



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:47 AM UTC

PDB ID : 2SNW / pdb_00002snw
Title : SINDBIS VIRUS CAPSID PROTEIN, TYPE3 CRYSTAL FORM
Authors : Choi, H.-K.; Lee, S.; Zhang, Y.-P.; Mckinney, B.R.; Wengler, G.; Rossmann, M.G.; Kuhn, R.J.
Deposited on : 1998-02-17
Resolution : 2.70 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	:	4-5-2 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

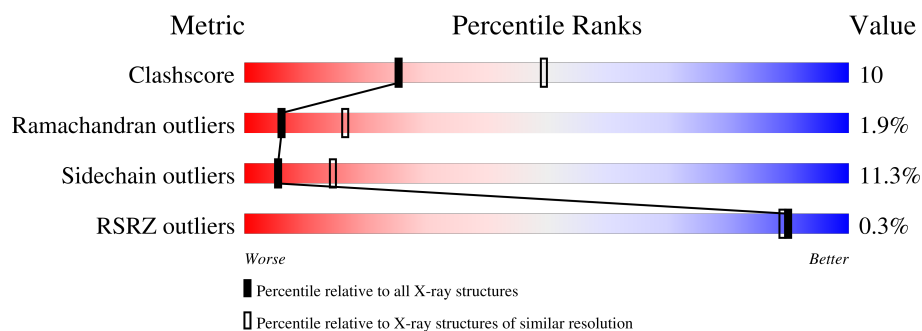
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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))
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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	A	158	 65% 30% 5%
1	B	158	 71% 22% 7%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3030 atoms, of which 586 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 COAT PROTEIN C.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	158	Total	C	H	N	O	S	0	0	0
			1497	764	281	215	232	5			
1	B	158	Total	C	H	N	O	S	0	0	0
			1497	764	281	215	232	5			

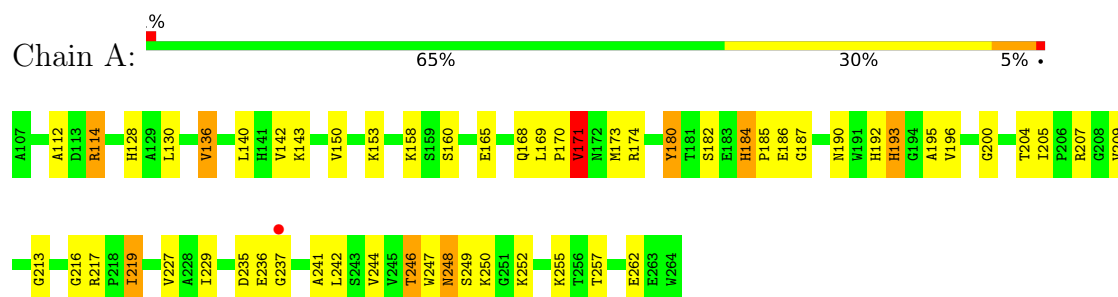
- Molecule 2 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	8	Total	H	O	0	0
			24	16	8		
2	B	4	Total	H	O	0	0
			12	8	4		

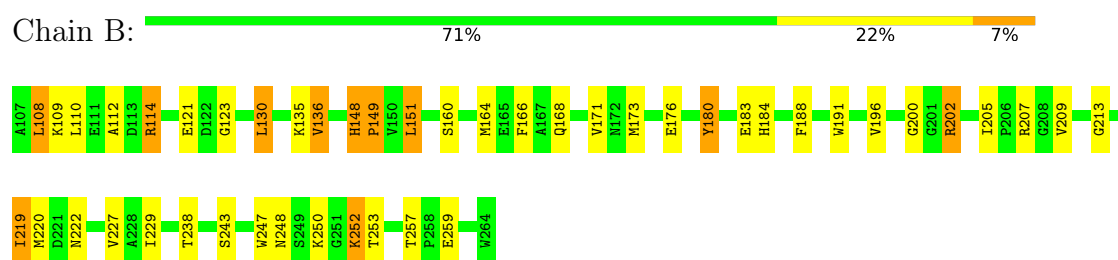
3 Residue-property plots

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: COAT PROTEIN C



• Molecule 1: COAT PROTEIN C



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	38.80Å 79.70Å 60.80Å 90.00° 102.20° 90.00°	Depositor
Resolution (Å)	8.00 – 2.70 8.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	78.0 (8.00-2.70) 74.2 (8.00-2.70)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.74 (at 2.68Å)	Xtriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.191 , (Not available) 0.176 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	51.4	Xtriage
Anisotropy	0.455	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 79.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3030	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.16% 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

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	0.81	0/1244	1.25	16/1679 (1.0%)
1	B	0.74	0/1244	1.34	16/1679 (1.0%)
All	All	0.78	0/2488	1.29	32/3358 (1.0%)

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
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	184	HIS	CA-C-N	9.57	130.82	120.11
1	A	184	HIS	C-N-CA	9.57	130.82	120.11
1	A	136	VAL	N-CA-C	-8.65	95.82	108.71
1	B	184	HIS	CA-C-N	8.40	129.52	120.11
1	B	184	HIS	C-N-CA	8.40	129.52	120.11
1	B	257	THR	CA-C-N	7.63	127.58	120.03
1	B	257	THR	C-N-CA	7.63	127.58	120.03
1	B	219	ILE	N-CA-C	-7.59	97.53	108.53
1	B	108	LEU	N-CA-C	7.47	120.77	110.24
1	B	213	GLY	N-CA-C	-6.57	106.55	113.58
1	B	148	HIS	CA-C-N	6.34	127.77	119.84
1	B	148	HIS	C-N-CA	6.34	127.77	119.84
1	A	190	ASN	N-CA-C	6.33	119.46	108.76
1	B	151	LEU	N-CA-C	6.31	118.16	111.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	243	SER	N-CA-C	-6.30	98.47	108.73
1	B	123	GLY	N-CA-C	6.20	121.04	113.79
1	A	136	VAL	CB-CA-C	-6.18	102.27	110.98
1	A	114	ARG	N-CA-C	-5.90	105.83	114.39
1	A	171	VAL	N-CA-C	5.87	121.55	109.34
1	A	186	GLU	N-CA-C	-5.82	102.69	110.55
1	A	192	HIS	N-CA-C	5.71	118.24	111.33
1	A	257	THR	CA-C-N	5.70	125.61	119.85
1	A	257	THR	C-N-CA	5.70	125.61	119.85
1	B	136	VAL	N-CA-C	-5.64	100.21	109.12
1	A	262	GLU	N-CA-C	-5.63	100.01	108.96
1	A	219	ILE	N-CA-C	-5.58	99.61	107.75
1	A	112	ALA	N-CA-C	5.19	117.95	110.28
1	A	216	GLY	N-CA-C	-5.16	108.50	115.21
1	B	202	ARG	N-CA-C	5.16	118.22	109.76
1	B	135	LYS	N-CA-C	5.15	116.90	109.07
1	A	142	VAL	N-CA-C	-5.06	101.05	108.54
1	B	259	GLU	N-CA-C	-5.04	102.83	110.28

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	180	TYR	Sidechain
1	B	180	TYR	Sidechain

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	A	1216	281	1189	29	0
1	B	1216	281	1189	19	0
2	A	8	16	0	0	0
2	B	4	8	0	0	0
All	All	2444	586	2378	46	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 10.

All (46) 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:B:112:ALA:HB1	1:B:176:GLU:HB2	1.55	0.89
1:A:217:ARG:HG3	1:A:217:ARG:HH11	1.48	0.79
1:B:207:ARG:HB2	1:B:238:THR:O	1.86	0.75
1:B:196:VAL:HG11	1:B:219:ILE:HD12	1.72	0.72
1:B:248:ASN:ND2	1:B:250:LYS:H	1.93	0.66
1:B:164:MET:HE1	1:B:229:ILE:HD13	1.79	0.64
1:A:158:LYS:HD2	1:A:158:LYS:N	2.16	0.61
1:A:217:ARG:HG3	1:A:217:ARG:NH1	2.14	0.61
1:A:204:THR:HG22	1:A:241:ALA:HA	1.84	0.58
1:A:248:ASN:HD22	1:A:250:LYS:H	1.50	0.58
1:B:252:LYS:HZ3	1:B:253:THR:H	1.52	0.58
1:A:195:ALA:HB2	1:B:188:PHE:CD2	2.39	0.57
1:B:136:VAL:HG21	1:B:151:LEU:HD22	1.85	0.56
1:B:114:ARG:HG3	1:B:176:GLU:O	2.10	0.52
1:A:219:ILE:HD11	1:A:242:LEU:HD13	1.92	0.50
1:A:170:PRO:HB2	1:A:173:MET:HE3	1.92	0.50
1:A:255:LYS:HG2	1:A:255:LYS:O	2.11	0.50
1:B:114:ARG:O	1:B:130:LEU:HA	2.12	0.49
1:A:248:ASN:HD22	1:A:250:LYS:N	2.11	0.49
1:A:140:LEU:HA	1:A:165:GLU:HG3	1.95	0.48
1:A:136:VAL:HG22	1:A:169:LEU:CD2	2.45	0.47
1:A:180:TYR:CE2	1:A:247:TRP:HB2	2.50	0.46
1:A:187:GLY:HA3	1:B:222:ASN:OD1	2.16	0.46
1:B:205:ILE:HD12	1:B:209:VAL:HG23	1.97	0.46
1:B:148:HIS:HA	1:B:149:PRO:HD2	1.70	0.45
1:B:252:LYS:NZ	1:B:253:THR:H	2.14	0.45
1:B:180:TYR:CE2	1:B:247:TRP:HB2	2.51	0.45
1:A:171:VAL:H	1:A:174:ARG:HH21	1.63	0.45
1:A:193:HIS:ND1	1:A:193:HIS:N	2.65	0.44
1:A:248:ASN:ND2	1:A:252:LYS:H	2.15	0.44
1:A:184:HIS:HA	1:A:185:PRO:HD3	1.61	0.43
1:B:164:MET:CE	1:B:229:ILE:HD13	2.48	0.43
1:B:166:PHE:CD1	1:B:166:PHE:N	2.87	0.43
1:B:173:MET:HE2	1:B:173:MET:HB3	1.83	0.43
1:A:248:ASN:HD22	1:A:248:ASN:C	2.27	0.43
1:A:248:ASN:ND2	1:A:250:LYS:H	2.15	0.43
1:A:128:HIS:CE1	1:A:213:GLY:O	2.72	0.42
1:A:153:LYS:HD3	1:A:153:LYS:HA	1.86	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:169:LEU:HB2	1:A:174:ARG:HG3	2.02	0.42
1:B:136:VAL:CG2	1:B:151:LEU:HD22	2.50	0.42
1:A:158:LYS:HD2	1:A:158:LYS:H	1.86	0.41
1:A:196:VAL:HG22	1:A:205:ILE:HG22	2.03	0.41
1:A:205:ILE:HD12	1:A:209:VAL:HB	2.03	0.40
1:A:180:TYR:OH	1:A:246:THR:HG22	2.22	0.40
1:A:229:ILE:O	1:A:244:VAL:HA	2.21	0.40
1:A:217:ARG:NH1	1:A:217:ARG:CG	2.81	0.40

There are no symmetry-related clashes.

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	A	156/158 (99%)	143 (92%)	10 (6%)	3 (2%)	6	17
1	B	156/158 (99%)	135 (86%)	18 (12%)	3 (2%)	6	17
All	All	312/316 (99%)	278 (89%)	28 (9%)	6 (2%)	6	17

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	171	VAL
1	B	171	VAL
1	B	149	PRO
1	A	200	GLY
1	A	237	GLY
1	B	200	GLY

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	128/128 (100%)	113 (88%)	15 (12%)	5	13
1	B	128/128 (100%)	114 (89%)	14 (11%)	6	16
All	All	256/256 (100%)	227 (89%)	29 (11%)	5	14

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	114	ARG
1	A	130	LEU
1	A	143	LYS
1	A	150	VAL
1	A	160	SER
1	A	168	GLN
1	A	182	SER
1	A	193	HIS
1	A	207	ARG
1	A	227	VAL
1	A	235	ASP
1	A	236	GLU
1	A	246	THR
1	A	248	ASN
1	A	249	SER
1	B	108	LEU
1	B	109	LYS
1	B	110	LEU
1	B	114	ARG
1	B	121	GLU
1	B	130	LEU
1	B	160	SER
1	B	168	GLN
1	B	183	GLU
1	B	191	TRP
1	B	202	ARG
1	B	220	MET

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Mol	Chain	Res	Type
1	B	227	VAL
1	B	252	LYS

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	184	HIS
1	A	190	ASN
1	A	248	ASN
1	B	184	HIS
1	B	248	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	158/158 (100%)	-0.55	1 (0%) 85 85	7, 24, 53, 57	0
1	B	158/158 (100%)	-0.53	0 100 100	7, 26, 45, 71	0
All	All	316/316 (100%)	-0.54	1 (0%) 90 89	7, 25, 50, 71	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	237	GLY	2.1

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.