



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 24, 2026 – 11:07 PM EDT

PDB ID : 1JMM / pdb_00001jmm
Title : Crystal structure of the V-region of Streptococcus mutans antigen I/II
Authors : Troffer-Charlier, N.; Ogier, J.; Moras, D.; Cavarelli, J.
Deposited on : 2001-07-19
Resolution : 2.40 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
Mogul : 2022.3.0, CSD as543be (2022)
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

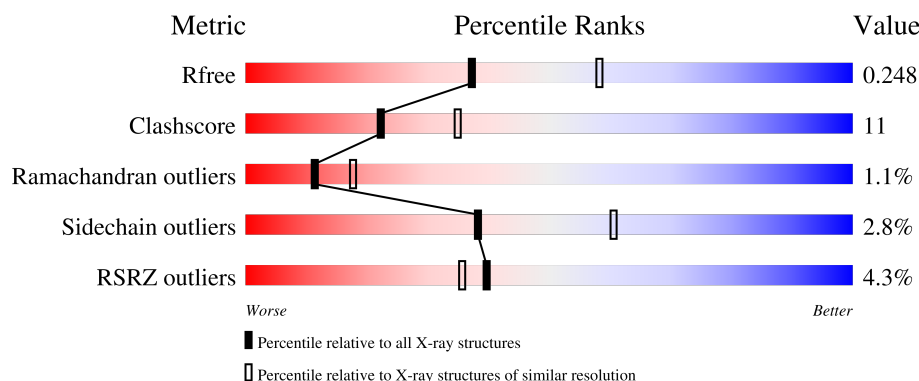
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	377	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3171 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 protein I/II V-region.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	377	Total	C	N	O	Se	0	0	0
			2908	1830	484	587	7			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	482	ALA	THR	conflict	UNP P11657
A	547	VAL	ASP	conflict	UNP P11657
A	571	MSE	MET	cloning artifact	UNP P11657
A	680	ASP	HIS	conflict	UNP P11657
A	683	GLY	GLU	conflict	UNP P11657
A	696	ALA	THR	conflict	UNP P11657
A	707	MSE	MET	cloning artifact	UNP P11657
A	729	MSE	MET	cloning artifact	UNP P11657
A	749	MSE	MET	cloning artifact	UNP P11657
A	776	MSE	MET	cloning artifact	UNP P11657
A	794	MSE	MET	cloning artifact	UNP P11657
A	799	MSE	MET	cloning artifact	UNP P11657

- Molecule 2 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Na	0	0
			1	1		

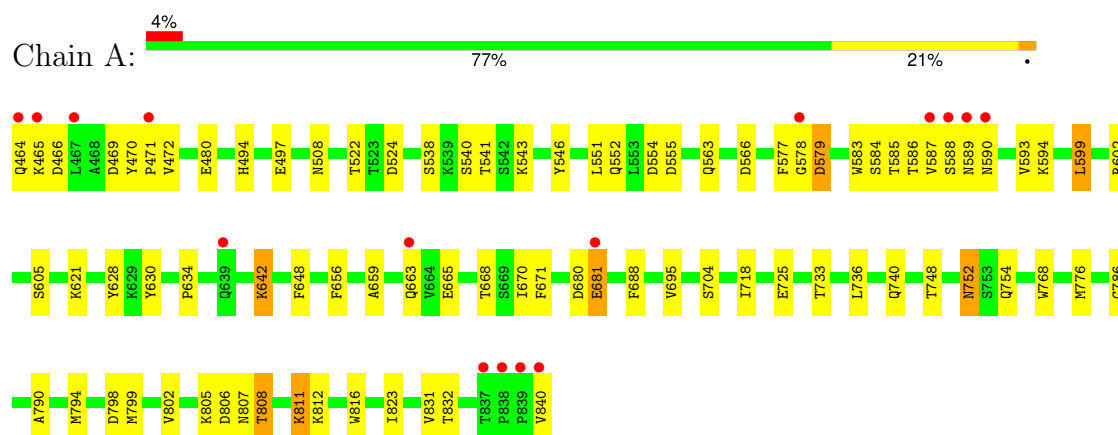
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	262	Total	O	0	0
			262	262		

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: protein I/II V-region



4 Data and refinement statistics

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants a, b, c, α , β , γ	124.57Å 124.57Å 147.69Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	19.99 – 2.40 19.99 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.7 (19.99-2.40) 98.5 (19.99-2.40)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.27 (at 2.20Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.207 , 0.234 0.219 , 0.248	Depositor DCC
R_{free} test set	4694 reflections (7.49%)	wwPDB-VP
Wilson B-factor (Å ²)	26.0	Xtriage
Anisotropy	0.683	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	3171	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.60% 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:
NA

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	0.36	0/2962	0.91	9/4000 (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	A	0	1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	733	THR	N-CA-C	7.38	120.20	111.71
1	A	524	ASP	N-CA-C	-6.43	105.01	112.92
1	A	579	ASP	N-CA-C	-6.30	105.65	113.15
1	A	522	THR	N-CA-C	-6.20	99.88	109.24
1	A	541	THR	N-CA-C	5.84	119.93	112.34
1	A	736	LEU	N-CA-C	-5.70	101.53	110.36
1	A	465	LYS	N-CA-C	-5.65	106.37	113.20
1	A	642	LYS	N-CA-C	5.28	118.19	109.85
1	A	659	ALA	N-CA-C	-5.19	105.62	112.94

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	628	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	2908	0	2839	61	0
2	A	1	0	0	0	0
3	A	262	0	0	4	0
All	All	3171	0	2839	61	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 11.

All (61) 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:A:752:ASN:HD21	1:A:754:GLN:HG2	1.25	1.01
1:A:740:GLN:H	1:A:748:THR:HG22	1.31	0.94
1:A:752:ASN:ND2	1:A:754:GLN:HG2	1.97	0.78
1:A:794:MSE:HE3	3:A:1224:HOH:O	1.81	0.77
1:A:806:ASP:OD1	1:A:808:THR:HB	1.89	0.73
1:A:752:ASN:HD22	1:A:752:ASN:C	1.97	0.72
1:A:587:VAL:HG21	1:A:593:VAL:HG11	1.74	0.70
1:A:665:GLU:OE1	1:A:668:THR:HG21	1.92	0.69
1:A:621:LYS:HE2	1:A:681:GLU:OE2	1.93	0.69
1:A:585:THR:OG1	1:A:587:VAL:HG22	1.94	0.67
1:A:752:ASN:HD21	1:A:754:GLN:CG	2.05	0.67
1:A:681:GLU:H	1:A:681:GLU:CD	2.04	0.66
1:A:799:MSE:HE1	1:A:807:ASN:HB3	1.79	0.64
1:A:680:ASP:HB2	1:A:681:GLU:OE2	2.00	0.62
1:A:799:MSE:HE3	3:A:1050:HOH:O	2.01	0.60
1:A:799:MSE:CE	1:A:807:ASN:HB3	2.33	0.58
1:A:802:VAL:HG11	1:A:805:LYS:HD2	1.85	0.58
1:A:480:GLU:OE2	1:A:832:THR:HB	2.04	0.57
1:A:577:PHE:CD2	1:A:594:LYS:HG2	2.41	0.56
1:A:752:ASN:ND2	1:A:752:ASN:C	2.61	0.56
1:A:740:GLN:N	1:A:748:THR:HG22	2.13	0.55
1:A:794:MSE:HE2	1:A:798:ASP:CB	2.36	0.55
1:A:552:GLN:NE2	1:A:586:THR:HG21	2.24	0.53
1:A:695:VAL:HG23	1:A:695:VAL:O	2.09	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:665:GLU:CB	1:A:668:THR:HG21	2.42	0.50
1:A:602:ARG:HB3	1:A:634:PRO:HA	1.93	0.50
1:A:794:MSE:HE2	1:A:798:ASP:HB3	1.94	0.50
1:A:656:PHE:HD1	1:A:816:TRP:HB2	1.76	0.49
1:A:508:ASN:HA	1:A:831:VAL:HB	1.95	0.49
1:A:840:VAL:HG22	1:A:840:VAL:OXT	2.13	0.49
1:A:552:GLN:HG2	1:A:555:ASP:OD2	2.13	0.48
1:A:748:THR:HG21	1:A:754:GLN:NE2	2.28	0.48
1:A:602:ARG:HG3	3:A:1101:HOH:O	2.14	0.47
1:A:538:SER:HB3	1:A:546:TYR:CE2	2.49	0.47
1:A:538:SER:O	1:A:543:LYS:HG3	2.16	0.45
1:A:599:LEU:CD2	1:A:642:LYS:HB3	2.47	0.45
1:A:663:GLN:N	1:A:663:GLN:CD	2.74	0.45
1:A:605:SER:HB2	1:A:630:TYR:O	2.17	0.44
1:A:665:GLU:HB3	1:A:668:THR:HG21	2.00	0.44
1:A:670:ILE:O	1:A:670:ILE:HG23	2.18	0.44
1:A:555:ASP:OD1	1:A:812:LYS:NZ	2.39	0.44
1:A:665:GLU:HB3	1:A:668:THR:CG2	2.48	0.44
1:A:469:ASP:O	1:A:472:VAL:HG22	2.17	0.43
1:A:790:ALA:HB1	1:A:799:MSE:HE3	1.99	0.43
1:A:799:MSE:CE	3:A:1050:HOH:O	2.63	0.43
1:A:599:LEU:HD22	1:A:642:LYS:HB3	2.00	0.43
1:A:589:ASN:OD1	1:A:590:ASN:N	2.49	0.42
1:A:688:PHE:CE2	1:A:776:MSE:HE3	2.54	0.42
1:A:740:GLN:H	1:A:748:THR:CG2	2.17	0.42
1:A:494:HIS:HA	1:A:497:GLU:OE2	2.19	0.42
1:A:811:LYS:HB2	1:A:811:LYS:NZ	2.35	0.42
1:A:563:GLN:HB2	1:A:566:ASP:OD2	2.20	0.42
1:A:470:TYR:N	1:A:471:PRO:CD	2.83	0.41
1:A:718:ILE:HG21	1:A:768:TRP:HB2	2.03	0.41
1:A:587:VAL:HG11	1:A:648:PHE:CZ	2.55	0.41
1:A:554:ASP:HA	1:A:656:PHE:HZ	1.86	0.41
1:A:464:GLN:C	1:A:466:ASP:H	2.29	0.41
1:A:584:SER:HA	1:A:589:ASN:O	2.21	0.41
1:A:794:MSE:HE2	1:A:798:ASP:C	2.45	0.41
1:A:671:PHE:CD1	1:A:786:GLY:HA3	2.56	0.40
1:A:704:SER:HB2	1:A:811:LYS:HD2	2.03	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	375/377 (100%)	357 (95%)	14 (4%)	4 (1%)	11	18

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	583	TRP
1	A	588	SER
1	A	578	GLY
1	A	540	SER

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	319/312 (102%)	310 (97%)	9 (3%)	38	60

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	551	LEU
1	A	579	ASP
1	A	599	LEU
1	A	681	GLU
1	A	725	GLU
1	A	752	ASN
1	A	808	THR

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Mol	Chain	Res	Type
1	A	811	LYS
1	A	823	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	464	GLN
1	A	481	GLN
1	A	496	ASN
1	A	548	GLN
1	A	552	GLN
1	A	592	GLN
1	A	614	GLN
1	A	687	ASN
1	A	727	ASN
1	A	752	ASN
1	A	754	GLN
1	A	781	ASN
1	A	792	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](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

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.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	370/377 (98%)	0.01	16 (4%) 40 36	15, 27, 55, 92	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	840	VAL	5.4
1	A	467	LEU	5.0
1	A	589	ASN	4.4
1	A	464	GLN	4.0
1	A	837	THR	3.6
1	A	838	PRO	3.1
1	A	590	ASN	2.9
1	A	465	LYS	2.9
1	A	588	SER	2.8
1	A	663	GLN	2.7
1	A	681	GLU	2.6
1	A	839	PRO	2.5
1	A	639	GLN	2.5
1	A	471	PRO	2.2
1	A	587	VAL	2.1
1	A	578	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

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($\text{\AA}^2$)	Q<0.9
2	NA	A	3001	1/1	0.97	0.04	22,22,22,22	0

6.5 Other polymers

There are no such residues in this entry.