



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:34 PM UTC

PDB ID : 6MZIP / pdb_00006mzp
Title : Zebrafish betaglycan orphan domain structure from orthorhombic crystal form
Authors : Hinck, A.P.; Kim, S.
Deposited on : 2018-11-05
Resolution : 2.10 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

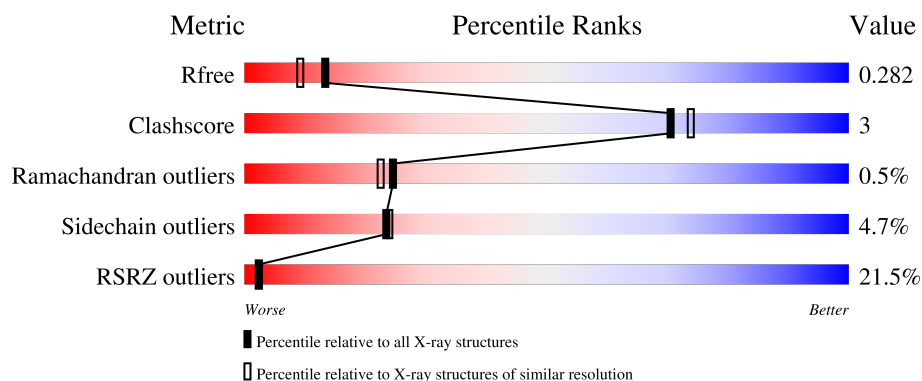
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	338	8% 84% 8% 7%
1	B	338	30% 72% 13% 13%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4881 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 Transforming growth factor beta receptor III.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	314	Total	C	N	O	S	0	0	0
			2482	1580	435	456	11			
1	B	295	Total	C	N	O	S	0	0	0
			2320	1481	405	423	11			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	28	GLY	-	expression tag	UNP A0A0H3UK16
A	360	HIS	-	expression tag	UNP A0A0H3UK16
A	361	HIS	-	expression tag	UNP A0A0H3UK16
A	362	HIS	-	expression tag	UNP A0A0H3UK16
A	363	HIS	-	expression tag	UNP A0A0H3UK16
A	364	HIS	-	expression tag	UNP A0A0H3UK16
A	365	HIS	-	expression tag	UNP A0A0H3UK16
B	28	GLY	-	expression tag	UNP A0A0H3UK16
B	360	HIS	-	expression tag	UNP A0A0H3UK16
B	361	HIS	-	expression tag	UNP A0A0H3UK16
B	362	HIS	-	expression tag	UNP A0A0H3UK16
B	363	HIS	-	expression tag	UNP A0A0H3UK16
B	364	HIS	-	expression tag	UNP A0A0H3UK16
B	365	HIS	-	expression tag	UNP A0A0H3UK16

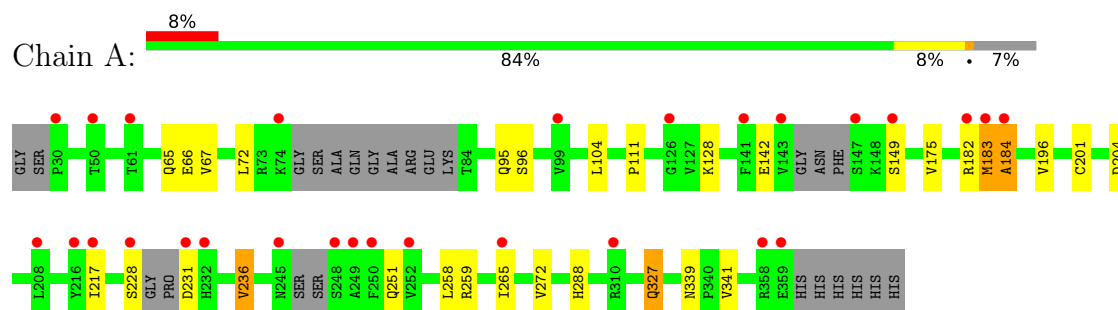
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	50	Total	O	0	0
			50	50		
2	B	29	Total	O	0	0
			29	29		

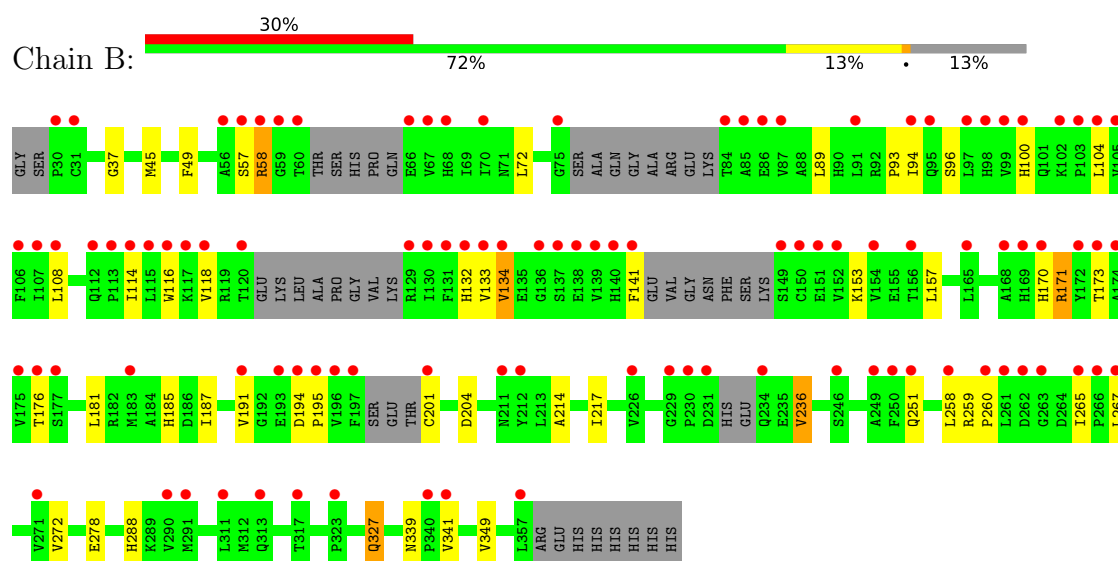
3 Residue-property plots [i](#)

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: Transforming growth factor beta receptor III



- Molecule 1: Transforming growth factor beta receptor III



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	63.52Å 107.27Å 113.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.98 – 2.10 40.98 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (40.98-2.10) 99.8 (40.98-2.10)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.49 (at 2.10Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.232 , 0.258 (Not available) , 0.282	Depositor DCC
R_{free} test set	2267 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	44.3	Xtriage
Anisotropy	0.466	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 51.5	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	4881	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.14% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.84	0/2537	1.16	3/3444 (0.1%)
1	B	0.89	0/2370	1.24	6/3216 (0.2%)
All	All	0.87	0/4907	1.20	9/6660 (0.1%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	185	HIS	N-CA-C	-5.97	105.66	113.12
1	B	37	GLY	CA-C-N	5.84	129.70	120.47
1	B	37	GLY	C-N-CA	5.84	129.70	120.47
1	B	204	ASP	CA-CB-CG	5.50	118.09	112.60
1	B	58	ARG	N-CA-C	-5.23	106.95	113.38
1	A	204	ASP	CA-CB-CG	5.21	117.81	112.60
1	A	182	ARG	CA-C-N	5.20	131.48	121.54
1	A	182	ARG	C-N-CA	5.20	131.48	121.54
1	B	141	PHE	CA-CB-CG	5.00	118.80	113.80

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	2482	0	2495	13	0
1	B	2320	0	2332	22	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	50	0	0	0	0
2	B	29	0	0	1	0
All	All	4881	0	4827	33	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 3.

All (33) 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:183:MET:HG3	1:A:184:ALA:H	1.48	0.78
1:B:260:PRO:HB3	1:B:267:LEU:HD13	1.70	0.73
1:B:58:ARG:HG3	1:B:195:PRO:HA	1.85	0.58
1:B:94:ILE:HG22	1:B:96:SER:H	1.68	0.58
1:B:108:LEU:HB3	1:B:116:TRP:CE2	2.38	0.57
1:B:108:LEU:HB2	1:B:133:VAL:HG23	1.87	0.56
1:B:236:VAL:HG22	1:B:341:VAL:HA	1.89	0.55
1:A:259:ARG:HG2	1:A:288:HIS:HB2	1.88	0.54
1:A:236:VAL:HG22	1:A:341:VAL:HA	1.91	0.53
1:B:100:HIS:CE1	1:B:104:LEU:HD21	2.45	0.52
1:B:259:ARG:HG2	1:B:288:HIS:HB2	1.92	0.52
1:B:327:GLN:H	1:B:327:GLN:CD	2.18	0.51
1:A:327:GLN:H	1:A:327:GLN:CD	2.18	0.51
1:B:89:LEU:HD23	1:B:118:VAL:HG22	1.93	0.50
1:B:132:HIS:CE1	1:B:153:LYS:HD3	2.47	0.49
1:A:251:GLN:O	1:A:251:GLN:HG3	2.13	0.49
1:A:128:LYS:HA	1:A:149:SER:O	2.12	0.49
1:A:72:LEU:O	1:A:111:PRO:HD3	2.16	0.46
1:A:67:VAL:HB	1:A:175:VAL:HA	1.98	0.46
1:B:134:VAL:HG13	1:B:157:LEU:HD12	1.97	0.46
1:B:116:TRP:HZ3	1:B:187:ILE:HD12	1.81	0.45
1:B:170:HIS:HB3	1:B:171:ARG:HH11	1.82	0.45
1:B:72:LEU:HD23	1:B:181:LEU:HB2	1.98	0.44
1:B:49:PHE:HA	1:B:214:ALA:O	2.18	0.44
1:A:183:MET:O	1:A:184:ALA:HB2	2.18	0.43
1:B:251:GLN:HG3	2:B:425:HOH:O	2.18	0.43
1:B:236:VAL:HB	1:B:272:VAL:HB	1.99	0.43
1:A:236:VAL:HB	1:A:272:VAL:HB	2.00	0.43
1:A:66:GLU:HB2	1:A:104:LEU:HD23	2.00	0.43
1:A:95:GLN:CD	1:B:349:VAL:HG11	2.46	0.41
1:A:196:VAL:HG23	1:B:278:GLU:OE1	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:108:LEU:HB3	1:B:116:TRP:CZ2	2.57	0.40
1:B:93:PRO:HA	1:B:191:VAL:O	2.21	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	304/338 (90%)	296 (97%)	6 (2%)	2 (1%)	18	15
1	B	281/338 (83%)	271 (96%)	9 (3%)	1 (0%)	30	28
All	All	585/676 (86%)	567 (97%)	15 (3%)	3 (0%)	24	22

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	183	MET
1	A	184	ALA
1	B	173	THR

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	284/301 (94%)	272 (96%)	12 (4%)	26	28

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	265/301 (88%)	251 (95%)	14 (5%)	20	19
All	All	549/602 (91%)	523 (95%)	26 (5%)	23	24

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	65	GLN
1	A	96	SER
1	A	142	GLU
1	A	201	CYS
1	A	217	ILE
1	A	228	SER
1	A	231	ASP
1	A	236	VAL
1	A	258	LEU
1	A	265	ILE
1	A	327	GLN
1	A	339	ASN
1	B	45	MET
1	B	57	SER
1	B	114	ILE
1	B	134	VAL
1	B	171	ARG
1	B	176	THR
1	B	194	ASP
1	B	201	CYS
1	B	217	ILE
1	B	236	VAL
1	B	258	LEU
1	B	265	ILE
1	B	327	GLN
1	B	339	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	63	HIS
1	A	166	ASN
1	A	211	ASN
1	A	245	ASN
1	A	288	HIS

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Mol	Chain	Res	Type
1	B	95	GLN
1	B	242	GLN
1	B	288	HIS
1	B	336	ASN
1	B	346	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, 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	314/338 (92%)	0.74	28 (8%) 15 16	37, 59, 99, 143	0
1	B	295/338 (87%)	1.67	103 (34%) 1 1	34, 79, 142, 160	0
All	All	609/676 (90%)	1.19	131 (21%) 2 2	34, 65, 132, 160	0

All (131) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	173	THR	7.8
1	B	139	VAL	7.0
1	B	141	PHE	6.9
1	B	197	PHE	6.5
1	A	250	PHE	6.5
1	B	131	PHE	6.5
1	B	116	TRP	6.2
1	B	59	GLY	6.1
1	B	175	VAL	6.1
1	B	137	SER	6.1
1	B	67	VAL	6.0
1	B	130	ILE	5.9
1	A	143	VAL	5.9
1	B	133	VAL	5.9
1	B	103	PRO	5.6
1	B	106	PHE	5.5
1	B	140	HIS	5.3
1	B	152	VAL	5.3
1	A	249	ALA	5.1
1	B	115	LEU	5.0
1	B	118	VAL	4.9
1	B	120	THR	4.8
1	B	168	ALA	4.7
1	B	75	GLY	4.4

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Mol	Chain	Res	Type	RSRZ
1	B	132	HIS	4.3
1	B	30	PRO	4.2
1	B	105	VAL	4.2
1	B	250	PHE	4.1
1	B	265	ILE	4.1
1	B	176	THR	4.0
1	B	174	ALA	3.9
1	B	114	ILE	3.9
1	B	266	PRO	3.9
1	B	170	HIS	3.9
1	B	201	CYS	3.9
1	A	248	SER	3.9
1	B	154	VAL	3.8
1	B	104	LEU	3.8
1	B	99	VAL	3.8
1	B	95	GLN	3.8
1	B	291	MET	3.8
1	B	129	ARG	3.7
1	B	263	GLY	3.7
1	B	66	GLU	3.7
1	B	261	LEU	3.6
1	B	134	VAL	3.6
1	B	60	THR	3.6
1	B	57	SER	3.6
1	B	149	SER	3.5
1	B	169	HIS	3.4
1	A	50	THR	3.4
1	A	245	ASN	3.3
1	B	138	GLU	3.3
1	B	177	SER	3.3
1	B	113	PRO	3.3
1	B	56	ALA	3.3
1	A	182	ARG	3.2
1	B	196	VAL	3.2
1	B	85	ALA	3.1
1	B	194	ASP	3.1
1	B	91	LEU	3.1
1	B	211	ASN	3.0
1	B	191	VAL	3.0
1	B	84	THR	3.0
1	B	68	HIS	3.0
1	B	234	GLN	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	232	HIS	3.0
1	A	183	MET	2.9
1	A	141	PHE	2.9
1	B	249	ALA	2.9
1	B	258	LEU	2.9
1	A	149	SER	2.9
1	B	117	LYS	2.9
1	B	212	TYR	2.9
1	B	136	GLY	2.9
1	B	97	LEU	2.8
1	B	112	GLN	2.8
1	B	230	PRO	2.8
1	A	126	GLY	2.8
1	B	231	ASP	2.8
1	B	172	TYR	2.8
1	B	357	LEU	2.8
1	B	165	LEU	2.7
1	B	195	PRO	2.7
1	B	341	VAL	2.7
1	B	31	CYS	2.7
1	B	150	CYS	2.7
1	B	102	LYS	2.7
1	B	229	GLY	2.7
1	B	260	PRO	2.7
1	A	265	ILE	2.6
1	B	262	ASP	2.6
1	A	228	SER	2.6
1	B	94	ILE	2.6
1	A	30	PRO	2.6
1	B	251	GLN	2.5
1	B	151	GLU	2.5
1	B	290	VAL	2.5
1	A	216	TYR	2.4
1	A	252	VAL	2.4
1	B	107	ILE	2.4
1	B	86	GLU	2.4
1	B	70	ILE	2.4
1	B	183	MET	2.4
1	A	310	ARG	2.3
1	A	147	SER	2.3
1	B	100	HIS	2.3
1	A	184	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	208	LEU	2.3
1	B	193	GLU	2.3
1	A	61	THR	2.3
1	A	217	ILE	2.2
1	B	271	VAL	2.2
1	B	313	GLN	2.2
1	A	358	ARG	2.2
1	B	226	VAL	2.2
1	B	246	SER	2.2
1	B	340	PRO	2.2
1	A	231	ASP	2.2
1	B	267	LEU	2.1
1	A	359	GLU	2.1
1	A	99	VAL	2.1
1	A	74	LYS	2.1
1	B	108	LEU	2.1
1	B	156	THR	2.1
1	B	317	THR	2.1
1	B	98	HIS	2.1
1	B	58	ARG	2.1
1	B	323	PRO	2.1
1	B	311	LEU	2.0
1	B	87	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.