



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 10:15 PM GMT

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
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

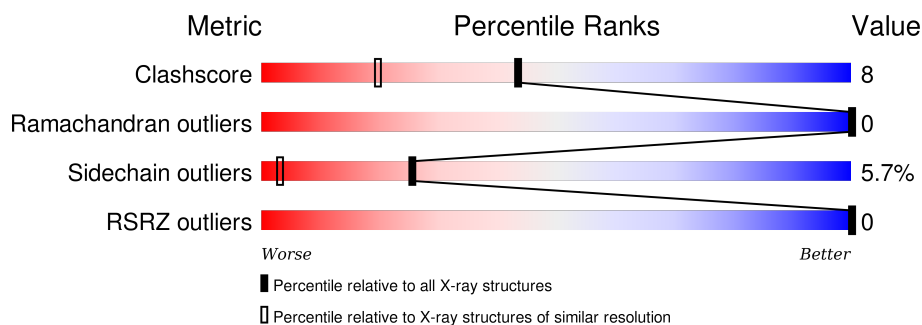
1 Overall quality at a glance

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	102246	1295 (1.40-1.40)
Ramachandran outliers	100387	1259 (1.40-1.40)
Sidechain outliers	100360	1258 (1.40-1.40)
RSRZ outliers	91569	1198 (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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	269	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	CA	A	277	-	-	-	X

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
1	A	269	Total	C	N	O	S	1	0	0
			1880	1150	347	380	3			

- 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		

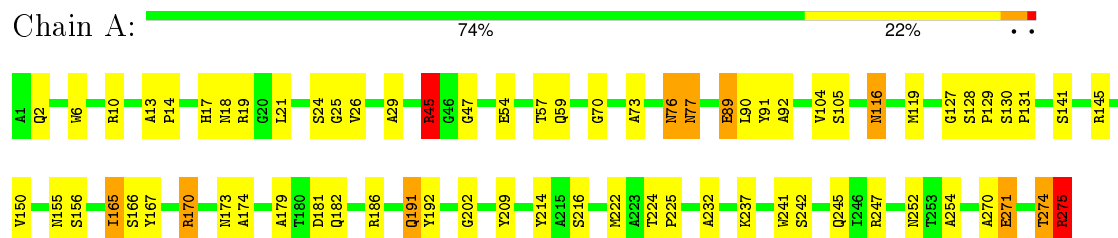
- Molecule 3 is water.

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

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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: SAVINASE (TM)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	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
$\langle I/\sigma(I) \rangle$ ¹	14.79 (at 1.40Å)	Xtriage
Refinement program	PROLSQ	Depositor
R, R_{free}	(Not available) , (Not available) 0.155 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	8.5	Xtriage
Anisotropy	0.541	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 55.9	EDS
Estimated twinning fraction	0.045 for h,-k,-h-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 29046 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	2042	wwPDB-VP
Average B, all atoms (Å ²)	12.0	wwPDB-VP

Xtriage'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.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: 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

Continued on next page...

Continued from previous page...

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

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
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:HB3	1:A:45:ARG:HH11	1.20	1.06
1:A:45:ARG:CZ	3:A:373:HOH:O	2.19	0.90
1:A:45:ARG:NH1	1:A:45:ARG:HB3	1.90	0.86

Continued on next page...

Continued from previous page...

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:271:GLU:OE1	1:A:275:ARG:NH2	2.48	0.41
1:A:179:ALA:HB1	1:A:202:GLY:HA3	2.02	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 ⓘ

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%)	25	3

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

Some 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

Continued on next page...

Continued from previous page...

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 carbohydrates 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 [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	269/269 (100%)	-0.56	0 100 100	4, 9, 19, 28	0

There are no RSRZ outliers to report.

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	CA	A	277	1/1	0.99	0.15	3.69	14,14,14,14	1
2	CA	A	276	1/1	1.00	0.05	-1.83	8,8,8,8	0

6.5 Other polymers [i](#)

There are no such residues in this entry.