



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 15, 2023 – 12:55 AM JST

PDB ID : 6IRV  
Title : Crystal structure of the human cap-specific adenosine methyltransferase  
Authors : Hirano, S.; Nishimasu, H.; Ishitani, R.; Nureki, O.  
Deposited on : 2018-11-14  
Resolution : 2.70 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

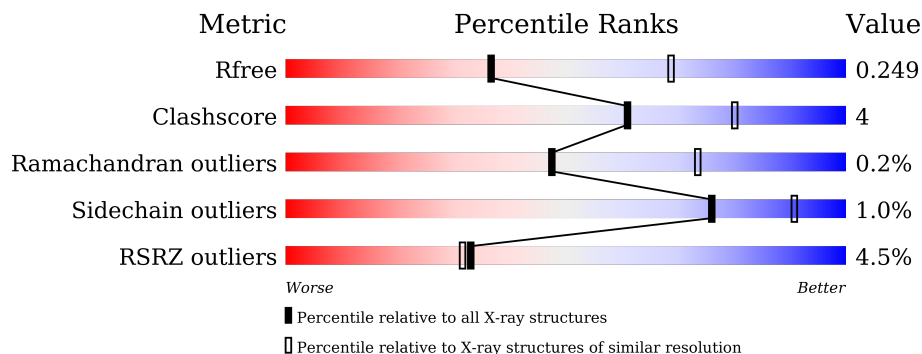
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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  $\geq 3$ , 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	508	 5% (Poor fit)   85% (Green)   12% (Yellow)   • (Grey)
1	B	508	 4% (Poor fit)   85% (Green)   12% (Yellow)   • (Grey)

## 2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 8079 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 Phosphorylated CTD-interacting factor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	494	4009	2566	707	708	28	0	0	0
1	B	494	4006	2563	708	707	28	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	165	GLU	-	expression tag	UNP Q9H4Z3
A	166	ASN	-	expression tag	UNP Q9H4Z3
A	167	LEU	-	expression tag	UNP Q9H4Z3
A	168	TYR	-	expression tag	UNP Q9H4Z3
A	169	PHE	-	expression tag	UNP Q9H4Z3
A	170	GLN	-	expression tag	UNP Q9H4Z3
A	171	GLY	-	expression tag	UNP Q9H4Z3
A	172	SER	-	expression tag	UNP Q9H4Z3
A	173	HIS	-	expression tag	UNP Q9H4Z3
B	165	GLU	-	expression tag	UNP Q9H4Z3
B	166	ASN	-	expression tag	UNP Q9H4Z3
B	167	LEU	-	expression tag	UNP Q9H4Z3
B	168	TYR	-	expression tag	UNP Q9H4Z3
B	169	PHE	-	expression tag	UNP Q9H4Z3
B	170	GLN	-	expression tag	UNP Q9H4Z3
B	171	GLY	-	expression tag	UNP Q9H4Z3
B	172	SER	-	expression tag	UNP Q9H4Z3
B	173	HIS	-	expression tag	UNP Q9H4Z3

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	30	Total	O	0	0
			30	30		

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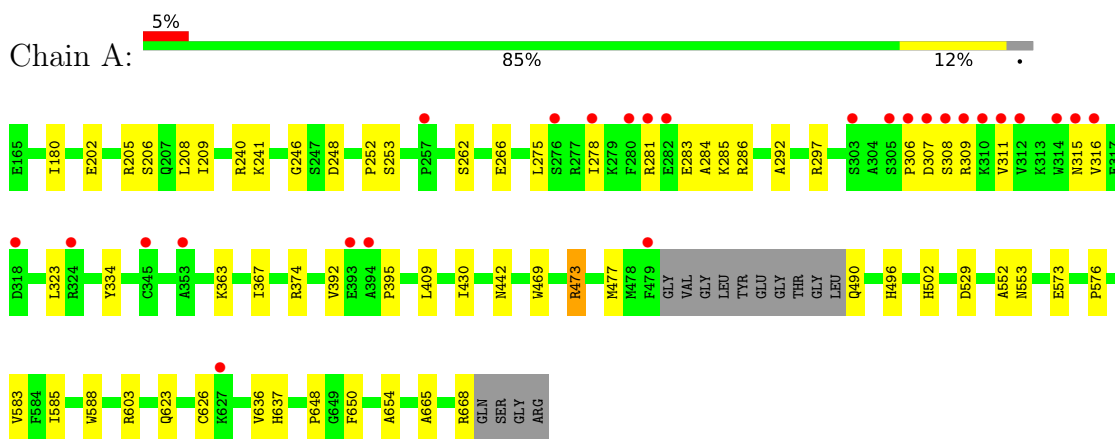
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
2	B	34	Total	O	0	0
			34	34		

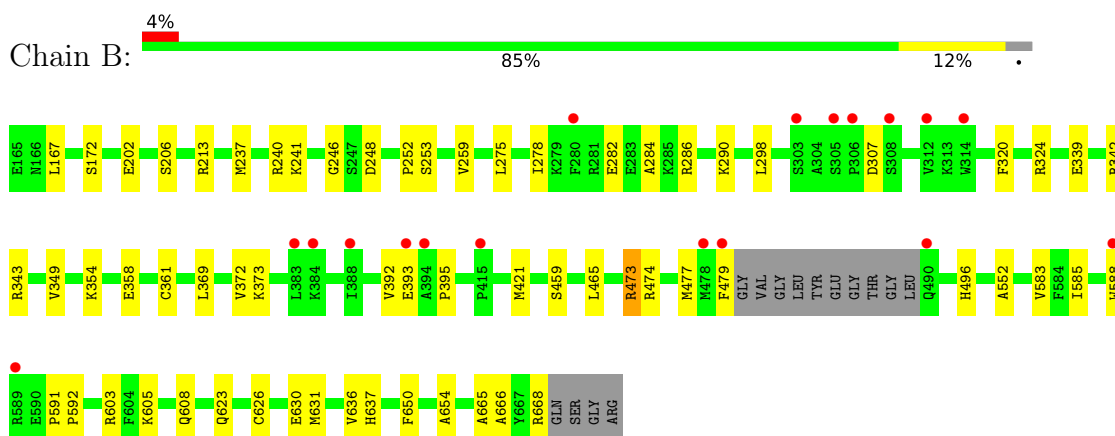
### 3 Residue-property plots

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: Phosphorylated CTD-interacting factor 1



- Molecule 1: Phosphorylated CTD-interacting factor 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	70.70Å 120.31Å 156.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.12 – 2.70 48.12 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (48.12-2.70) 100.0 (48.12-2.70)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.65 (at 2.69Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, $R_{free}$	0.214 , 0.252 0.213 , 0.249	Depositor DCC
$R_{free}$ test set	1883 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	51.2	Xtrriage
Anisotropy	0.381	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 41.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8079	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 48.59 % 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 8.4136e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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	0.25	0/4123	0.40	0/5587
1	B	0.25	0/4121	0.39	0/5587
All	All	0.25	0/8244	0.40	0/11174

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 [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	4009	0	3907	39	1
1	B	4006	0	3892	35	0
2	A	30	0	0	0	0
2	B	34	0	0	0	0
All	All	8079	0	7799	71	1

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 4.

All (71) 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:278:ILE:HD13	1:B:284:ALA:HA	1.62	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:573:GLU:HG2	1:A:603:ARG:HH22	1.50	0.76
1:A:278:ILE:HG21	1:A:284:ALA:HB2	1.74	0.68
1:B:259:VAL:HG21	1:B:358:GLU:HG2	1.78	0.66
1:B:241:LYS:NZ	1:B:248:ASP:O	2.25	0.66
1:A:286:ARG:HG3	1:B:636:VAL:HG11	1.80	0.64
1:B:339:GLU:HB3	1:B:343:ARG:NH2	2.13	0.63
1:A:636:VAL:HG21	1:B:290:LYS:HE3	1.81	0.61
1:B:167:LEU:HD22	1:B:172:SER:HB3	1.82	0.61
1:A:241:LYS:NZ	1:A:248:ASP:O	2.23	0.60
1:A:306:PRO:HA	1:A:309:ARG:HB3	1.84	0.59
1:B:623:GLN:HB2	1:B:631:MET:HE3	1.84	0.59
1:B:665:ALA:HA	1:B:668:ARG:HD2	1.85	0.59
1:A:246:GLY:HA3	1:A:253:SER:HB3	1.86	0.56
1:A:573:GLU:HG2	1:A:603:ARG:NH2	2.19	0.54
1:A:363:LYS:HE3	1:A:367:ILE:HD11	1.89	0.53
1:A:205:ARG:O	1:A:209:ILE:HG12	2.09	0.52
1:A:278:ILE:HD12	1:A:283:GLU:HG2	1.92	0.52
1:B:552:ALA:HB3	1:B:583:VAL:HG22	1.92	0.52
1:A:430:ILE:HG22	1:A:469:TRP:HD1	1.76	0.51
1:B:282:GLU:O	1:B:286:ARG:HG3	2.11	0.51
1:B:206:SER:HB3	1:B:477:MET:HE2	1.92	0.51
1:A:307:ASP:O	1:A:311:VAL:N	2.44	0.49
1:A:623:GLN:HA	1:A:626:CYS:SG	2.54	0.48
1:B:605:LYS:HE2	1:B:608:GLN:HB2	1.96	0.48
1:A:473:ARG:O	1:A:477:MET:HG3	2.14	0.47
1:A:202:GLU:OE2	1:A:205:ARG:NH2	2.46	0.47
1:A:311:VAL:O	1:A:315:ASN:ND2	2.47	0.47
1:A:392:VAL:HG12	1:A:395:PRO:HD3	1.96	0.47
1:B:320:PHE:O	1:B:324:ARG:HG3	2.15	0.47
1:B:213:ARG:NH2	1:B:477:MET:O	2.46	0.47
1:A:496:HIS:CD2	1:A:496:HIS:H	2.33	0.46
1:B:392:VAL:HG12	1:B:395:PRO:HD3	1.97	0.46
1:A:240:ARG:HB3	1:A:252:PRO:HB3	1.98	0.45
1:A:285:LYS:HG3	1:A:323:LEU:HD22	1.98	0.45
1:A:206:SER:HB3	1:A:477:MET:HE2	1.98	0.45
1:B:240:ARG:HB3	1:B:252:PRO:HB3	1.98	0.45
1:A:262:SER:O	1:A:266:GLU:HG3	2.18	0.44
1:A:650:PHE:O	1:A:654:ALA:HB2	2.17	0.44
1:B:259:VAL:HG13	1:B:361:CYS:HB2	2.00	0.44
1:B:473:ARG:O	1:B:477:MET:HG3	2.17	0.44
1:A:442:ASN:OD1	1:A:442:ASN:N	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:623:GLN:HA	1:B:626:CYS:SG	2.58	0.44
1:B:496:HIS:ND1	1:B:666:ALA:O	2.51	0.43
1:A:665:ALA:O	1:A:668:ARG:HG2	2.18	0.43
1:A:180:ILE:HD12	1:A:502:HIS:CE1	2.53	0.43
1:B:202:GLU:OE2	1:B:474:ARG:NH2	2.39	0.43
1:B:354:LYS:O	1:B:358:GLU:HB2	2.19	0.43
1:A:409:LEU:HD11	1:A:529:ASP:HA	1.99	0.43
1:B:650:PHE:O	1:B:654:ALA:HB2	2.19	0.43
1:A:275:LEU:HD23	1:A:275:LEU:HA	1.87	0.43
1:A:588:TRP:HD1	1:A:637:HIS:CG	2.37	0.43
1:B:246:GLY:HA3	1:B:253:SER:HB3	2.01	0.43
1:B:465:LEU:HD23	1:B:465:LEU:HA	1.90	0.43
1:A:292:ALA:HB1	1:A:316:VAL:HG13	2.01	0.42
1:B:473:ARG:HD2	1:B:473:ARG:HA	1.62	0.42
1:A:285:LYS:HB2	1:A:334:TYR:CE2	2.54	0.42
1:B:588:TRP:HD1	1:B:637:HIS:CD2	2.38	0.42
1:A:490:GLN:NE2	1:A:553:ASN:OD1	2.52	0.42
1:B:298:LEU:HD22	1:B:349:VAL:HG23	2.01	0.42
1:B:373:LYS:HA	1:B:373:LYS:HD3	1.77	0.42
1:B:591:PRO:HA	1:B:592:PRO:HD2	1.96	0.41
1:A:576:PRO:O	1:A:648:PRO:HG3	2.20	0.41
1:B:253:SER:O	1:B:369:LEU:HD13	2.20	0.41
1:A:308:SER:HA	1:A:311:VAL:HB	2.03	0.41
1:A:552:ALA:HB3	1:A:583:VAL:HG22	2.02	0.41
1:B:248:ASP:HB2	1:B:372:VAL:HG13	2.02	0.41
1:A:278:ILE:HG13	1:A:284:ALA:HA	2.04	0.40
1:B:275:LEU:HD11	1:B:342:ARG:HD2	2.03	0.40
1:A:208:LEU:HD21	1:A:374:ARG:HH21	1.85	0.40
1:A:297:ARG:HH21	1:B:630:GLU:HA	1.85	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:281:ARG:NH2	1:A:307:ASP:OD2[4_455]	2.16	0.04

## 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	490/508 (96%)	473 (96%)	17 (4%)	0	100	100
1	B	490/508 (96%)	480 (98%)	8 (2%)	2 (0%)	34	60
All	All	980/1016 (96%)	953 (97%)	25 (3%)	2 (0%)	47	73

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	393	GLU
1	B	459	SER

### 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	434/459 (95%)	432 (100%)	2 (0%)	88	96
1	B	433/459 (94%)	426 (98%)	7 (2%)	62	85
All	All	867/918 (94%)	858 (99%)	9 (1%)	76	91

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	473	ARG
1	A	585	ILE
1	B	237	MET
1	B	307	ASP

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Mol	Chain	Res	Type
1	B	421	MET
1	B	473	ARG
1	B	479	PHE
1	B	585	ILE
1	B	603	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	315	ASN
1	A	623	GLN
1	B	422	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 monosaccharides 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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	494/508 (97%)	0.14	26 (5%) 26 25	29, 55, 125, 171	0
1	B	494/508 (97%)	0.10	18 (3%) 42 42	31, 57, 108, 164	0
All	All	988/1016 (97%)	0.12	44 (4%) 33 31	29, 57, 117, 171	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	393	GLU	7.6
1	A	312	VAL	5.8
1	A	309	ARG	4.7
1	A	308	SER	4.6
1	A	394	ALA	4.4
1	B	479	PHE	4.4
1	A	280	PHE	4.2
1	A	278	ILE	4.1
1	A	310	LYS	4.1
1	A	479	PHE	4.0
1	A	311	VAL	4.0
1	A	316	VAL	4.0
1	B	393	GLU	4.0
1	A	318	ASP	3.8
1	A	307	ASP	3.8
1	A	282	GLU	3.4
1	A	306	PRO	3.4
1	B	588	TRP	3.3
1	A	276	SER	3.3
1	B	478	MET	3.2
1	B	384	LYS	3.1
1	B	383	LEU	3.1
1	A	281	ARG	3.0
1	B	589	ARG	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	388	ILE	2.9
1	A	314	TRP	2.8
1	B	303	SER	2.8
1	B	490	GLN	2.8
1	A	303	SER	2.7
1	A	315	ASN	2.6
1	B	308	SER	2.6
1	B	280	PHE	2.6
1	A	324	ARG	2.6
1	B	314	TRP	2.5
1	A	345	CYS	2.5
1	B	394	ALA	2.4
1	A	257	PRO	2.4
1	B	312	VAL	2.3
1	B	415	PRO	2.3
1	B	306	PRO	2.1
1	A	305	SER	2.1
1	B	305	SER	2.1
1	A	627	LYS	2.0
1	A	353	ALA	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 monosaccharides 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.