Full wwPDB X-ray Structure Validation Report ⓘ

Apr 22, 2026 – 06:09 PM JST

PDB ID	:	9VBB / pdb_00009vbb
Title	:	Crystal structure of the PDZ tandem of syntenin
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Deposited on	:	2025-06-04
Resolution	:	1.90 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:

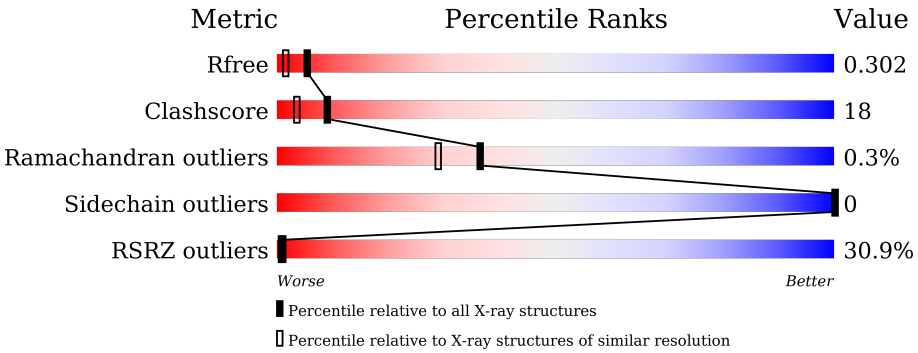
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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 <=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	166	24% 78% 21%
1	B	166	37% 70% 30%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 2551 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 Syntenin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	164	Total	C	N	O	S	0	0	0
			1248	783	223	236	6			
1	B	166	Total	C	N	O	S	0	0	0
			1270	797	225	242	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	275	TYR	PHE	engineered mutation	UNP O00560
B	275	TYR	PHE	engineered mutation	UNP O00560

- Molecule 2 is water.

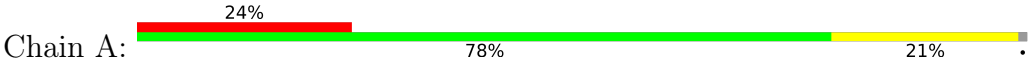
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	18	Total	O	0	0
			18	18		
2	B	15	Total	O	0	0
			15	15		

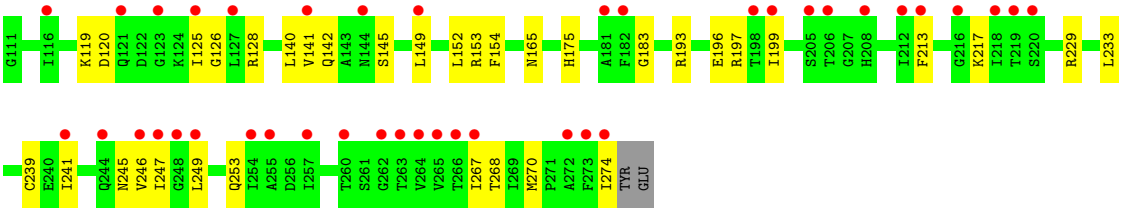
3 Residue-property plots (i)

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: Syntenin-1

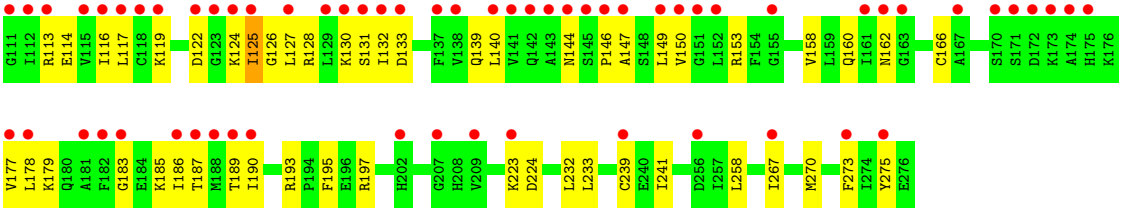
Chain A:





• Molecule 1: Syntenin-1

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α, β, γ	56.96Å 56.96Å 150.47Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.87 – 1.90 46.87 – 1.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (46.87-1.90) 94.3 (46.87-1.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.64 (at 1.90Å)	Xtriage
Refinement program	PHENIX 1.21.2_5419	Depositor
R, R_{free}	0.264 , 0.302 0.264 , 0.302	Depositor DCC
R_{free} test set	1169 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	34.8	Xtriage
Anisotropy	0.537	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 38.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.037 for -h,-k,l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	2551	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.46% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.24	0/1263	0.49	0/1700
1	B	0.26	0/1286	0.49	0/1730
All	All	0.25	0/2549	0.49	0/3430

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	1248	0	1285	38	0
1	B	1270	0	1300	59	0
2	A	18	0	0	2	0
2	B	15	0	0	0	0
All	All	2551	0	2585	94	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 18.

All (94) 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:B:223:LYS:O	1:B:223:LYS:HD2	1.30	1.31

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:124:LYS:O	1:B:125:ILE:HG22	1.30	1.25
1:A:246:VAL:HA	1:A:249:LEU:HD13	1.41	1.00
1:B:223:LYS:HD2	1:B:223:LYS:C	1.95	0.91
1:B:114:GLU:OE1	1:B:114:GLU:C	2.16	0.89
1:B:124:LYS:O	1:B:125:ILE:CG2	2.21	0.88
1:B:130:LYS:HG2	1:B:132:ILE:HD11	1.67	0.77
1:A:145:SER:O	1:A:149:LEU:HD23	1.87	0.75
1:A:126:GLY:HA2	1:A:142:GLN:OE1	1.89	0.73
1:A:239:CYS:SG	1:A:270:MET:HE3	2.29	0.72
1:B:193:ARG:HD2	1:B:270:MET:HE1	1.71	0.72
1:B:125:ILE:CD1	1:B:146:PRO:HB2	2.19	0.71
1:A:153:ARG:HE	1:A:154:PHE:H	1.38	0.71
1:A:140:LEU:HD12	1:A:141:VAL:H	1.56	0.70
1:A:246:VAL:HA	1:A:249:LEU:CD1	2.21	0.69
1:B:158:VAL:HG12	1:B:166:CYS:SG	2.33	0.69
1:B:153:ARG:HH21	1:B:193:ARG:HG3	1.59	0.68
1:B:130:LYS:HG2	1:B:132:ILE:CD1	2.24	0.67
1:A:154:PHE:CZ	1:A:274:ILE:HD12	2.32	0.65
1:A:154:PHE:HZ	1:A:274:ILE:HD12	1.62	0.64
1:B:122:ASP:HB3	1:B:125:ILE:H	1.62	0.64
1:B:117:LEU:HB3	1:B:125:ILE:HD11	1.78	0.64
1:A:239:CYS:HB2	1:A:268:THR:HG22	1.79	0.63
1:B:125:ILE:HD11	1:B:146:PRO:HB2	1.79	0.63
1:B:114:GLU:OE1	1:B:114:GLU:O	2.16	0.63
1:A:120:ASP:HB2	2:A:301:HOH:O	1.99	0.62
1:A:196:GLU:HG3	1:A:268:THR:HG23	1.82	0.62
1:B:146:PRO:HA	1:B:149:LEU:CD1	2.29	0.62
1:B:117:LEU:HB3	1:B:125:ILE:CD1	2.31	0.60
1:B:232:LEU:HD11	1:B:267:ILE:HD11	1.84	0.60
1:B:113:ARG:HB2	1:B:190:ILE:HD11	1.85	0.59
1:B:146:PRO:HA	1:B:149:LEU:HD11	1.84	0.59
1:A:245:ASN:OD1	1:A:247:ILE:HG12	2.04	0.58
1:B:125:ILE:HA	1:B:146:PRO:HG2	1.86	0.57
1:B:132:ILE:HD12	1:B:132:ILE:N	2.20	0.57
1:B:162:ASN:HA	1:B:187:THR:HG22	1.87	0.56
1:A:153:ARG:HD3	1:A:245:ASN:ND2	2.21	0.56
1:B:177:VAL:O	1:B:177:VAL:HG13	2.06	0.55
1:B:127:LEU:HD11	1:B:147:ALA:HB2	1.89	0.55
1:A:241:ILE:HG12	1:A:267:ILE:HG22	1.88	0.55
1:B:130:LYS:HE2	1:B:275:TYR:O	2.07	0.55
1:A:153:ARG:NE	1:A:154:PHE:H	2.05	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:153:ARG:HD3	1:A:245:ASN:HD21	1.73	0.54
1:A:239:CYS:HA	1:A:247:ILE:HD11	1.90	0.54
1:B:178:LEU:O	1:B:186:ILE:HD12	2.07	0.54
1:A:239:CYS:HA	1:A:247:ILE:CD1	2.38	0.54
1:B:125:ILE:HD12	1:B:146:PRO:HB2	1.88	0.53
1:B:153:ARG:NH2	1:B:193:ARG:HG3	2.21	0.53
1:B:223:LYS:C	1:B:223:LYS:CD	2.74	0.52
1:B:130:LYS:CG	1:B:132:ILE:HD11	2.37	0.52
1:B:160:GLN:HB2	1:B:189:THR:CG2	2.40	0.51
1:A:140:LEU:HD12	1:A:141:VAL:N	2.26	0.51
1:A:193:ARG:HD2	1:A:196:GLU:OE1	2.11	0.51
1:B:124:LYS:C	1:B:125:ILE:HG22	2.27	0.50
1:B:127:LEU:CD1	1:B:147:ALA:HB2	2.42	0.50
1:A:165:ASN:HD22	1:B:224:ASP:HA	1.76	0.49
1:B:127:LEU:HD11	1:B:147:ALA:CB	2.42	0.49
1:A:125:ILE:HD12	1:A:126:GLY:N	2.27	0.49
1:A:197:ARG:HH21	1:A:199:ILE:HD11	1.79	0.47
1:B:128:ARG:HG2	1:B:139:GLN:HE21	1.79	0.47
1:B:131:SER:C	1:B:132:ILE:HD12	2.40	0.47
1:A:153:ARG:HE	1:A:154:PHE:N	2.09	0.47
1:A:193:ARG:HG2	1:A:270:MET:HE1	1.96	0.47
1:B:128:ARG:HE	1:B:140:LEU:HD12	1.80	0.46
1:B:153:ARG:HE	1:B:153:ARG:HB2	1.60	0.46
1:B:117:LEU:HD13	1:B:125:ILE:CD1	2.47	0.45
1:B:160:GLN:HB2	1:B:189:THR:HG22	1.98	0.45
1:A:119:LYS:HD2	1:A:183:GLY:HA3	1.98	0.45
1:A:193:ARG:CD	1:A:270:MET:HE1	2.47	0.44
1:B:125:ILE:HD12	1:B:146:PRO:CB	2.48	0.44
1:A:233:LEU:HB3	1:B:133:ASP:HB3	2.00	0.44
1:B:195:PHE:CD2	1:B:273:PHE:CZ	3.05	0.44
1:B:241:ILE:HD13	1:B:258:LEU:HG	1.98	0.44
1:B:144:ASN:C	1:B:144:ASN:OD1	2.61	0.44
1:B:132:ILE:HG22	1:B:133:ASP:OD2	2.18	0.44
1:A:128:ARG:HA	1:A:175:HIS:CE1	2.53	0.43
1:A:274:ILE:HD13	1:A:274:ILE:N	2.34	0.43
1:A:213:PHE:HB2	1:A:217:LYS:O	2.19	0.43
1:B:185:LYS:C	1:B:186:ILE:HD13	2.44	0.43
1:A:229:ARG:HD3	2:A:302:HOH:O	2.18	0.42
1:B:130:LYS:O	1:B:132:ILE:HD12	2.19	0.42
1:B:179:LYS:HG3	1:B:183:GLY:O	2.19	0.42
1:A:193:ARG:CD	1:A:196:GLU:OE1	2.67	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:117:LEU:HD13	1:B:125:ILE:HD11	2.01	0.42
1:B:239:CYS:SG	1:B:270:MET:HE3	2.59	0.42
1:B:185:LYS:NZ	1:B:185:LYS:HB3	2.35	0.41
1:B:119:LYS:HD3	1:B:179:LYS:HD3	2.03	0.41
1:B:124:LYS:C	1:B:126:GLY:H	2.28	0.41
1:A:165:ASN:ND2	1:B:224:ASP:HA	2.35	0.41
1:A:249:LEU:HD23	1:A:253:GLN:CD	2.45	0.41
1:B:197:ARG:HH22	1:B:233:LEU:HD12	1.86	0.41
1:B:116:ILE:O	1:B:150:VAL:HG11	2.20	0.40
1:A:196:GLU:HG3	1:A:268:THR:CG2	2.48	0.40
1:A:152:LEU:HD23	1:A:152:LEU:HA	1.95	0.40

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	162/166 (98%)	156 (96%)	6 (4%)	0	100	100
1	B	164/166 (99%)	154 (94%)	9 (6%)	1 (1%)	21	13
All	All	326/332 (98%)	310 (95%)	15 (5%)	1 (0%)	36	29

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	125	ILE

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	139/141 (99%)	139 (100%)	0	100	100
1	B	141/141 (100%)	141 (100%)	0	100	100
All	All	280/282 (99%)	280 (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 (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	230	ASN
1	B	139	GLN
1	B	202	HIS
1	B	237	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 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, 95^{th} 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	164/166 (98%)	1.47	40 (24%)	2 1	28, 49, 66, 76	0
1	B	166/166 (100%)	1.94	62 (37%)	1 0	30, 52, 94, 105	0
All	All	330/332 (99%)	1.71	102 (30%)	1 1	28, 50, 84, 105	0

All (102) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	117	LEU	5.8
1	B	178	LEU	5.3
1	B	115	VAL	5.2
1	B	140	LEU	4.7
1	B	186	ILE	4.6
1	B	181	ALA	4.4
1	B	182	PHE	4.4
1	B	116	ILE	4.3
1	B	162	ASN	4.3
1	A	247	ILE	4.2
1	A	273	PHE	4.0
1	A	274	ILE	3.9
1	B	125	ILE	3.9
1	B	177	VAL	3.9
1	B	129	LEU	3.8
1	B	147	ALA	3.8
1	B	143	ALA	3.6
1	B	172	ASP	3.6
1	B	144	ASN	3.5
1	B	123	GLY	3.5
1	B	190	ILE	3.4
1	B	150	VAL	3.4
1	B	146	PRO	3.4
1	B	141	VAL	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	263	THR	3.2
1	B	273	PHE	3.2
1	B	138	VAL	3.2
1	A	121	GLN	3.1
1	B	152	LEU	3.1
1	A	127	LEU	3.1
1	B	127	LEU	3.1
1	B	171	SER	3.1
1	A	249	LEU	3.1
1	B	188	MET	3.0
1	B	151	GLY	3.0
1	B	167	ALA	3.0
1	B	112	ILE	3.0
1	B	174	ALA	2.9
1	B	223	LYS	2.9
1	B	202	HIS	2.9
1	A	125	ILE	2.9
1	B	149	LEU	2.9
1	B	118	CYS	2.9
1	A	149	LEU	2.9
1	A	267	ILE	2.9
1	A	199	ILE	2.8
1	B	119	LYS	2.8
1	B	130	LYS	2.7
1	B	145	SER	2.7
1	B	122	ASP	2.7
1	A	257	ILE	2.7
1	B	132	ILE	2.7
1	A	220	SER	2.7
1	B	133	ASP	2.7
1	A	213	PHE	2.6
1	B	131	SER	2.6
1	B	183	GLY	2.6
1	B	256	ASP	2.6
1	A	248	GLY	2.6
1	B	124	LYS	2.6
1	B	173	LYS	2.6
1	A	254	ILE	2.5
1	B	175	HIS	2.5
1	A	182	PHE	2.5
1	B	137	PHE	2.5
1	A	123	GLY	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	265	VAL	2.5
1	B	155	GLY	2.5
1	A	212	ILE	2.5
1	B	111	GLY	2.4
1	A	272	ALA	2.4
1	B	113	ARG	2.4
1	A	181	ALA	2.3
1	A	219	THR	2.3
1	B	161	ILE	2.3
1	B	275	TYR	2.2
1	A	244	GLN	2.2
1	B	189	THR	2.2
1	A	116	ILE	2.2
1	B	267	ILE	2.2
1	A	144	ASN	2.2
1	A	141	VAL	2.2
1	A	246	VAL	2.2
1	A	260	THR	2.2
1	A	262	GLY	2.2
1	A	216	GLY	2.2
1	B	207	GLY	2.2
1	A	208	HIS	2.1
1	A	218	ILE	2.1
1	A	206	THR	2.1
1	A	266	THR	2.1
1	B	209	VAL	2.1
1	B	170	SER	2.1
1	A	241	ILE	2.1
1	A	205	SER	2.1
1	A	198	THR	2.1
1	A	264	VAL	2.1
1	B	142	GLN	2.1
1	A	255	ALA	2.1
1	B	187	THR	2.0
1	B	239	CYS	2.0
1	B	163	GLY	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.