



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 29, 2024 – 11:58 AM EDT

PDB ID : 1NSN  
Title : THE CRYSTAL STRUCTURE OF ANTIBODY N10-STAPHYLOCOCCAL  
NUCLEASE COMPLEX AT 2.9 ANGSTROMS RESOLUTION  
Authors : Sheriff, S.; Bossart-Whitaker, P.  
Deposited on : 1995-06-06  
Resolution : 2.80 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

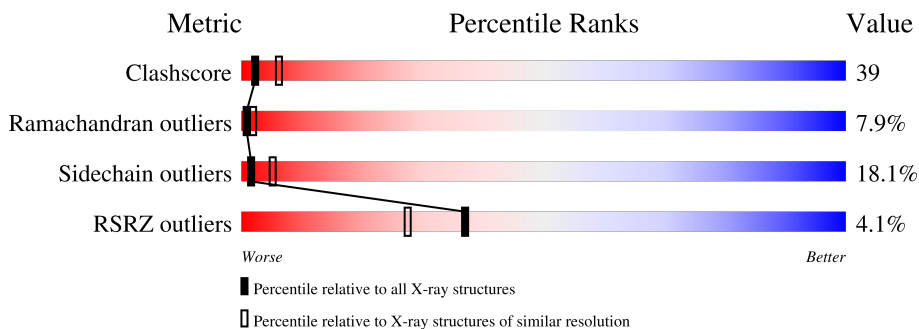
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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  $\geq 3$ , 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	L	218	
2	H	210	
3	S	149	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4388 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 IGG FAB (IGG1, KAPPA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	217	1694	1056	289	343	6	0	0	0

- Molecule 2 is a protein called IGG FAB (IGG1, KAPPA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	210	1587	997	261	322	7	0	0	0

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	29	ILE	VAL	conflict	GB 1513182
H	32	ASP	GLU	conflict	GB 1513182
H	48	MET	LEU	conflict	GB 1513182
H	52	THR	ASN	conflict	GB 1513182
H	56	THR	SER	conflict	GB 1513182
H	70	SER	THR	conflict	GB 1513182
H	80	MET	LEU	conflict	GB 1513182
H	88	GLY	ALA	conflict	GB 1513182
H	90	PHE	TYR	conflict	GB 1513182
H	?	-	ALA	deletion	GB 1513182
H	93	THR	ASP	conflict	GB 1513182
H	?	-	SER	deletion	GB 1513182
H	95	GLY	TRP	conflict	GB 1513182
H	96	ASN	PHE	conflict	GB 1513182
H	97	GLY	ALA	conflict	GB 1513182
H	98	ASP	TYR	conflict	GB 1513182
H	108	THR	LEU	conflict	GB 1513182
H	109	LEU	VAL	conflict	GB 1513182
H	113	SER	ALA	conflict	GB 1513182
H	199	PRO	THR	conflict	GB 1513182

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Chain	Residue	Modelled	Actual	Comment	Reference
H	200	ARG	TRP	conflict	GB 1513182

- Molecule 3 is a protein called STAPHYLOCOCCAL NUCLEASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	S	138	Total	C	N	O	S	0	0	0
			1107	707	195	201	4			

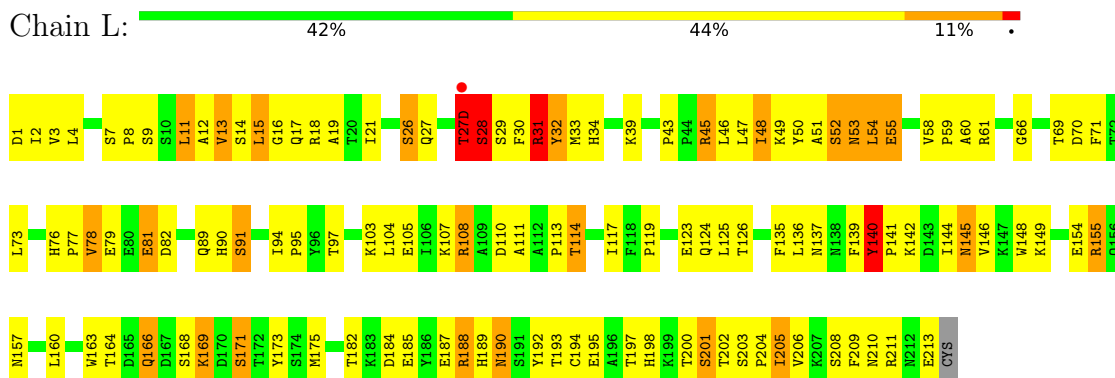
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
S	143	ASN	ASP	conflict	UNP P00644
S	144	ASP	ASN	conflict	UNP P00644

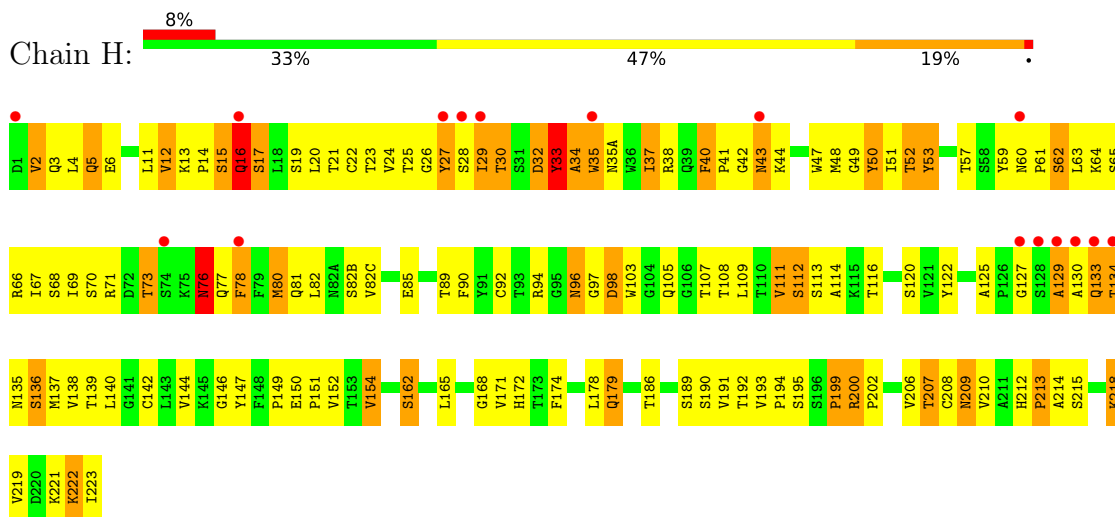
### 3 Residue-property plots [i](#)

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.

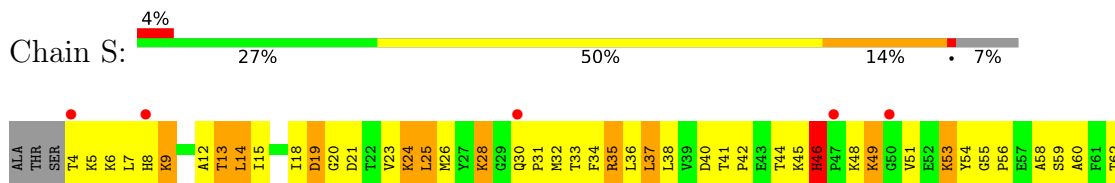
- Molecule 1: IGG FAB (IGG1, KAPPA)

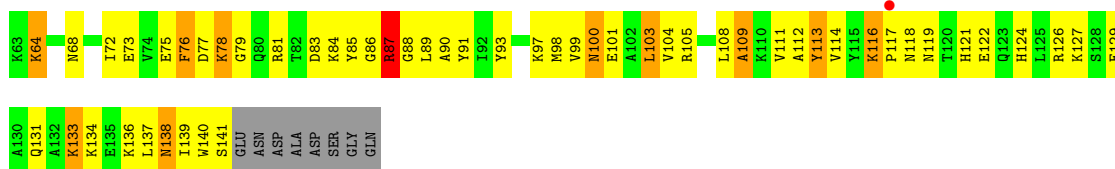


- Molecule 2: IGG FAB (IGG1, KAPPA)



- Molecule 3: STAPHYLOCOCCAL NUCLEASE





## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	234.70Å 43.50Å 74.40Å 90.00° 106.40° 90.00°	Depositor
Resolution (Å)	5.00 – 2.80 37.92 – 2.79	Depositor EDS
% Data completeness (in resolution range)	81.0 (5.00-2.80) 79.4 (37.92-2.79)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.85 (at 2.81Å)	Xtrriage
Refinement program	X-PLOR 3.1	Depositor
R, $R_{free}$	0.195 , (Not available) 0.195 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.9	Xtrriage
Anisotropy	0.194	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 97.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.026 for -h-2*1,-k,l	Xtrriage
$F_o, F_c$ correlation	0.86	EDS
Total number of atoms	4388	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.45% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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	L	0.63	0/1736	0.92	2/2360 (0.1%)
2	H	0.62	0/1628	0.97	3/2228 (0.1%)
3	S	0.61	0/1128	0.91	3/1511 (0.2%)
All	All	0.62	0/4492	0.94	8/6099 (0.1%)

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	L	0	1
2	H	0	1
All	All	0	2

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	L	31	ARG	N-CA-C	-9.93	84.19	111.00
2	H	33	TYR	N-CA-C	-6.12	94.48	111.00
2	H	146	GLY	N-CA-C	6.08	128.30	113.10
3	S	14	LEU	CA-CB-CG	5.97	129.02	115.30
3	S	137	LEU	N-CA-C	5.68	126.34	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	50	TYR	Sidechain
1	L	140	TYR	Sidechain



## 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	L	1694	0	1615	117	0
2	H	1587	0	1543	139	0
3	S	1107	0	1151	100	0
All	All	4388	0	4309	339	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 39.

The worst 5 of 339 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:L:15:LEU:HG	1:L:108:ARG:NH2	1.79	0.95
3:S:75:GLU:HB3	3:S:91:TYR:HB2	1.50	0.93
3:S:33:THR:HG23	3:S:87:ARG:HA	1.50	0.91
2:H:6:GLU:HG2	2:H:22:CYS:SG	2.16	0.86
2:H:57:THR:HB	2:H:69:ILE:HD11	1.57	0.85

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	L	215/218 (99%)	178 (83%)	30 (14%)	7 (3%)	<b>4</b> <b>13</b>
2	H	208/210 (99%)	145 (70%)	41 (20%)	22 (11%)	<b>0</b> <b>1</b>
3	S	136/149 (91%)	99 (73%)	22 (16%)	15 (11%)	<b>0</b> <b>1</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	559/577 (97%)	422 (76%)	93 (17%)	44 (8%)	<b>1</b> <b>2</b>

5 of 44 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	28	SER
1	L	29	SER
1	L	31	ARG
1	L	140	TYR
1	L	201	SER

### 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	L	193/194 (100%)	156 (81%)	37 (19%)	<b>1</b> <b>4</b>
2	H	186/186 (100%)	155 (83%)	31 (17%)	<b>2</b> <b>6</b>
3	S	117/125 (94%)	95 (81%)	22 (19%)	<b>1</b> <b>5</b>
All	All	496/505 (98%)	406 (82%)	90 (18%)	<b>1</b> <b>5</b>

5 of 90 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	142	CYS
3	S	19	ASP
2	H	162	SER
2	H	218	LYS
3	S	37	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
3	S	8	HIS
2	H	209	ASN

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Mol	Chain	Res	Type
2	H	39	GLN
2	H	105	GLN
1	L	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 monosaccharides 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	L	217/218 (99%)	-0.41	1 (0%) 91 88	3, 14, 25, 36	0
2	H	210/210 (100%)	0.07	16 (7%) 13 7	4, 19, 35, 42	0
3	S	138/149 (92%)	-0.05	6 (4%) 35 25	10, 25, 33, 38	0
All	All	565/577 (97%)	-0.14	23 (4%) 37 27	3, 18, 32, 42	0

The worst 5 of 23 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	28	SER	5.8
2	H	29	ILE	5.1
3	S	47	PRO	5.0
3	S	4	THR	4.3
2	H	128	SER	4.0

### 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](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.