



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:43 PM UTC

PDB ID : 2ETA / pdb_00002eta
Title : Crystal structure of the ankyrin repeat domain of the TRPV2
Authors : Jin, X.; Gaudet, R.
Deposited on : 2005-10-27
Resolution : 2.20 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

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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

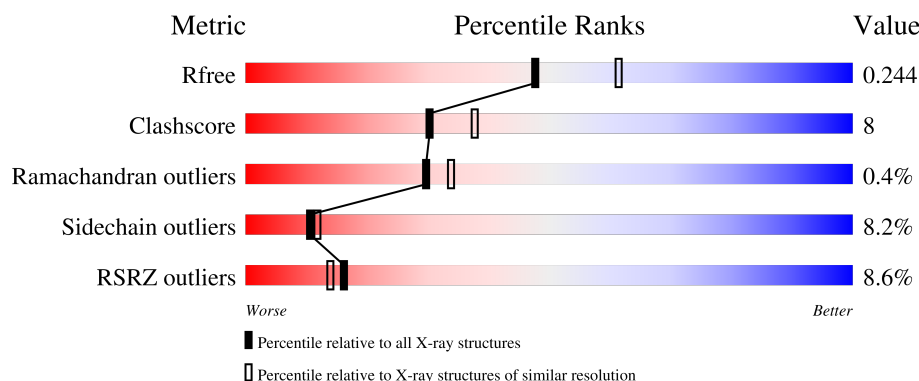
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	256	
1	B	256	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4025 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 Transient receptor potential cation channel subfamily V member 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	239	Total	C	N	O	S	0	0	0
			1871	1187	321	351	12			
1	B	240	Total	C	N	O	S	0	0	0
			1877	1190	322	353	12			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	151	PRO	LEU	SEE REMARK 999	UNP Q9WUD2
A	322	ALA	-	cloning artifact	UNP Q9WUD2
A	323	ALA	-	cloning artifact	UNP Q9WUD2
A	324	ALA	-	cloning artifact	UNP Q9WUD2
A	325	HIS	-	expression tag	UNP Q9WUD2
A	326	HIS	-	expression tag	UNP Q9WUD2
A	327	HIS	-	expression tag	UNP Q9WUD2
A	328	HIS	-	expression tag	UNP Q9WUD2
A	329	HIS	-	expression tag	UNP Q9WUD2
A	330	HIS	-	expression tag	UNP Q9WUD2
B	151	PRO	LEU	SEE REMARK 999	UNP Q9WUD2
B	322	ALA	-	cloning artifact	UNP Q9WUD2
B	323	ALA	-	cloning artifact	UNP Q9WUD2
B	324	ALA	-	cloning artifact	UNP Q9WUD2
B	325	HIS	-	expression tag	UNP Q9WUD2
B	326	HIS	-	expression tag	UNP Q9WUD2
B	327	HIS	-	expression tag	UNP Q9WUD2
B	328	HIS	-	expression tag	UNP Q9WUD2
B	329	HIS	-	expression tag	UNP Q9WUD2
B	330	HIS	-	expression tag	UNP Q9WUD2

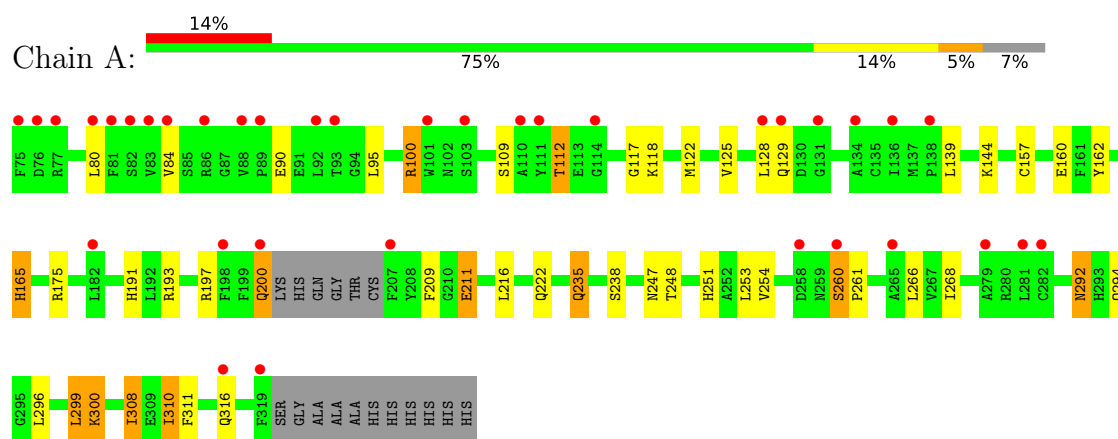
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	143	Total 143	O 143	0	0
2	B	134	Total 134	O 134	0	0

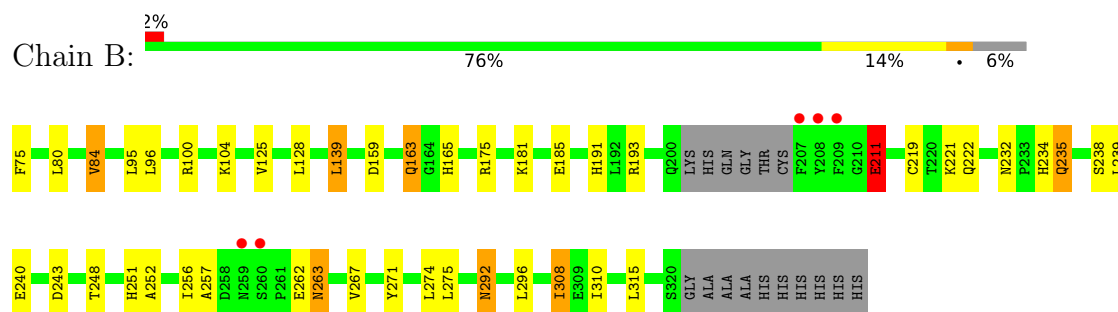
3 Residue-property plots [i](#)

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: Transient receptor potential cation channel subfamily V member 2



- Molecule 1: Transient receptor potential cation channel subfamily V member 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	60.77Å 60.77Å 339.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.20 20.00 – 2.20	Depositor EDS
% Data completeness (in resolution range)	98.8 (20.00-2.20) 98.6 (20.00-2.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.29 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.189 , 0.242 0.192 , 0.244	Depositor DCC
R_{free} test set	3361 reflections (9.93%)	wwPDB-VP
Wilson B-factor (Å ²)	37.4	Xtriage
Anisotropy	0.307	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 41.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4025	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 22.23 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.9442e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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	2/1907 (0.1%)	1.02	6/2584 (0.2%)
1	B	0.81	0/1913	0.97	2/2592 (0.1%)
All	All	0.83	2/3820 (0.1%)	1.00	8/5176 (0.2%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	300	LYS	CD-CE	11.26	1.86	1.52
1	A	300	LYS	CE-NZ	6.35	1.68	1.49

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	211	GLU	CB-CA-C	-8.65	93.22	110.42
1	A	308	ILE	CB-CA-C	-6.71	103.30	111.88
1	A	211	GLU	CB-CA-C	-6.06	98.37	110.42
1	A	300	LYS	CD-CE-NZ	-6.03	92.60	111.90
1	A	300	LYS	CG-CD-CE	-5.64	98.32	111.30
1	A	260	SER	CA-C-N	5.17	126.30	119.84
1	A	260	SER	C-N-CA	5.17	126.30	119.84
1	B	235	GLN	O-C-N	5.03	124.29	121.27

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	1871	0	1866	33	0
1	B	1877	0	1871	30	0
2	A	143	0	0	1	0
2	B	134	0	0	3	0
All	All	4025	0	3737	63	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 8.

All (63) 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:300:LYS:CE	1:A:300:LYS:NZ	1.68	1.51
1:A:300:LYS:CE	1:A:300:LYS:CD	1.86	1.49
1:A:100:ARG:HG2	1:A:100:ARG:HH11	1.21	1.01
1:B:104:LYS:HD2	2:B:391:HOH:O	1.60	0.99
1:B:191:HIS:HE1	1:B:238:SER:H	1.14	0.93
1:A:118:LYS:HA	1:A:122:MET:CE	2.01	0.90
1:A:191:HIS:HE1	1:A:238:SER:H	1.14	0.88
1:A:118:LYS:HA	1:A:122:MET:HE1	1.56	0.87
1:B:232:ASN:HD21	1:B:235:GLN:H	1.25	0.84
1:A:247:ASN:ND2	1:A:292:ASN:OD1	2.12	0.82
1:B:191:HIS:CE1	1:B:238:SER:H	2.02	0.76
1:A:248:THR:H	1:A:251:HIS:HD2	1.36	0.74
1:A:300:LYS:CE	1:A:300:LYS:CG	2.65	0.74
1:A:191:HIS:CE1	1:A:238:SER:H	2.03	0.73
1:A:118:LYS:CG	1:A:122:MET:HE2	2.20	0.72
1:A:248:THR:H	1:A:251:HIS:CD2	2.10	0.69
1:B:193:ARG:HA	1:B:211:GLU:O	1.92	0.69
1:A:300:LYS:NZ	1:A:300:LYS:CD	2.56	0.68
1:B:232:ASN:HD22	1:B:234:HIS:H	1.40	0.67
1:A:112:THR:HG23	1:A:117:GLY:HA2	1.76	0.66
1:A:193:ARG:HA	1:A:211:GLU:O	1.99	0.62
1:A:100:ARG:HG2	1:A:100:ARG:NH1	2.01	0.61
1:B:75:PHE:N	2:B:456:HOH:O	2.33	0.61
1:B:84:VAL:HG21	1:B:139:LEU:HD21	1.83	0.60
1:B:248:THR:H	1:B:251:HIS:HD2	1.49	0.60
1:A:118:LYS:HG3	1:A:122:MET:HE2	1.85	0.57
1:A:118:LYS:HA	1:A:122:MET:HE2	1.84	0.57
1:B:292:ASN:C	1:B:292:ASN:HD22	2.11	0.56
1:B:251:HIS:HE1	1:B:296:LEU:O	1.88	0.56
1:A:112:THR:CG2	1:A:117:GLY:HA2	2.36	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:257:ALA:HA	1:B:263:ASN:HD21	1.71	0.54
1:A:235:GLN:HB2	2:A:399:HOH:O	2.07	0.53
1:B:232:ASN:ND2	1:B:234:HIS:H	2.05	0.53
1:B:232:ASN:ND2	1:B:235:GLN:H	2.02	0.52
1:A:292:ASN:HB2	1:A:296:LEU:H	1.77	0.50
1:A:200:GLN:HE21	1:A:200:GLN:HA	1.76	0.49
1:B:219:CYS:SG	1:B:252:ALA:HB1	2.52	0.49
1:A:118:LYS:HG3	1:A:122:MET:CE	2.42	0.49
1:A:125:VAL:O	1:A:128:LEU:HG	2.12	0.49
1:B:248:THR:H	1:B:251:HIS:CD2	2.28	0.48
1:A:118:LYS:HG2	1:A:122:MET:HE2	1.95	0.48
1:B:181:LYS:O	1:B:185:GLU:HG3	2.14	0.48
1:A:292:ASN:HB3	1:A:294:GLN:H	1.79	0.47
1:B:239:LEU:HD21	1:B:274:LEU:HD22	1.95	0.47
1:A:162:TYR:O	1:A:165:HIS:HB2	2.13	0.47
1:A:299:LEU:HD22	1:A:311:PHE:CE1	2.50	0.47
1:B:159:ASP:O	1:B:163:GLN:HG2	2.16	0.45
1:A:175:ARG:HA	1:A:222:GLN:OE1	2.17	0.45
1:A:260:SER:HA	1:A:261:PRO:HD2	1.78	0.44
1:A:209:PHE:CD1	1:A:216:LEU:HB2	2.53	0.44
1:A:122:MET:HE1	1:A:157:CYS:SG	2.58	0.44
1:B:243:ASP:C	1:B:243:ASP:OD1	2.59	0.43
1:B:175:ARG:HA	1:B:222:GLN:OE1	2.19	0.43
1:B:219:CYS:HA	1:B:256:ILE:HG12	1.99	0.43
1:B:271:TYR:CE2	1:B:275:LEU:HD11	2.53	0.43
1:B:191:HIS:HD2	2:B:462:HOH:O	2.02	0.42
1:B:221:LYS:HZ3	1:B:221:LYS:HG3	1.74	0.42
1:B:267:VAL:HG12	1:B:310:ILE:HD12	2.01	0.42
1:B:125:VAL:O	1:B:128:LEU:HG	2.19	0.42
1:B:308:ILE:H	1:B:308:ILE:HG13	1.70	0.41
1:B:292:ASN:ND2	1:B:296:LEU:H	2.19	0.41
1:A:254:VAL:HG22	1:A:310:ILE:HD12	2.03	0.40
1:B:96:LEU:HD21	1:B:100:ARG:HH21	1.86	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	235/256 (92%)	230 (98%)	4 (2%)	1 (0%)	30	34
1	B	236/256 (92%)	231 (98%)	4 (2%)	1 (0%)	30	34
All	All	471/512 (92%)	461 (98%)	8 (2%)	2 (0%)	30	34

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	292	ASN
1	B	211	GLU

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	206/218 (94%)	184 (89%)	22 (11%)	6	6
1	B	207/218 (95%)	195 (94%)	12 (6%)	18	22
All	All	413/436 (95%)	379 (92%)	34 (8%)	10	12

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	80	LEU
1	A	84	VAL
1	A	90	GLU
1	A	95	LEU

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Mol	Chain	Res	Type
1	A	100	ARG
1	A	109	SER
1	A	112	THR
1	A	129	GLN
1	A	139	LEU
1	A	144	LYS
1	A	160	GLU
1	A	165	HIS
1	A	197	ARG
1	A	200	GLN
1	A	235	GLN
1	A	253	LEU
1	A	266	LEU
1	A	268	ILE
1	A	299	LEU
1	A	308	ILE
1	A	310	ILE
1	A	316	GLN
1	B	80	LEU
1	B	84	VAL
1	B	95	LEU
1	B	139	LEU
1	B	163	GLN
1	B	165	HIS
1	B	240	GLU
1	B	262	GLU
1	B	263	ASN
1	B	292	ASN
1	B	308	ILE
1	B	315	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	129	GLN
1	A	178	GLN
1	A	191	HIS
1	A	200	GLN
1	A	234	HIS
1	A	247	ASN
1	A	251	HIS
1	A	286	GLN

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Mol	Chain	Res	Type
1	A	294	GLN
1	A	316	GLN
1	B	191	HIS
1	B	232	ASN
1	B	251	HIS
1	B	259	ASN
1	B	263	ASN
1	B	286	GLN
1	B	292	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	239/256 (93%)	1.00	36 (15%) 5 4	23, 33, 53, 60	0
1	B	240/256 (93%)	0.05	5 (2%) 63 60	24, 32, 45, 53	0
All	All	479/512 (93%)	0.52	41 (8%) 16 14	23, 32, 49, 60	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	77	ARG	5.0
1	A	75	PHE	4.6
1	A	88	VAL	3.7
1	A	316	GLN	3.5
1	B	260	SER	3.2
1	A	76	ASP	3.2
1	A	82	SER	3.0
1	A	81	PHE	3.0
1	B	207	PHE	3.0
1	A	101	TRP	3.0
1	A	319	PHE	3.0
1	A	258	ASP	3.0
1	A	83	VAL	2.9
1	A	129	GLN	2.8
1	A	114	GLY	2.8
1	A	207	PHE	2.8
1	A	80	LEU	2.7
1	A	138	PRO	2.7
1	A	279	ALA	2.6
1	A	131	GLY	2.6
1	A	92	LEU	2.5
1	A	84	VAL	2.4
1	B	259	ASN	2.4
1	B	209	PHE	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	282	CYS	2.3
1	A	128	LEU	2.3
1	A	260	SER	2.3
1	A	136	ILE	2.3
1	A	200	GLN	2.2
1	A	198	PHE	2.2
1	A	86	ARG	2.2
1	A	265	ALA	2.2
1	B	208	TYR	2.2
1	A	89	PRO	2.2
1	A	110	ALA	2.2
1	A	111	TYR	2.1
1	A	134	ALA	2.1
1	A	182	LEU	2.1
1	A	281	LEU	2.1
1	A	93	THR	2.0
1	A	103	SER	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.