



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 29, 2020 – 11:07 am BST

PDB ID : 6SJ1  
Title : Amidohydrolase, AHS  
Authors : Naismith, J.H.; Song, H.  
Deposited on : 2019-08-12  
Resolution : 2.06 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.

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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	:	2.11
buster-report	:	1.1.7 (2018)
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)	:	2.11

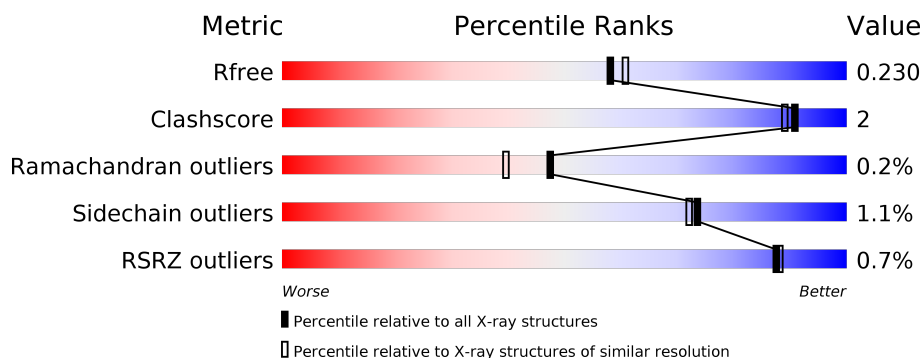
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.06 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))
$R_{free}$	130704	2684 (2.08-2.04)
Clashscore	141614	2801 (2.08-2.04)
Ramachandran outliers	138981	2768 (2.08-2.04)
Sidechain outliers	138945	2768 (2.08-2.04)
RSRZ outliers	127900	2646 (2.08-2.04)

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 on 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	A	519	<div> <div>%</div> <div> <div></div> <div>90%</div> <div>5%</div> <div>5%</div> </div> </div>
1	B	519	<div> <div>%</div> <div> <div></div> <div>90%</div> <div>5%</div> <div>5%</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 7715 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 Amidohydrolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	494	Total	C	N	O	S	0	1	0
			3739	2317	687	712	23			
1	B	495	Total	C	N	O	S	0	0	0
			3738	2317	687	711	23			

There are 50 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-24	MET	-	initiating methionine	UNP A0A022MQ12
A	-23	SER	-	expression tag	UNP A0A022MQ12
A	-22	TYR	-	expression tag	UNP A0A022MQ12
A	-21	TYR	-	expression tag	UNP A0A022MQ12
A	-20	HIS	-	expression tag	UNP A0A022MQ12
A	-19	HIS	-	expression tag	UNP A0A022MQ12
A	-18	HIS	-	expression tag	UNP A0A022MQ12
A	-17	HIS	-	expression tag	UNP A0A022MQ12
A	-16	HIS	-	expression tag	UNP A0A022MQ12
A	-15	HIS	-	expression tag	UNP A0A022MQ12
A	-14	ASP	-	expression tag	UNP A0A022MQ12
A	-13	TYR	-	expression tag	UNP A0A022MQ12
A	-12	ASP	-	expression tag	UNP A0A022MQ12
A	-11	ILE	-	expression tag	UNP A0A022MQ12
A	-10	PRO	-	expression tag	UNP A0A022MQ12
A	-9	THR	-	expression tag	UNP A0A022MQ12
A	-8	THR	-	expression tag	UNP A0A022MQ12
A	-7	GLU	-	expression tag	UNP A0A022MQ12
A	-6	ASN	-	expression tag	UNP A0A022MQ12
A	-5	LEU	-	expression tag	UNP A0A022MQ12
A	-4	TYR	-	expression tag	UNP A0A022MQ12
A	-3	PHE	-	expression tag	UNP A0A022MQ12
A	-2	GLN	-	expression tag	UNP A0A022MQ12
A	-1	GLY	-	expression tag	UNP A0A022MQ12
A	0	ALA	-	expression tag	UNP A0A022MQ12

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-24	MET	-	initiating methionine	UNP A0A022MQ12
B	-23	SER	-	expression tag	UNP A0A022MQ12
B	-22	TYR	-	expression tag	UNP A0A022MQ12
B	-21	TYR	-	expression tag	UNP A0A022MQ12
B	-20	HIS	-	expression tag	UNP A0A022MQ12
B	-19	HIS	-	expression tag	UNP A0A022MQ12
B	-18	HIS	-	expression tag	UNP A0A022MQ12
B	-17	HIS	-	expression tag	UNP A0A022MQ12
B	-16	HIS	-	expression tag	UNP A0A022MQ12
B	-15	HIS	-	expression tag	UNP A0A022MQ12
B	-14	ASP	-	expression tag	UNP A0A022MQ12
B	-13	TYR	-	expression tag	UNP A0A022MQ12
B	-12	ASP	-	expression tag	UNP A0A022MQ12
B	-11	ILE	-	expression tag	UNP A0A022MQ12
B	-10	PRO	-	expression tag	UNP A0A022MQ12
B	-9	THR	-	expression tag	UNP A0A022MQ12
B	-8	THR	-	expression tag	UNP A0A022MQ12
B	-7	GLU	-	expression tag	UNP A0A022MQ12
B	-6	ASN	-	expression tag	UNP A0A022MQ12
B	-5	LEU	-	expression tag	UNP A0A022MQ12
B	-4	TYR	-	expression tag	UNP A0A022MQ12
B	-3	PHE	-	expression tag	UNP A0A022MQ12
B	-2	GLN	-	expression tag	UNP A0A022MQ12
B	-1	GLY	-	expression tag	UNP A0A022MQ12
B	0	ALA	-	expression tag	UNP A0A022MQ12

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by author).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Zn 1 1	0	0
2	A	1	Total Zn 1 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	101	Total O 101 101	0	0
3	B	135	Total O 135 135	0	0



- Molecule 1: Amidohydrolase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	135.61Å 54.51Å 141.54Å 90.00° 111.87° 90.00°	Depositor
Resolution (Å)	67.36 – 2.06 67.36 – 2.06	Depositor EDS
% Data completeness (in resolution range)	99.5 (67.36-2.06) 99.5 (67.36-2.06)	Depositor EDS
$R_{merge}$	0.18	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.12 (at 2.07Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, $R_{free}$	0.181 , 0.219 0.195 , 0.230	Depositor DCC
$R_{free}$ test set	3006 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.2	Xtriage
Anisotropy	0.245	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 37.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7715	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 22.73 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.3734e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	0.64	0/3803	0.79	0/5156
1	B	0.64	0/3802	0.81	1/5155 (0.0%)
All	All	0.64	0/7605	0.80	1/10311 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	265	ARG	NE-CZ-NH2	-5.47	117.57	120.30

There are no chirality outliers.

There are no planarity outliers.

### 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	3739	0	3696	14	0
1	B	3738	0	3697	11	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	101	0	0	1	0
3	B	135	0	0	1	0
All	All	7715	0	7393	25	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 2.

The worst 5 of 25 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:7:THR:HG22	1:A:25:ALA:HB2	1.53	0.88
1:A:7:THR:HG22	1:A:25:ALA:CB	2.19	0.72
1:B:241:GLU:OE2	1:B:245:ARG:NH2	2.27	0.68
1:A:241:GLU:OE2	1:A:245:ARG:NH2	2.28	0.68
1:B:167:ARG:HD2	1:B:214:ASP:OD2	2.04	0.57

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	A	493/519 (95%)	485 (98%)	7 (1%)	1 (0%)	47	39
1	B	493/519 (95%)	485 (98%)	7 (1%)	1 (0%)	47	39
All	All	986/1038 (95%)	970 (98%)	14 (1%)	2 (0%)	47	39

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	290	HIS
1	B	290	HIS

### 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	375/397 (94%)	371 (99%)	4 (1%)	73	72
1	B	374/397 (94%)	370 (99%)	4 (1%)	73	72
All	All	749/794 (94%)	741 (99%)	8 (1%)	73	72

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	315	LYS
1	B	315	LYS
1	B	78	GLU
1	A	156	LEU
1	B	36	VAL

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

Mol	Chain	Res	Type
1	A	44	GLN
1	B	44	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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are 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, 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	A	494/519 (95%)	-0.28	4 (0%) 86 87	19, 31, 63, 90	0
1	B	495/519 (95%)	-0.35	3 (0%) 89 90	16, 25, 51, 81	0
All	All	989/1038 (95%)	-0.32	7 (0%) 87 88	16, 28, 59, 90	0

The worst 5 of 7 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	0	ALA	2.6
1	B	85	THR	2.4
1	A	1	MET	2.4
1	A	86	MET	2.3
1	B	50	ASP	2.2

### 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](#)

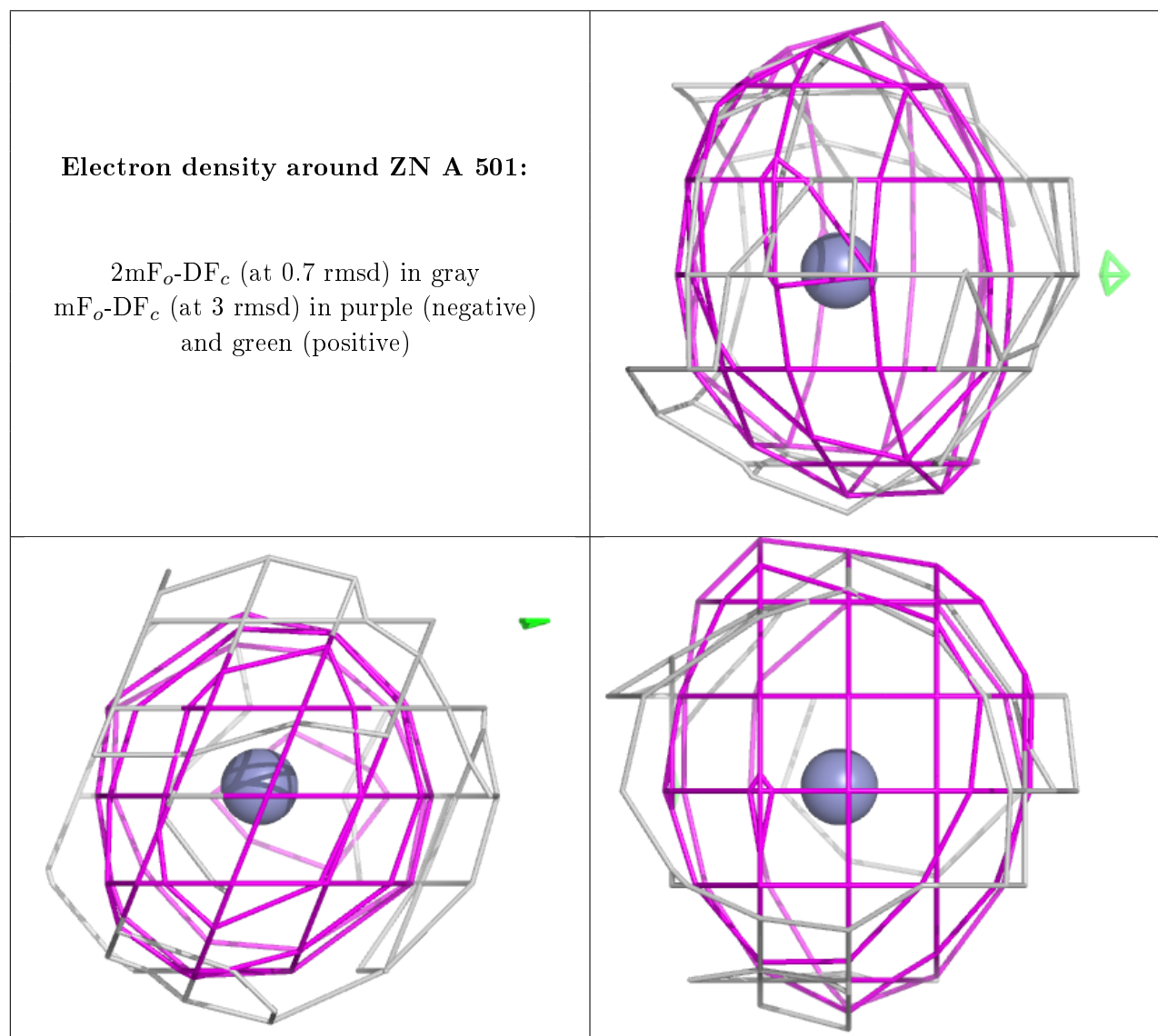
There are no carbohydrates in this entry.

### 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, 95<sup>th</sup> 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.

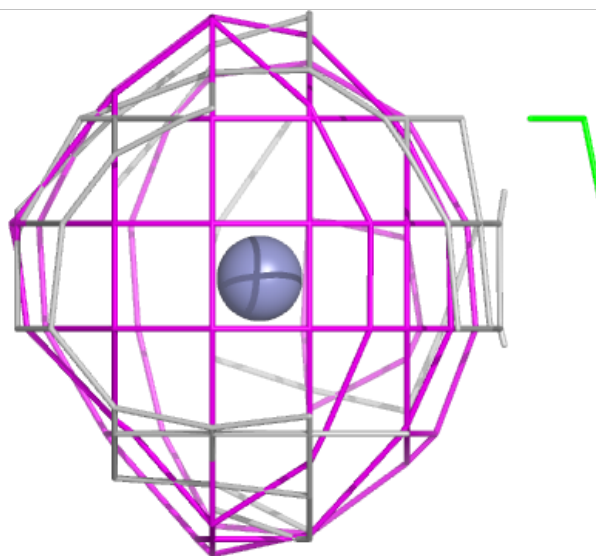
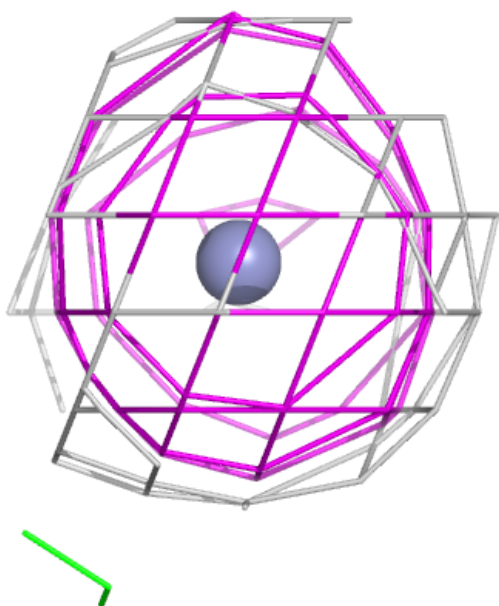
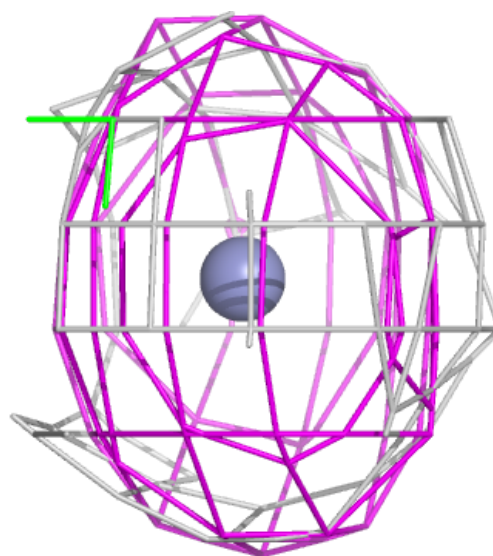
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	ZN	A	501	1/1	0.99	0.04	30,30,30,30	0
2	ZN	B	501	1/1	0.99	0.07	27,27,27,27	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



**Electron density around ZN B 501:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.