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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

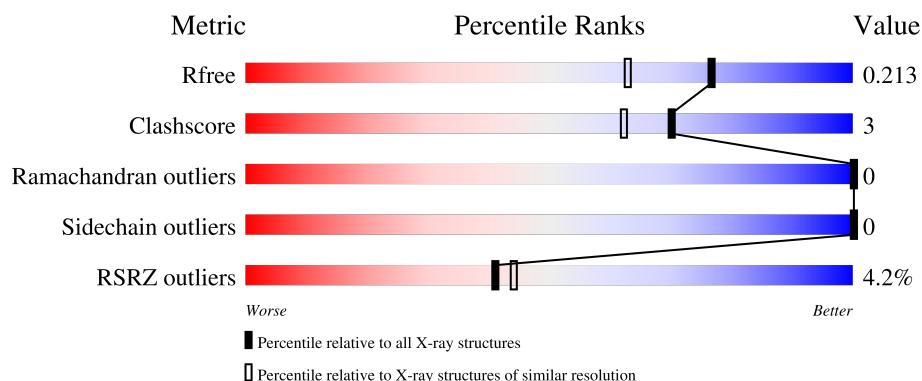
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	164625	5161 (1.70-1.70)
Clashscore	180529	5671 (1.70-1.70)
Ramachandran outliers	177936	5594 (1.70-1.70)
Sidechain outliers	177891	5594 (1.70-1.70)
RSRZ outliers	164620	5159 (1.70-1.70)

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 ≥ 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	E	110	
2	L	245	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 3210 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 Genome polyprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	E	101	Total	C	N	O	S	0	0	0
			768	488	126	148	6			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	298	MET	-	initiating methionine	UNP A0A142DS37

- Molecule 2 is a protein called ZV-48 Antibody scFv.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	230	Total	C	N	O	S	0	0	0
			1786	1132	293	349	12			

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

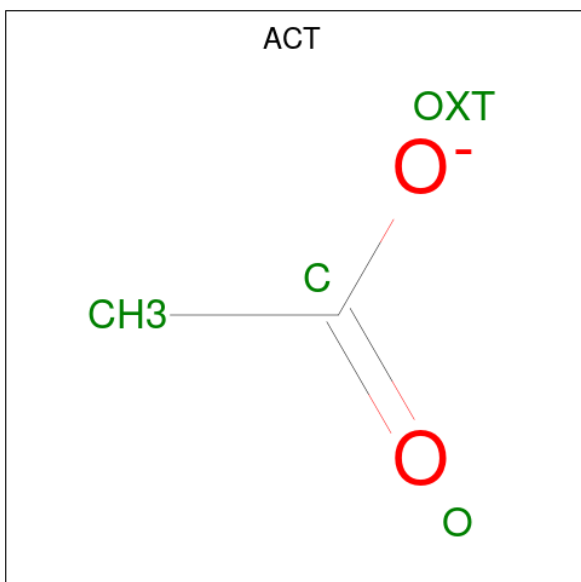
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	1	Total	Na	0	0
			1	1		
3	L	1	Total	Na	0	0
			1	1		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	E	1	Total	O	S	0	0
			5	4	1		
4	L	1	Total	O	S	0	0
			5	4	1		
4	L	1	Total	O	S	0	0
			5	4	1		
4	L	1	Total	O	S	0	0
			5	4	1		
4	L	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	E	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	E	1	Total	C	O	0	0
			4	2	2		
6	L	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	E	182	Total	O	0	0
			182	182		
7	L	435	Total	O	0	0
			435	435		

- Molecule 1: Genome polypeptide



- HQ
 I19
 T20
 Y31
 S32
 N33
 P65
 D66
 R67
 T78
 I81
 K112
 G114
 GLY
 GLY
 SER
 GLY
 GLY
 GLY
 GLY
 SER
 GLY
 GLY
 GLY
 GLY
 SER
 Q129
 I139
 R168
 P169
 G170
 Q171
 M206
 V207
 Y208
 S243
 SER

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	63.24Å 87.98Å 147.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.50 – 1.70 48.50 – 1.70	Depositor EDS
% Data completeness (in resolution range)	97.7 (48.50-1.70) 89.0 (48.50-1.70)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.10_2155	Depositor
R, R_{free}	0.187 , 0.213 0.187 , 0.213	Depositor DCC
R_{free} test set	2295 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	15.7	Xtriage
Anisotropy	0.856	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3210	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.46% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, ACT, NA, SO4

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	E	0.27	0/786	0.53	0/1073
2	L	0.27	0/1830	0.47	0/2475
All	All	0.27	0/2616	0.49	0/3548

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	E	768	0	762	10	0
2	L	1786	0	1727	7	0
3	E	1	0	0	0	0
3	L	1	0	0	0	0
4	E	5	0	0	0	0
4	L	20	0	0	1	0
5	E	4	0	3	0	0
6	E	4	0	6	1	0
6	L	4	0	5	0	0
7	E	182	0	0	2	1
7	L	435	0	0	0	1
All	All	3210	0	2503	17	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 3.

All (17) 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:E:358:LEU:HD21	1:E:363:PRO:HG3	1.73	0.70
1:E:403:SER:OG	7:E:601:HOH:O	2.13	0.66
1:E:359:ILE:HD11	1:E:379:ASP:HB2	1.88	0.56
2:L:20:THR:HG23	2:L:78:THR:HG23	1.90	0.53
2:L:19:ILE:HD11	2:L:81:ILE:HD12	1.92	0.51
1:E:338:PRO:HA	1:E:365:ILE:O	2.13	0.48
2:L:206:MET:HG2	2:L:208:TYR:CZ	2.49	0.48
2:L:113:LYS:HG3	2:L:114:GLY:H	1.80	0.47
1:E:387:ILE:O	1:E:397:THR:HA	2.16	0.46
2:L:168:ARG:NH1	4:L:305:SO4:O3	2.50	0.45
1:E:380:PRO:HG2	1:E:402:ARG:HD2	1.98	0.44
1:E:402:ARG:O	1:E:403:SER:HB2	2.17	0.44
1:E:396:ILE:HB	6:E:504:EDO:H12	2.01	0.43
1:E:403:SER:HB3	7:E:721:HOH:O	2.19	0.43
2:L:65:PRO:HB2	2:L:67:ARG:HG2	2.03	0.41
1:E:307:LEU:HD22	1:E:342:PRO:HG3	2.02	0.40
2:L:31:TYR:CE2	2:L:33:ASN:HB2	2.56	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)
7:E:703:HOH:O	7:L:473:HOH:O[3_657]	2.19	0.01

5.3 Torsion angles

5.3.1 Protein backbone

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	E	99/110 (90%)	98 (99%)	1 (1%)	0	100	100
2	L	226/245 (92%)	221 (98%)	5 (2%)	0	100	100
All	All	325/355 (92%)	319 (98%)	6 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	E	87/94 (93%)	87 (100%)	0	100	100
2	L	198/202 (98%)	198 (100%)	0	100	100
All	All	285/296 (96%)	285 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	398	HIS
2	L	133	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 10 ligands modelled in this entry, 2 are monoatomic - leaving 8 for Mogul analysis.

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	SO4	L	302	-	4,4,4	0.24	0	6,6,6	0.08	0
5	ACT	E	503	-	3,3,3	0.80	0	3,3,3	1.24	0
6	EDO	E	504	-	3,3,3	0.37	0	2,2,2	0.47	0
4	SO4	L	301	-	4,4,4	0.24	0	6,6,6	0.08	0
6	EDO	L	306	3	3,3,3	0.42	0	2,2,2	0.32	0
4	SO4	L	305	-	4,4,4	0.24	0	6,6,6	0.18	0
4	SO4	E	502	-	4,4,4	0.24	0	6,6,6	0.07	0
4	SO4	L	303	-	4,4,4	0.24	0	6,6,6	0.09	0

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
6	EDO	E	504	-	-	0/1/1/1	-
6	EDO	L	306	3	-	0/1/1/1	-

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.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	E	504	EDO	1	0
4	L	305	SO4	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 [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	E	101/110 (91%)	0.44	7 (6%) 24 25	14, 25, 41, 57	0
2	L	230/245 (93%)	0.31	7 (3%) 52 56	13, 24, 43, 66	1 (0%)
All	All	331/355 (93%)	0.35	14 (4%) 41 44	13, 24, 43, 66	1 (0%)

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	114	GLY	5.8
1	E	361	ALA	4.3
2	L	169	PRO	3.9
2	L	170	GLY	3.5
1	E	382	PHE	3.4
2	L	243	SER	2.8
1	E	403	SER	2.7
2	L	139	LEU	2.4
1	E	303	VAL	2.4
1	E	399	HIS	2.4
1	E	322	LEU	2.2
2	L	171	GLN	2.1
1	E	376	LEU	2.1
2	L	112	ILE	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 [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, 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	SO4	L	305	5/5	0.46	0.15	124,125,125,125	0
5	ACT	E	503	4/4	0.68	0.23	45,46,46,47	0
4	SO4	E	502	5/5	0.73	0.17	86,86,86,87	0
4	SO4	L	303	5/5	0.75	0.18	107,107,107,107	0
4	SO4	L	302	5/5	0.76	0.12	74,74,75,75	0
6	EDO	E	504	4/4	0.85	0.18	36,37,37,38	0
4	SO4	L	301	5/5	0.86	0.11	49,50,52,56	0
6	EDO	L	306	4/4	0.86	0.18	49,50,50,51	0
3	NA	L	304	1/1	0.89	0.13	45,45,45,45	0
3	NA	E	501	1/1	0.93	0.13	43,43,43,43	0

6.5 Other polymers [i](#)

There are no such residues in this entry.