



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:17 PM UTC

PDB ID : 6XCV / pdb_00006xcv
Title : Crystal structure of apo SznF from Streptomyces achromogenes var. streptozoticus NRRL 2697
Authors : McBride, M.J.; Boal, A.K.
Deposited on : 2020-06-09
Resolution : 1.77 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
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

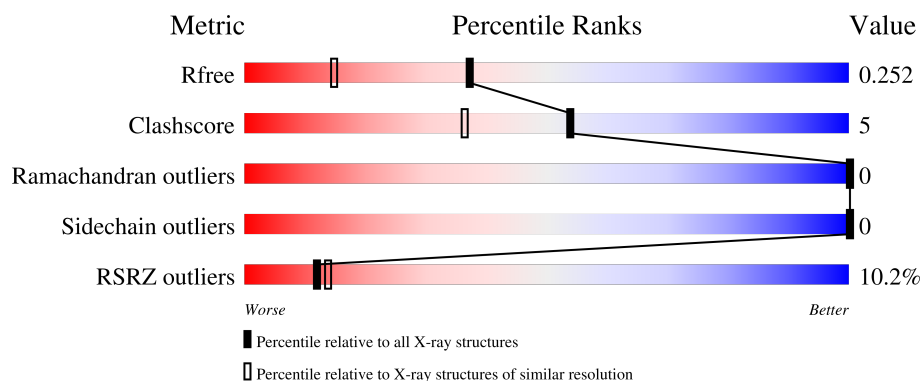
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 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	1365 (1.78-1.78)
Clashscore	190562	1395 (1.78-1.78)
Ramachandran outliers	187476	1382 (1.78-1.78)
Sidechain outliers	187428	1382 (1.78-1.78)
RSRZ outliers	180081	1365 (1.78-1.78)

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	491	8% 85% 8% 7%
1	B	491	11% 81% 12% 7%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8036 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 Cupin domain-containing diiron protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	457	Total	C	N	O	S	0	0	0
			3714	2366	642	695	11			
1	B	459	Total	C	N	O	S	0	0	0
			3730	2375	644	700	11			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP A0A411MR89
A	-18	GLY	-	expression tag	UNP A0A411MR89
A	-17	SER	-	expression tag	UNP A0A411MR89
A	-16	SER	-	expression tag	UNP A0A411MR89
A	-15	HIS	-	expression tag	UNP A0A411MR89
A	-14	HIS	-	expression tag	UNP A0A411MR89
A	-13	HIS	-	expression tag	UNP A0A411MR89
A	-12	HIS	-	expression tag	UNP A0A411MR89
A	-11	HIS	-	expression tag	UNP A0A411MR89
A	-10	HIS	-	expression tag	UNP A0A411MR89
A	-9	SER	-	expression tag	UNP A0A411MR89
A	-8	SER	-	expression tag	UNP A0A411MR89
A	-7	GLY	-	expression tag	UNP A0A411MR89
A	-6	LEU	-	expression tag	UNP A0A411MR89
A	-5	VAL	-	expression tag	UNP A0A411MR89
A	-4	PRO	-	expression tag	UNP A0A411MR89
A	-3	ARG	-	expression tag	UNP A0A411MR89
A	-2	GLY	-	expression tag	UNP A0A411MR89
A	-1	SER	-	expression tag	UNP A0A411MR89
A	0	HIS	-	expression tag	UNP A0A411MR89
B	-19	MET	-	expression tag	UNP A0A411MR89
B	-18	GLY	-	expression tag	UNP A0A411MR89
B	-17	SER	-	expression tag	UNP A0A411MR89
B	-16	SER	-	expression tag	UNP A0A411MR89
B	-15	HIS	-	expression tag	UNP A0A411MR89

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP A0A411MR89
B	-13	HIS	-	expression tag	UNP A0A411MR89
B	-12	HIS	-	expression tag	UNP A0A411MR89
B	-11	HIS	-	expression tag	UNP A0A411MR89
B	-10	HIS	-	expression tag	UNP A0A411MR89
B	-9	SER	-	expression tag	UNP A0A411MR89
B	-8	SER	-	expression tag	UNP A0A411MR89
B	-7	GLY	-	expression tag	UNP A0A411MR89
B	-6	LEU	-	expression tag	UNP A0A411MR89
B	-5	VAL	-	expression tag	UNP A0A411MR89
B	-4	PRO	-	expression tag	UNP A0A411MR89
B	-3	ARG	-	expression tag	UNP A0A411MR89
B	-2	GLY	-	expression tag	UNP A0A411MR89
B	-1	SER	-	expression tag	UNP A0A411MR89
B	0	HIS	-	expression tag	UNP A0A411MR89

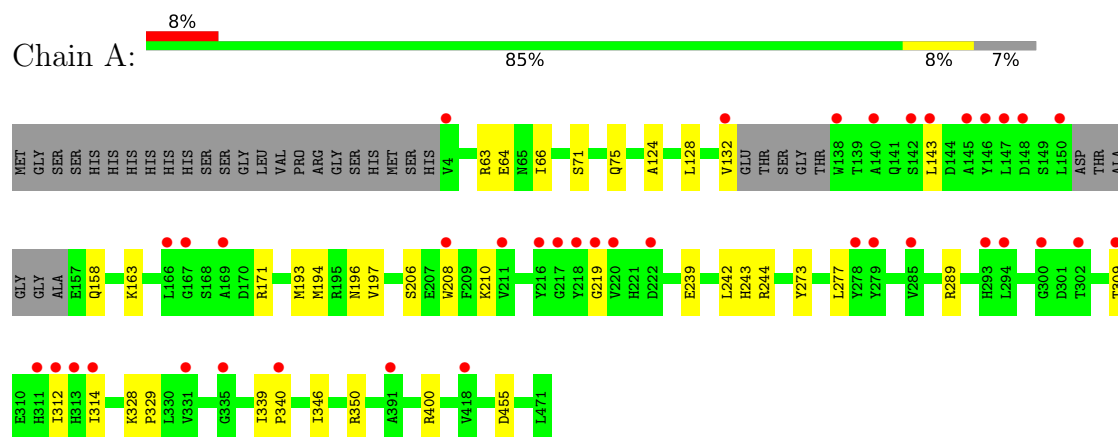
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	291	Total O 291 291	0	0
2	B	301	Total O 301 301	0	0

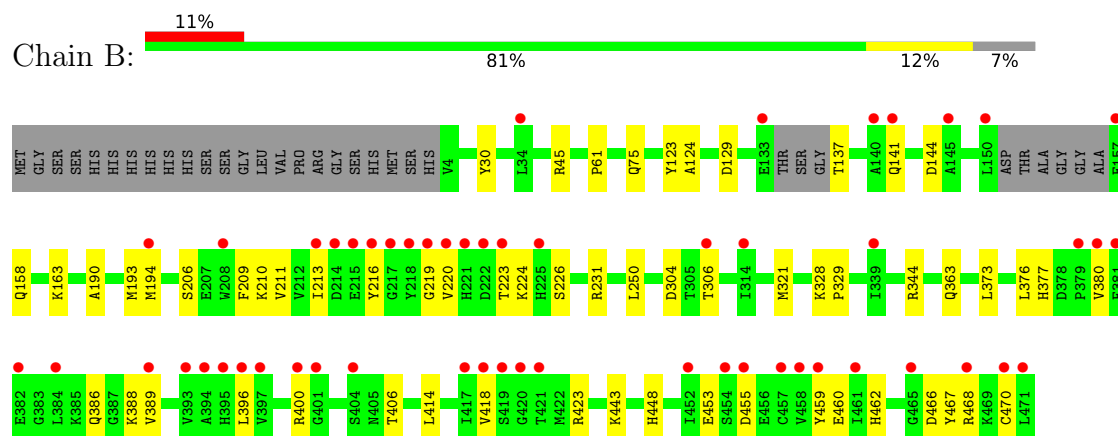
3 Residue-property plots [i](#)

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: Cupin domain-containing diiron protein



- Molecule 1: Cupin domain-containing diiron protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	57.91Å 108.13Å 150.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.22 – 1.77 38.22 – 1.77	Depositor EDS
% Data completeness (in resolution range)	89.1 (38.22-1.77) 85.5 (38.22-1.77)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.27 (at 1.77Å)	Xtriage
Refinement program	REFMAC 1.14_3260, PHENIX 1.14_3260	Depositor
R, R_{free}	0.206 , 0.254 0.209 , 0.252	Depositor DCC
R_{free} test set	4211 reflections (4.54%)	wwPDB-VP
Wilson B-factor (Å ²)	18.8	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 33.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8036	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.64% 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

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	0.38	0/3812	0.56	0/5168
1	B	0.39	0/3828	0.58	0/5190
All	All	0.39	0/7640	0.57	0/10358

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3714	0	3558	31	0
1	B	3730	0	3571	46	0
2	A	291	0	0	0	0
2	B	301	0	0	3	0
All	All	8036	0	7129	72	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 5.

All (72) 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:210:LYS:HD3	1:B:219:GLY:HA3	1.52	0.91

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:400:ARG:HB2	1:B:455:ASP:HA	1.59	0.83
1:A:219:GLY:HA3	1:B:210:LYS:HE2	1.77	0.66
1:B:376:LEU:HD21	1:B:467:TYR:CE1	2.33	0.64
1:A:314:ILE:HD12	1:A:314:ILE:H	1.62	0.64
1:B:141:GLN:HA	1:B:144:ASP:HB2	1.81	0.61
1:B:396:LEU:HD23	1:B:459:TYR:CZ	2.36	0.61
1:A:314:ILE:HD12	1:A:314:ILE:N	2.17	0.59
1:B:224:LYS:HZ2	1:B:226:SER:H	1.51	0.58
1:A:328:LYS:HB3	1:A:329:PRO:HD3	1.84	0.57
1:B:163:LYS:NZ	2:B:501:HOH:O	2.22	0.57
1:A:309:THR:HA	1:A:312:ILE:HG23	1.88	0.55
1:B:386:GLN:C	1:B:388:LYS:H	2.14	0.54
1:B:396:LEU:HD23	1:B:459:TYR:CE2	2.43	0.54
1:B:220:VAL:HB	1:B:223:THR:OG1	2.08	0.53
1:A:194:MET:O	1:A:197:VAL:HG22	2.09	0.53
1:B:216:TYR:CD2	1:B:224:LYS:HE2	2.44	0.53
1:A:289:ARG:HH12	1:A:314:ILE:HG13	1.74	0.52
1:A:193:MET:HG2	1:A:208:TRP:HZ3	1.73	0.52
1:B:224:LYS:NZ	1:B:226:SER:H	2.07	0.52
1:B:193:MET:HE1	1:B:211:VAL:HB	1.91	0.52
1:A:206:SER:HB3	1:B:219:GLY:O	2.09	0.51
1:A:400:ARG:NH1	1:A:455:ASP:OD1	2.44	0.51
1:A:314:ILE:H	1:A:314:ILE:CD1	2.25	0.49
1:B:250:LEU:HD21	1:B:363:GLN:HG2	1.95	0.48
1:B:406:THR:HA	1:B:448:HIS:O	2.13	0.48
1:B:209:PHE:CE2	1:B:213:ILE:HD11	2.49	0.48
1:A:196:ASN:ND2	1:A:273:TYR:CD2	2.82	0.47
1:A:128:LEU:O	1:A:132:VAL:HG22	2.14	0.47
1:B:380:VAL:HG12	1:B:414:LEU:HD22	1.95	0.47
1:B:396:LEU:HD23	1:B:459:TYR:OH	2.14	0.47
1:B:304:ASP:OD1	1:B:306:THR:HG23	2.15	0.47
1:A:239:GLU:HB2	1:A:244:ARG:HD2	1.97	0.46
1:B:373:LEU:HD21	1:B:443:LYS:HE3	1.98	0.46
1:B:466:ASP:OD1	1:B:468:ARG:HB3	2.15	0.46
1:B:137:THR:N	2:B:511:HOH:O	2.49	0.45
1:B:377:HIS:ND1	1:B:414:LEU:HD11	2.32	0.45
1:B:460:GLU:HB2	1:B:462:HIS:CE1	2.51	0.45
1:B:190:ALA:O	1:B:194:MET:HG3	2.17	0.45
1:B:30:TYR:HA	1:B:45:ARG:O	2.18	0.44
1:A:63:ARG:O	1:A:66:ILE:HG13	2.16	0.44
1:B:158:GLN:HB3	1:B:163:LYS:HG3	2.00	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:328:LYS:HB3	1:B:329:PRO:HD3	1.99	0.44
1:A:208:TRP:CZ3	1:A:277:LEU:HD22	2.52	0.44
1:A:75:GLN:HE22	1:A:124:ALA:HB1	1.83	0.44
1:B:216:TYR:O	1:B:216:TYR:CD1	2.70	0.44
1:A:194:MET:HE3	1:B:194:MET:HB3	2.00	0.43
1:B:224:LYS:HZ2	1:B:226:SER:N	2.16	0.43
1:A:158:GLN:OE1	1:A:163:LYS:HG2	2.18	0.43
1:A:339:ILE:N	1:A:340:PRO:HD2	2.33	0.43
1:A:64:GLU:H	1:A:64:GLU:CD	2.27	0.43
1:A:210:LYS:HA	1:A:210:LYS:HD2	1.63	0.43
1:B:386:GLN:HA	1:B:386:GLN:OE1	2.19	0.43
1:B:423:ARG:HB2	1:B:453:GLU:OE2	2.19	0.43
1:B:418:VAL:HG23	1:B:459:TYR:HA	2.01	0.43
1:B:129:ASP:OD1	1:B:344:ARG:NH1	2.48	0.42
1:B:389:VAL:HG21	1:B:470:CYS:SG	2.60	0.42
1:B:231:ARG:HG3	1:B:231:ARG:HH11	1.84	0.42
1:A:242:LEU:HA	1:A:243:HIS:HA	1.86	0.42
1:A:171:ARG:HE	1:A:171:ARG:HB2	1.64	0.41
1:B:443:LYS:NZ	2:B:515:HOH:O	2.53	0.41
1:A:346:ILE:O	1:A:350:ARG:HG3	2.21	0.41
1:A:219:GLY:O	1:B:206:SER:HB3	2.21	0.41
1:A:143:LEU:HG	1:A:339:ILE:HD13	2.01	0.41
1:A:193:MET:HE2	1:A:193:MET:HB3	1.82	0.41
1:A:289:ARG:NH1	1:A:314:ILE:HG13	2.36	0.41
1:A:71:SER:O	1:A:75:GLN:HG2	2.21	0.40
1:B:388:LYS:HG2	1:B:389:VAL:HG23	2.04	0.40
1:B:75:GLN:HE22	1:B:124:ALA:HB1	1.86	0.40
1:B:61:PRO:HD3	1:B:123:TYR:CZ	2.56	0.40
1:B:321:MET:HE3	1:B:321:MET:HB3	1.89	0.40
1:B:386:GLN:C	1:B:388:LYS:N	2.79	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	451/491 (92%)	440 (98%)	11 (2%)	0	100	100
1	B	453/491 (92%)	444 (98%)	9 (2%)	0	100	100
All	All	904/982 (92%)	884 (98%)	20 (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	396/422 (94%)	396 (100%)	0	100	100
1	B	398/422 (94%)	398 (100%)	0	100	100
All	All	794/844 (94%)	794 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	ASN
1	A	39	HIS
1	A	46	GLN
1	A	65	ASN
1	A	109	ASN
1	A	395	HIS
1	A	448	HIS
1	B	38	ASN
1	B	46	GLN
1	B	257	ASN
1	B	409	HIS

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](#)

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

6.1 Protein, DNA and RNA chains

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	457/491 (93%)	0.62	39 (8%) 16 19	10, 25, 47, 64	0
1	B	459/491 (93%)	0.67	54 (11%) 9 10	11, 24, 48, 66	0
All	All	916/982 (93%)	0.65	93 (10%) 12 14	10, 24, 48, 66	0

All (93) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	220	VAL	6.0
1	B	216	TYR	5.2
1	B	218	TYR	5.1
1	B	219	GLY	4.7
1	A	220	VAL	4.6
1	A	314	ILE	4.6
1	B	396	LEU	4.5
1	B	457	CYS	4.4
1	B	459	TYR	4.3
1	B	397	VAL	4.0
1	B	401	GLY	3.9
1	A	211	VAL	3.8
1	A	217	GLY	3.7
1	A	331	VAL	3.7
1	A	145	ALA	3.7
1	A	150	LEU	3.6
1	A	218	TYR	3.6
1	A	219	GLY	3.5
1	B	393	VAL	3.5
1	B	217	GLY	3.4
1	B	417	ILE	3.3
1	B	394	ALA	3.3
1	B	471	LEU	3.2
1	A	278	TYR	3.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	468	ARG	3.2
1	B	221	HIS	3.1
1	B	404	SER	3.1
1	B	389	VAL	3.0
1	A	216	TYR	3.0
1	B	458	VAL	2.9
1	B	215	GLU	2.9
1	B	420	GLY	2.8
1	B	395	HIS	2.8
1	B	133	GLU	2.8
1	B	461	ILE	2.8
1	B	419	SER	2.7
1	A	300	GLY	2.7
1	A	208	TRP	2.7
1	B	381	PHE	2.6
1	B	141	GLN	2.6
1	A	147	LEU	2.5
1	B	454	SER	2.5
1	B	157	GLU	2.5
1	A	222	ASP	2.5
1	B	455	ASP	2.5
1	B	418	VAL	2.5
1	B	222	ASP	2.5
1	B	145	ALA	2.5
1	A	146	TYR	2.4
1	A	140	ALA	2.4
1	B	465	GLY	2.4
1	B	34	LEU	2.4
1	A	169	ALA	2.4
1	B	421	THR	2.4
1	B	452	ILE	2.4
1	B	379	PRO	2.3
1	A	143	LEU	2.3
1	A	166	LEU	2.3
1	A	312	ILE	2.3
1	A	311	HIS	2.3
1	A	138	TRP	2.3
1	A	335	GLY	2.3
1	B	223	THR	2.3
1	A	294	LEU	2.3
1	B	384	LEU	2.3
1	A	142	SER	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	382	GLU	2.2
1	A	340	PRO	2.2
1	B	150	LEU	2.2
1	A	302	THR	2.2
1	A	309	THR	2.2
1	A	285	VAL	2.2
1	A	418	VAL	2.2
1	B	208	TRP	2.2
1	B	400	ARG	2.2
1	A	279	TYR	2.2
1	B	306	THR	2.2
1	B	194	MET	2.1
1	A	391	ALA	2.1
1	B	140	ALA	2.1
1	B	214	ASP	2.1
1	B	213	ILE	2.1
1	A	293	HIS	2.1
1	A	313	HIS	2.1
1	B	225	HIS	2.1
1	A	167	GLY	2.1
1	B	314	ILE	2.1
1	A	4	VAL	2.0
1	A	132	VAL	2.0
1	B	470	CYS	2.0
1	B	339	ILE	2.0
1	A	148	ASP	2.0
1	B	380	VAL	2.0

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 oligosaccharides 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.