



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 10:21 AM UTC

PDB ID : 6LYI / pdb_00006lyi
Title : Crystal structure of a N-methyltransferase CkTbS from *Camellia assamica* var. kucha
Authors : Wang, Y.; Zhang, Z.M.
Deposited on : 2020-02-14
Resolution : 2.49 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

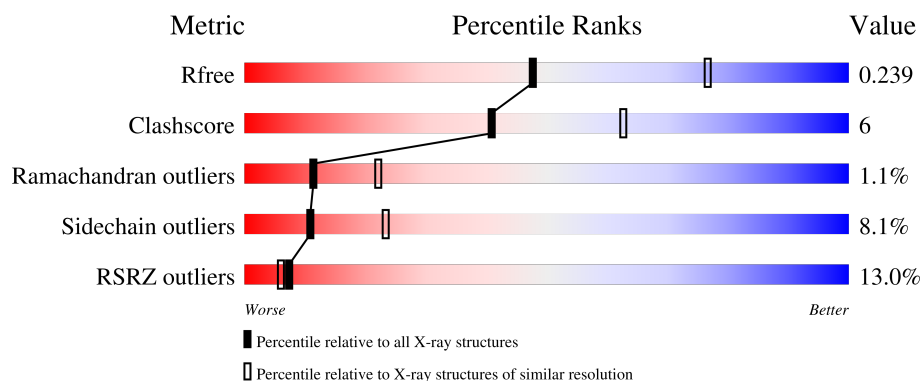
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.49 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	371	14% 71% 13% • 13%
1	B	371	9% 73% 15% • • 8%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5137 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 N-methyltransferase CkTbS.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	322	Total	C	N	O	S	0	0	0
			2426	1542	397	468	19			
1	B	341	Total	C	N	O	S	0	0	0
			2621	1673	428	501	19			

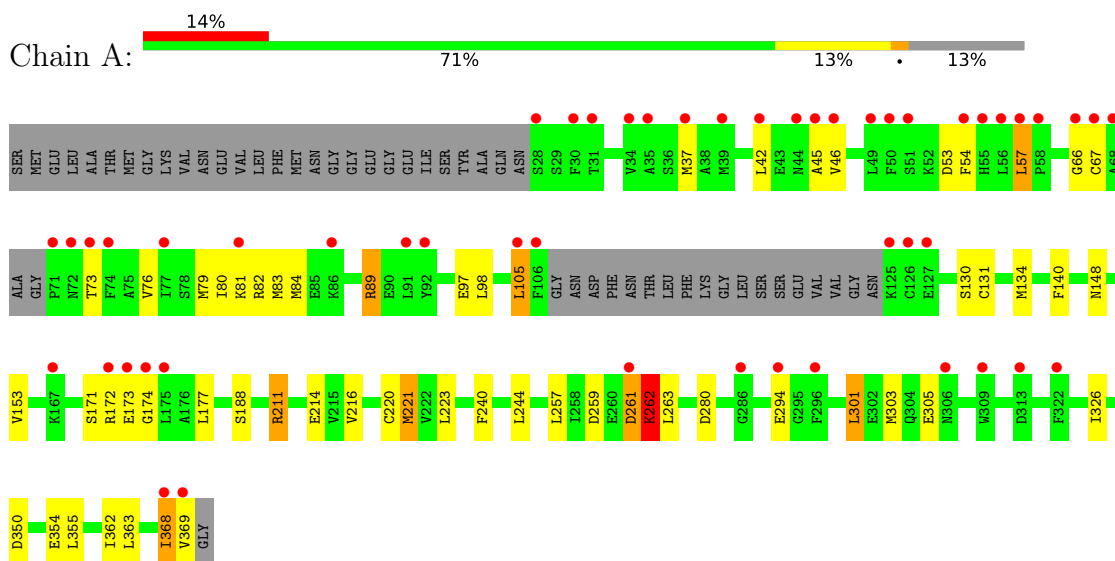
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	43	Total	O	0	0
			43	43		
2	B	47	Total	O	0	0
			47	47		

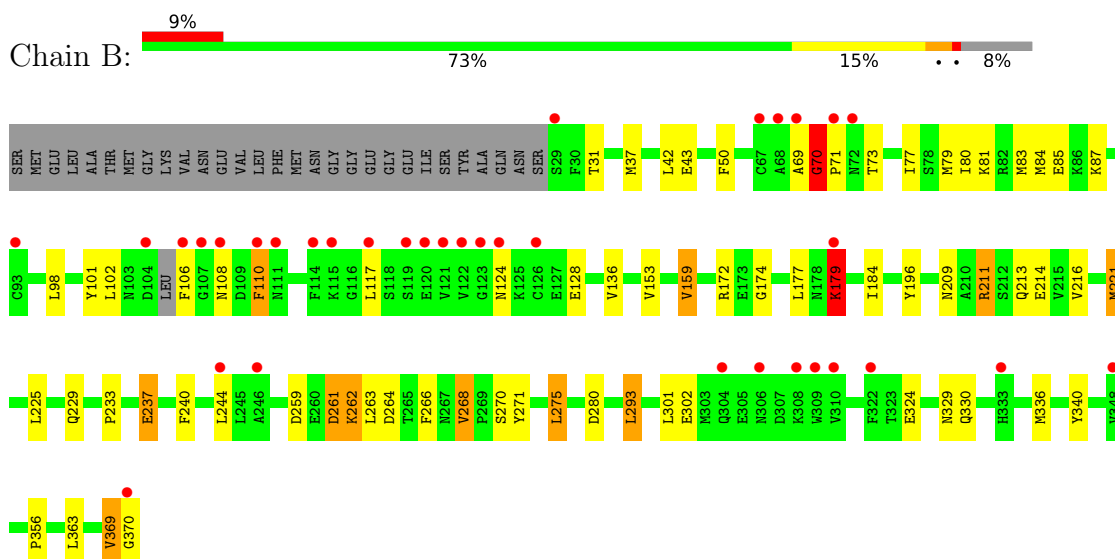
3 Residue-property plots [i](#)

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: N-methyltransferase CkTbS



• Molecule 1: N-methyltransferase CkTbS



4 Data and refinement statistics

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α , β , γ	144.77Å 144.77Å 76.18Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.39 – 2.49 47.39 – 2.49	Depositor EDS
% Data completeness (in resolution range)	100.0 (47.39-2.49) 94.0 (47.39-2.49)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.43 (at 2.45Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.183 , 0.224 0.214 , 0.239	Depositor DCC
R_{free} test set	2006 reflections (5.90%)	wwPDB-VP
Wilson B-factor (Å ²)	48.9	Xtriage
Anisotropy	0.362	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 62.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.037 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5137	wwPDB-VP
Average B, all atoms (Å ²)	67.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.07% 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	0.45	0/2475	0.84	3/3363 (0.1%)
1	B	0.48	0/2678	0.84	5/3630 (0.1%)
All	All	0.47	0/5153	0.84	8/6993 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	261	ASP	CA-C-N	8.99	137.88	121.70
1	A	261	ASP	C-N-CA	8.99	137.88	121.70
1	B	261	ASP	CA-C-N	8.76	137.47	121.70
1	B	261	ASP	C-N-CA	8.76	137.47	121.70
1	B	70	GLY	CA-C-N	7.10	144.03	127.00
1	B	70	GLY	C-N-CA	7.10	144.03	127.00
1	B	70	GLY	C-N-CD	-6.99	105.22	120.60
1	A	368	ILE	N-CA-C	5.67	117.19	111.00

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	2426	0	2299	27	0
1	B	2621	0	2524	39	0
2	A	43	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	47	0	0	0	0
All	All	5137	0	4823	64	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 6.

All (64) 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:153:VAL:HB	1:B:221:MET:HG3	1.52	0.89
1:A:261:ASP:HB3	1:A:262:LYS:HB2	1.66	0.78
1:A:153:VAL:HB	1:A:221:MET:HG3	1.68	0.74
1:A:172:ARG:HA	1:A:173:GLU:C	2.15	0.71
1:A:211:ARG:NH1	1:A:214:GLU:OE1	2.28	0.66
1:A:84:MET:HE1	1:A:98:LEU:HD13	1.81	0.62
1:B:211:ARG:NH1	1:B:214:GLU:OE1	2.33	0.60
1:B:184:ILE:HG21	1:B:233:PRO:HB2	1.82	0.59
1:B:84:MET:HE1	1:B:98:LEU:HB2	1.86	0.58
1:B:336:MET:HE3	1:B:340:TYR:HE2	1.67	0.58
1:A:45:ALA:HB1	1:A:220:CYS:SG	2.45	0.56
1:A:240:PHE:O	1:A:244:LEU:HG	2.06	0.56
1:A:81:LYS:HD3	1:A:131:CYS:HB2	1.87	0.55
1:A:57:LEU:H	1:A:57:LEU:HD13	1.73	0.54
1:B:84:MET:HE1	1:B:98:LEU:HD22	1.91	0.53
1:A:79:MET:HG2	1:A:82:ARG:HH11	1.74	0.53
1:A:66:GLY:HA2	1:A:105:LEU:HB2	1.92	0.52
1:B:275:LEU:HD13	1:B:293:LEU:HD22	1.92	0.52
1:B:324:GLU:HG3	1:B:336:MET:HE2	1.92	0.52
1:A:37:MET:O	2:A:401:HOH:O	2.19	0.52
1:B:261:ASP:CB	1:B:262:LYS:HB2	2.39	0.51
1:B:240:PHE:CD1	1:B:356:PRO:HG2	2.45	0.51
1:B:179:LYS:O	1:B:264:ASP:HA	2.10	0.51
1:A:67:CYS:HB3	1:A:73:THR:HG21	1.93	0.51
1:B:266:PHE:CE1	1:B:330:GLN:HG3	2.46	0.51
1:B:240:PHE:O	1:B:244:LEU:HG	2.11	0.50
1:A:171:SER:HB3	1:A:177:LEU:HD21	1.92	0.50
1:A:294:GLU:HG3	1:A:362:ILE:HB	1.94	0.49
1:A:46:VAL:HG21	1:A:79:MET:HE1	1.95	0.49
1:B:70:GLY:HA2	1:B:73:THR:H	1.77	0.48
1:B:259:ASP:C	1:B:261:ASP:H	2.21	0.48
1:A:140:PHE:O	1:A:211:ARG:NH2	2.41	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:79:MET:HE1	1:B:83:MET:SD	2.54	0.48
1:B:229:GLN:N	1:B:237:GLU:OE2	2.33	0.46
1:B:43:GLU:HG2	1:B:79:MET:CE	2.45	0.46
1:B:77:ILE:HD11	1:B:102:LEU:HD21	1.97	0.46
1:A:301:LEU:HD11	1:A:355:LEU:HB2	1.97	0.46
1:B:31:THR:HG21	1:B:69:ALA:O	2.15	0.46
1:B:79:MET:HE3	1:B:79:MET:HB3	1.58	0.46
1:A:76:VAL:O	1:A:80:ILE:HG13	2.16	0.46
1:B:85:GLU:HG2	1:B:128:GLU:OE1	2.16	0.45
1:B:261:ASP:HB3	1:B:262:LYS:HB2	1.98	0.45
1:B:101:TYR:HB3	1:B:136:VAL:HG21	1.99	0.45
1:B:159:VAL:HG12	1:B:225:LEU:HD13	1.97	0.44
1:B:369:VAL:HA	1:B:370:GLY:HA3	1.66	0.44
1:B:174:GLY:HA2	1:B:177:LEU:HG	2.00	0.44
1:B:77:ILE:HG21	1:B:117:LEU:HD13	2.00	0.44
1:A:350:ASP:OD1	1:A:350:ASP:N	2.52	0.43
1:B:211:ARG:HA	1:B:211:ARG:HD3	1.55	0.43
1:B:268:VAL:CG1	1:B:270:SER:HB3	2.49	0.43
1:A:173:GLU:O	1:B:209:ASN:HB3	2.20	0.42
1:A:97:GLU:HG2	1:A:130:SER:HB2	2.02	0.42
1:A:221:MET:HG2	1:A:223:LEU:HD21	2.00	0.42
1:A:259:ASP:HB2	1:A:262:LYS:HD2	2.00	0.42
1:A:303:MET:C	1:A:305:GLU:H	2.27	0.42
1:B:196:TYR:HB3	1:B:271:TYR:CD1	2.55	0.42
1:B:102:LEU:HD12	1:B:110:PHE:HD2	1.85	0.41
1:B:43:GLU:HG2	1:B:79:MET:HE1	2.03	0.41
1:B:80:ILE:HG22	1:B:84:MET:HE2	2.02	0.41
1:B:106:PHE:C	1:B:108:ASN:H	2.29	0.41
1:A:105:LEU:HD22	1:B:172:ARG:HG3	2.03	0.40
1:B:84:MET:HB2	1:B:84:MET:HE3	1.84	0.40
1:A:89:ARG:HD3	1:A:89:ARG:HA	1.82	0.40
1:B:50:PHE:CD2	1:B:87:LYS:HD3	2.57	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	316/371 (85%)	299 (95%)	15 (5%)	2 (1%)	21	38
1	B	337/371 (91%)	320 (95%)	12 (4%)	5 (2%)	8	16
All	All	653/742 (88%)	619 (95%)	27 (4%)	7 (1%)	11	22

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	262	LYS
1	B	71	PRO
1	B	179	LYS
1	B	262	LYS
1	B	302	GLU
1	A	174	GLY
1	B	70	GLY

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	259/325 (80%)	236 (91%)	23 (9%)	9	20
1	B	284/325 (87%)	263 (93%)	21 (7%)	13	27
All	All	543/650 (84%)	499 (92%)	44 (8%)	11	23

All (44) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	LEU
1	A	53	ASP
1	A	54	PHE
1	A	57	LEU
1	A	83	MET

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Mol	Chain	Res	Type
1	A	89	ARG
1	A	105	LEU
1	A	134	MET
1	A	148	ASN
1	A	188	SER
1	A	211	ARG
1	A	216	VAL
1	A	221	MET
1	A	257	LEU
1	A	262	LYS
1	A	263	LEU
1	A	280	ASP
1	A	301	LEU
1	A	326	ILE
1	A	354	GLU
1	A	363	LEU
1	A	368	ILE
1	A	369	VAL
1	B	37	MET
1	B	42	LEU
1	B	81	LYS
1	B	110	PHE
1	B	124	ASN
1	B	159	VAL
1	B	179	LYS
1	B	211	ARG
1	B	213	GLN
1	B	216	VAL
1	B	221	MET
1	B	237	GLU
1	B	263	LEU
1	B	268	VAL
1	B	275	LEU
1	B	280	ASP
1	B	293	LEU
1	B	301	LEU
1	B	329	ASN
1	B	363	LEU
1	B	369	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	103	ASN
1	A	199	GLN
1	B	44	ASN
1	B	55	HIS
1	B	72	ASN
1	B	213	GLN
1	B	226	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	322/371 (86%)	0.70	51 (15%) 5 4	35, 63, 116, 158	0
1	B	341/371 (91%)	0.44	35 (10%) 12 10	33, 61, 108, 127	0
All	All	663/742 (89%)	0.56	86 (12%) 7 6	33, 62, 113, 158	0

All (86) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	31	THR	6.0
1	A	106	PHE	5.6
1	B	124	ASN	5.6
1	A	55	HIS	5.3
1	A	56	LEU	5.0
1	B	107	GLY	4.9
1	B	122	VAL	4.9
1	A	261	ASP	4.7
1	B	69	ALA	4.6
1	A	369	VAL	4.4
1	A	68	ALA	4.3
1	B	106	PHE	4.2
1	A	173	GLU	4.1
1	A	54	PHE	4.1
1	A	322	PHE	4.0
1	B	68	ALA	3.9
1	B	179	LYS	3.9
1	A	57	LEU	3.8
1	A	309	TRP	3.8
1	A	46	VAL	3.7
1	B	108	ASN	3.7
1	B	120	GLU	3.6
1	A	50	PHE	3.6
1	A	42	LEU	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	322	PHE	3.5
1	A	73	THR	3.4
1	A	174	GLY	3.4
1	A	72	ASN	3.3
1	B	123	GLY	3.3
1	B	310	VAL	3.3
1	A	167	LYS	3.2
1	B	71	PRO	3.2
1	A	71	PRO	3.0
1	A	58	PRO	3.0
1	A	39	MET	3.0
1	B	110	PHE	2.9
1	A	306	ASN	2.8
1	A	49	LEU	2.8
1	B	29	SER	2.8
1	B	308	LYS	2.7
1	A	77	ILE	2.7
1	B	115	LYS	2.7
1	A	172	ARG	2.7
1	A	105	LEU	2.7
1	B	117	LEU	2.7
1	A	175	LEU	2.6
1	A	127	GLU	2.6
1	A	286	GLY	2.6
1	A	313	ASP	2.6
1	B	370	GLY	2.6
1	A	368	ILE	2.6
1	B	67	CYS	2.6
1	B	114	PHE	2.5
1	B	306	ASN	2.5
1	A	35	ALA	2.5
1	B	93	CYS	2.5
1	B	119	SER	2.5
1	A	74	PHE	2.5
1	A	66	GLY	2.4
1	B	104	ASP	2.4
1	B	304	GLN	2.4
1	B	309	TRP	2.4
1	B	244	LEU	2.4
1	A	92	TYR	2.4
1	B	121	VAL	2.4
1	A	44	ASN	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	333	HIS	2.3
1	A	67	CYS	2.3
1	A	86	LYS	2.3
1	B	348	VAL	2.3
1	A	45	ALA	2.3
1	A	126	CYS	2.3
1	A	81	LYS	2.3
1	A	34	VAL	2.3
1	B	126	CYS	2.3
1	A	91	LEU	2.2
1	B	246	ALA	2.2
1	B	111	ASN	2.1
1	A	28	SER	2.1
1	A	37	MET	2.1
1	B	72	ASN	2.1
1	A	30	PHE	2.1
1	A	294	GLU	2.1
1	A	125	LYS	2.1
1	A	296	PHE	2.0
1	A	51	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.