



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 24, 2024 – 08:03 AM EST

PDB ID : 1SVN  
Title : SAVINASE  
Authors : Betzel, C.; Klupsch, S.; Papendorf, G.; Hastrup, S.; Branner, S.; Wilson, K.S.  
Deposited on : 1995-09-01  
Resolution : 1.40 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](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  
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

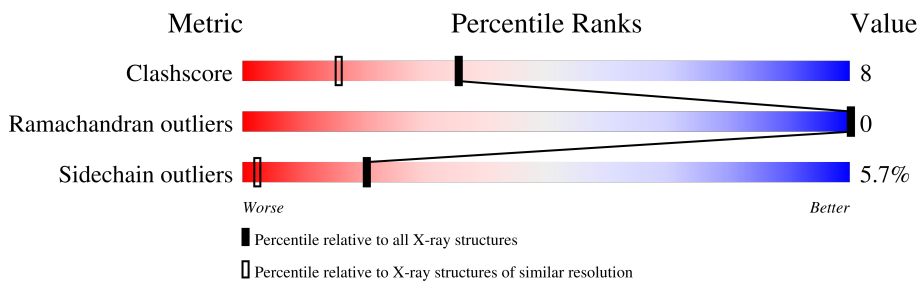
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.40 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))
Clashscore	141614	1812 (1.40-1.40)
Ramachandran outliers	138981	1763 (1.40-1.40)
Sidechain outliers	138945	1762 (1.40-1.40)

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  $\geq 3$ , 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	269	74% 22% ..

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2042 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 SAVINASE (TM).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	269	1880	1150	347	380	3	1	0	0

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		

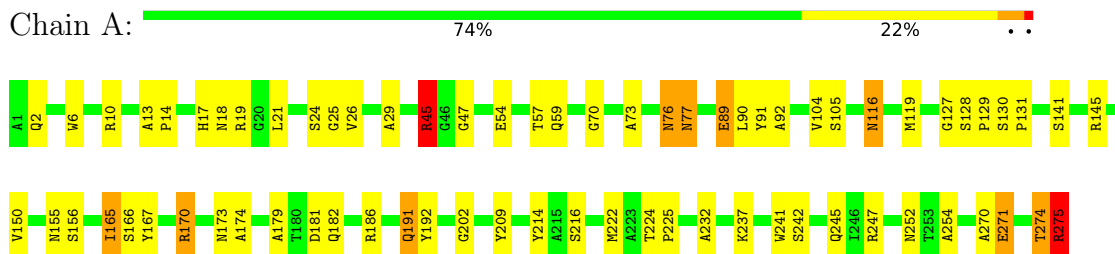
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	160	Total	O	0	0
			160	160		

### 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. 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. 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: SAVINASE (TM)



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	40.47Å 64.24Å 42.89Å 90.00° 118.80° 90.00°	Depositor
Resolution (Å)	10.00 – 1.40 9.90 – 1.40	Depositor EDS
% Data completeness (in resolution range)	77.0 (10.00-1.40) 76.9 (9.90-1.40)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	14.79 (at 1.40Å)	Xtrriage
Refinement program	PROLSQ	Depositor
R, $R_{free}$	(Not available) , (Not available) 0.153 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	8.5	Xtrriage
Anisotropy	0.541	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 55.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.045 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	2042	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	12.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.20% 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

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

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	1.23	1/1914 (0.1%)	2.32	63/2614 (2.4%)

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

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	275	ARG	C-OXT	13.31	1.48	1.23

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	170	ARG	NE-CZ-NH1	35.61	138.10	120.30
1	A	170	ARG	NE-CZ-NH2	-24.82	107.89	120.30
1	A	10	ARG	NE-CZ-NH1	18.69	129.65	120.30
1	A	145	ARG	NE-CZ-NH1	18.61	129.61	120.30
1	A	165	ILE	CA-CB-CG2	13.28	137.46	110.90
1	A	247	ARG	NE-CZ-NH2	-13.16	113.72	120.30
1	A	186	ARG	NE-CZ-NH2	-13.06	113.77	120.30
1	A	170	ARG	CD-NE-CZ	12.87	141.62	123.60
1	A	145	ARG	CD-NE-CZ	11.68	139.95	123.60
1	A	145	ARG	CG-CD-NE	10.98	134.86	111.80
1	A	10	ARG	NE-CZ-NH2	-10.53	115.03	120.30
1	A	145	ARG	NE-CZ-NH2	-10.07	115.27	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	165	ILE	CA-CB-CG1	-9.77	92.43	111.00
1	A	247	ARG	NH1-CZ-NH2	9.72	130.09	119.40
1	A	181	ASP	CB-CG-OD1	9.28	126.65	118.30
1	A	271	GLU	OE1-CD-OE2	-9.24	112.21	123.30
1	A	170	ARG	CG-CD-NE	-8.98	92.93	111.80
1	A	214	TYR	CG-CD1-CE1	-8.71	114.33	121.30
1	A	247	ARG	NE-CZ-NH1	-8.24	116.18	120.30
1	A	186	ARG	NE-CZ-NH1	8.06	124.33	120.30
1	A	192	TYR	CB-CG-CD2	-7.85	116.29	121.00
1	A	167	TYR	CZ-CE2-CD2	-7.59	112.97	119.80
1	A	209	TYR	CB-CG-CD1	-7.47	116.52	121.00
1	A	155	ASN	O-C-N	7.47	134.65	122.70
1	A	89	GLU	OE1-CD-OE2	-7.09	114.79	123.30
1	A	116	ASN	OD1-CG-ND2	7.04	138.10	121.90
1	A	271	GLU	O-C-N	-6.84	111.75	122.70
1	A	54	GLU	OE1-CD-OE2	6.60	131.22	123.30
1	A	104	VAL	CA-CB-CG2	-6.51	101.14	110.90
1	A	89	GLU	CB-CG-CD	-6.31	97.16	114.20
1	A	216	SER	CB-CA-C	6.26	121.99	110.10
1	A	186	ARG	O-C-N	-6.19	112.79	122.70
1	A	19	ARG	NE-CZ-NH2	-6.12	117.24	120.30
1	A	166	SER	CA-CB-OG	-6.11	94.71	111.20
1	A	105	SER	CA-CB-OG	-6.09	94.76	111.20
1	A	131	PRO	N-CA-CB	5.99	110.48	103.30
1	A	275	ARG	CG-CD-NE	5.79	123.97	111.80
1	A	70	GLY	O-C-N	-5.78	113.45	122.70
1	A	73	ALA	N-CA-CB	-5.73	102.08	110.10
1	A	242	SER	N-CA-CB	-5.66	102.01	110.50
1	A	181	ASP	CB-CG-OD2	-5.64	113.23	118.30
1	A	252	ASN	CA-CB-CG	-5.56	101.18	113.40
1	A	192	TYR	CD1-CE1-CZ	-5.55	114.80	119.80
1	A	17	HIS	CG-CD2-NE2	-5.55	98.66	109.20
1	A	274	THR	O-C-N	5.53	131.54	122.70
1	A	192	TYR	CZ-CE2-CD2	-5.46	114.88	119.80
1	A	127	GLY	O-C-N	5.37	131.29	122.70
1	A	91	TYR	O-C-N	5.36	131.28	122.70
1	A	90	LEU	CB-CA-C	-5.29	100.14	110.20
1	A	174	ALA	N-CA-CB	5.29	117.50	110.10
1	A	254	ALA	O-C-N	5.24	131.08	122.70
1	A	45	ARG	CB-CG-CD	-5.23	97.99	111.60
1	A	25	GLY	O-C-N	5.23	131.07	122.70
1	A	167	TYR	CG-CD1-CE1	-5.23	117.12	121.30

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Mol	Chain	Res	Type	Atoms	Z	Observed( <sup>o</sup> )	Ideal( <sup>o</sup> )
1	A	141	SER	N-CA-CB	-5.19	102.71	110.50
1	A	18	ASN	OD1-CG-ND2	5.18	133.81	121.90
1	A	214	TYR	CD1-CE1-CZ	5.12	124.41	119.80
1	A	91	TYR	CD1-CE1-CZ	-5.08	115.22	119.80
1	A	209	TYR	CD1-CG-CD2	5.07	123.47	117.90
1	A	270	ALA	O-C-N	5.05	130.78	122.70
1	A	19	ARG	NE-CZ-NH1	-5.04	117.78	120.30
1	A	191	GLN	CA-CB-CG	-5.03	102.34	113.40
1	A	19	ARG	NH1-CZ-NH2	5.02	124.92	119.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	57	THR	Mainchain

## 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	1880	0	1838	30	0
2	A	2	0	0	0	0
3	A	160	0	0	6	1
All	All	2042	0	1838	30	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 8.

All (30) 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:89:GLU:CD	3:A:332:HOH:O	1.84	1.15
1:A:45:ARG:HH11	1:A:45:ARG:HB3	1.20	1.06
1:A:45:ARG:CZ	3:A:373:HOH:O	2.19	0.90
1:A:45:ARG:HB3	1:A:45:ARG:NH1	1.90	0.86

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:156:SER:H	1:A:191:GLN:HE21	1.28	0.82
1:A:89:GLU:CG	3:A:332:HOH:O	2.24	0.78
1:A:45:ARG:HD2	1:A:89:GLU:HG2	1.70	0.73
1:A:59:GLN:HG3	3:A:317:HOH:O	1.90	0.72
1:A:45:ARG:HD2	1:A:89:GLU:CG	2.26	0.66
1:A:173:ASN:O	3:A:414:HOH:O	2.14	0.64
1:A:128:SER:HB2	1:A:129:PRO:HD2	1.84	0.58
1:A:45:ARG:HD2	1:A:89:GLU:CB	2.37	0.55
1:A:156:SER:H	1:A:191:GLN:NE2	1.99	0.55
1:A:2:GLN:HE22	1:A:76:ASN:HD22	1.54	0.55
1:A:241:TRP:HA	1:A:245:GLN:OE1	2.08	0.54
1:A:45:ARG:CD	1:A:89:GLU:HB3	2.40	0.52
1:A:47:GLY:HA3	1:A:92:ALA:O	2.12	0.50
1:A:45:ARG:NH2	3:A:373:HOH:O	2.39	0.48
1:A:2:GLN:HE22	1:A:76:ASN:ND2	2.12	0.47
1:A:45:ARG:HD2	1:A:89:GLU:HB3	1.98	0.44
1:A:6:TRP:CZ2	1:A:182:GLN:HG3	2.52	0.44
1:A:13:ALA:N	1:A:14:PRO:CD	2.81	0.43
1:A:77:ASN:HD22	1:A:77:ASN:C	2.21	0.43
1:A:29:ALA:HB2	1:A:119:MET:HG3	1.99	0.43
1:A:21:LEU:CD1	1:A:274:THR:HB	2.49	0.42
1:A:224:THR:N	1:A:225:PRO:HD2	2.33	0.42
1:A:179:ALA:HB1	1:A:202:GLY:HA3	2.02	0.41
1:A:271:GLU:OE1	1:A:275:ARG:NH2	2.48	0.41
1:A:26:VAL:HG11	1:A:232:ALA:HA	2.03	0.40
1:A:150:VAL:HG12	1:A:224:THR:HG23	2.04	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)
3:A:372:HOH:O	3:A:396:HOH:O[2_646]	2.15	0.05

## 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	267/269 (99%)	261 (98%)	6 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	194/194 (100%)	183 (94%)	11 (6%)	20	2

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	SER
1	A	45	ARG
1	A	76	ASN
1	A	77	ASN
1	A	116	ASN
1	A	130	SER
1	A	165	ILE
1	A	170	ARG
1	A	222	MET
1	A	237	LYS
1	A	275	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	76	ASN
1	A	77	ASN
1	A	173	ASN
1	A	182	GLN
1	A	191	GLN

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Mol	Chain	Res	Type
1	A	204	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](#)

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 [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

### 6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.