



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:10 AM UTC

PDB ID : 6AI4 / pdb_00006ai4
Title : Structure of Transferase mutant-C21S,C199S
Authors : Park, J.B.; Yoo, Y.; Kim, J.
Deposited on : 2018-08-21
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

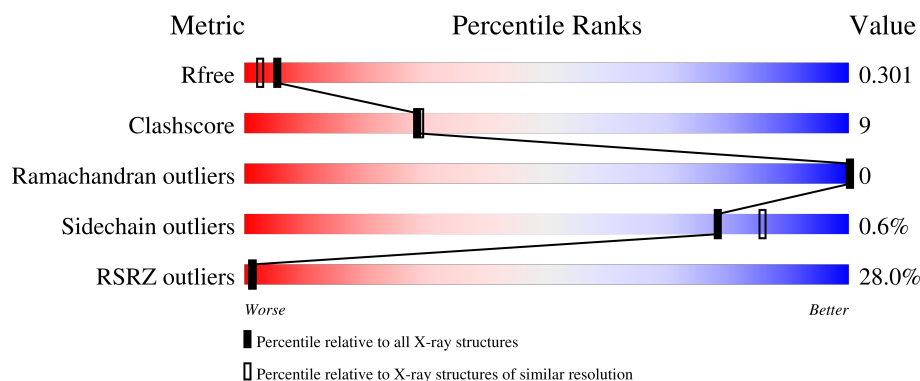
1 Overall quality at a glance

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	326	10% 76% 11% 12%
1	B	326	38% 62% 23% 15%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4799 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 Non-LEE encoded effector protein NleB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	286	Total	C	N	O	S	0	0	0
			2364	1510	401	441	12			
1	B	278	Total	C	N	O	S	0	0	0
			2298	1474	388	424	12			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	21	SER	CYS	engineered mutation	UNP A0A0D7C3R7
A	199	SER	CYS	engineered mutation	UNP A0A0D7C3R7
B	21	SER	CYS	engineered mutation	UNP A0A0D7C3R7
B	199	SER	CYS	engineered mutation	UNP A0A0D7C3R7

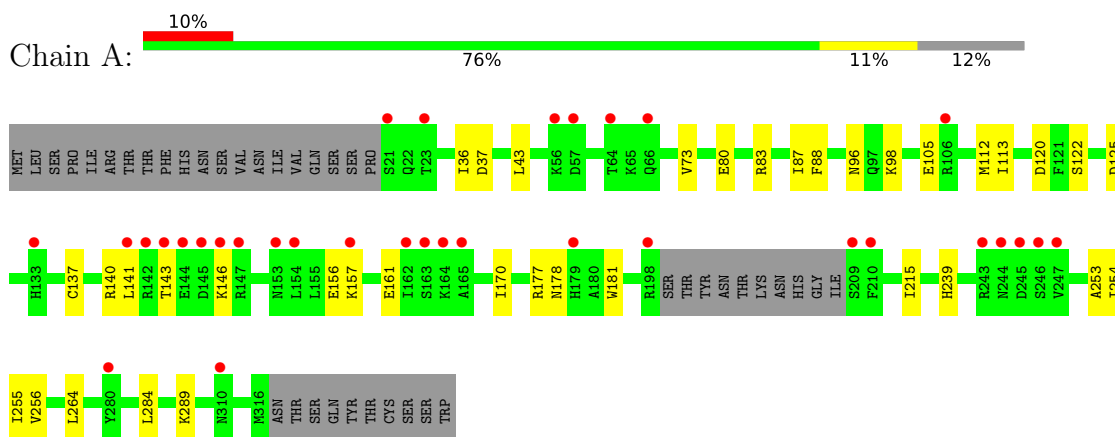
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	111	Total	O	0	0
			111	111		
2	B	26	Total	O	0	0
			26	26		

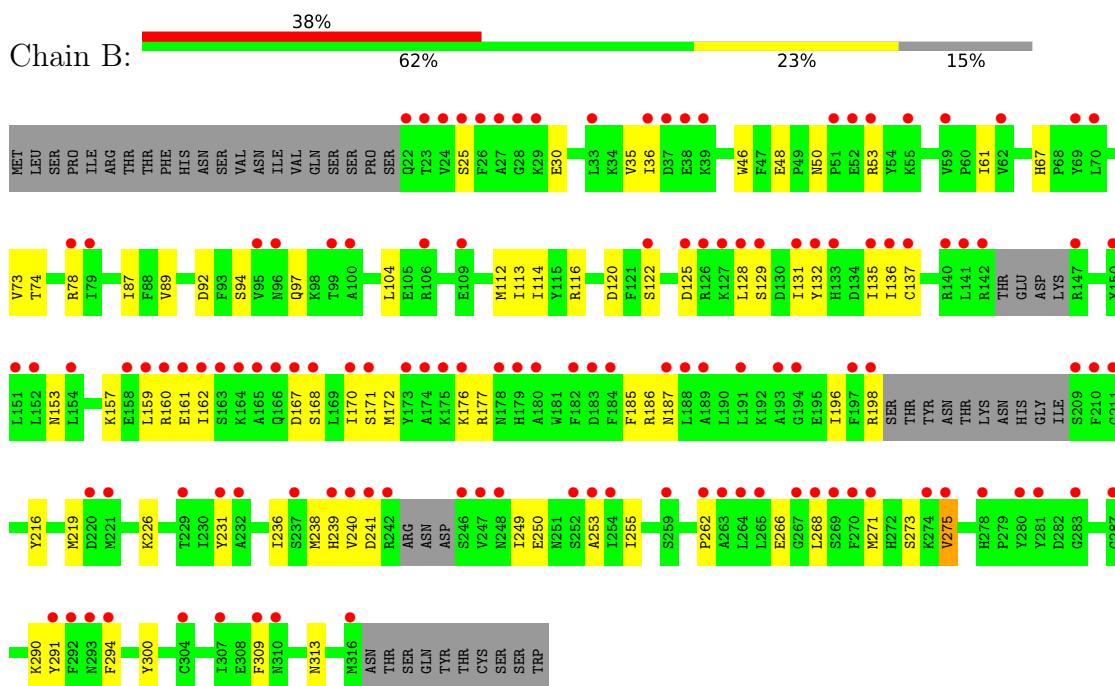
3 Residue-property plots [i](#)

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: Non-LEE encoded effector protein NleB



- Molecule 1: Non-LEE encoded effector protein NleB



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2 ₁	Depositor
Cell constants a, b, c, α , β , γ	67.82Å 95.52Å 120.08Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.42 – 2.10 44.42 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.5 (44.42-2.10) 99.5 (44.42-2.10)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.84 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.261 , 0.298 0.264 , 0.301	Depositor DCC
R_{free} test set	2311 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	28.7	Xtriage
Anisotropy	0.262	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 31.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	4799	wwPDB-VP
Average B, all atoms (Å ²)	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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

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	0.75	0/2419	0.79	0/3260
1	B	0.60	0/2351	0.70	0/3166
All	All	0.68	0/4770	0.74	0/6426

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	2364	0	2298	22	2
1	B	2298	0	2237	59	2
2	A	111	0	0	1	0
2	B	26	0	0	1	0
All	All	4799	0	4535	81	2

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 9.

All (81) 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:129:SER:H	1:B:167:ASP:CG	1.80	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:159:LEU:O	1:B:162:ILE:HG22	1.74	0.87
1:B:112:MET:HE2	1:B:114:ILE:HG12	1.67	0.77
1:B:50:ASN:HB3	1:B:53:ARG:HG3	1.71	0.71
1:B:168:SER:HB3	1:B:171:SER:HB3	1.74	0.69
1:B:73:VAL:HG21	1:B:219:MET:HE2	1.77	0.67
1:B:172:MET:HE3	1:B:176:LYS:HE3	1.76	0.66
1:B:73:VAL:HG11	1:B:87:ILE:HD11	1.78	0.65
1:B:268:LEU:HA	1:B:271:MET:HE3	1.79	0.65
1:B:35:VAL:HG12	1:B:231:TYR:CE1	2.32	0.64
1:B:162:ILE:HD11	1:B:167:ASP:CB	2.26	0.64
1:B:262:PRO:HB2	1:B:291:TYR:CE1	2.32	0.64
1:A:105:GLU:HG3	1:A:113:ILE:HG12	1.80	0.64
1:B:94:SER:H	1:B:97:GLN:HE21	1.47	0.62
1:B:241:ASP:HB2	1:B:250:GLU:OE1	2.00	0.61
1:B:132:TYR:O	1:B:136:ILE:HG13	2.00	0.61
1:B:239:HIS:HB2	1:B:253:ALA:HB3	1.81	0.60
1:B:162:ILE:HD11	1:B:167:ASP:HB2	1.84	0.60
1:B:35:VAL:HG12	1:B:231:TYR:HE1	1.65	0.60
1:A:80:GLU:OE1	1:A:83:ARG:HD2	2.02	0.58
1:B:266:GLU:OE2	1:B:290:LYS:NZ	2.34	0.58
1:A:239:HIS:HB2	1:A:253:ALA:HB3	1.86	0.57
1:B:238:MET:O	1:B:309:PHE:N	2.31	0.57
1:B:129:SER:OG	1:B:167:ASP:OD2	2.22	0.57
1:B:198:ARG:HA	1:B:198:ARG:HE	1.70	0.56
1:B:48:GLU:OE1	1:B:50:ASN:N	2.30	0.56
1:B:240:VAL:HG12	1:B:249:ILE:HG12	1.89	0.54
1:A:215:ILE:HG12	1:A:255:ILE:HD12	1.90	0.54
1:B:162:ILE:CD1	1:B:167:ASP:HB2	2.37	0.54
1:A:140:ARG:NH2	1:A:156:GLU:OE1	2.35	0.53
1:A:157:LYS:O	1:A:161:GLU:HG3	2.09	0.53
1:B:153:ASN:O	1:B:157:LYS:HD3	2.09	0.53
1:B:161:GLU:O	1:B:161:GLU:HG2	2.09	0.52
1:B:104:LEU:HD23	1:B:113:ILE:HD11	1.91	0.51
1:B:36:ILE:HD13	1:B:255:ILE:HG22	1.93	0.50
1:A:143:THR:OG1	1:A:146:LYS:HG2	2.11	0.50
1:B:125:ASP:OD2	1:B:168:SER:OG	2.27	0.50
1:B:226:LYS:O	1:B:313:ASN:ND2	2.42	0.50
1:B:162:ILE:O	1:B:162:ILE:HG23	2.12	0.49
1:B:129:SER:CB	1:B:167:ASP:OD2	2.60	0.49
1:B:157:LYS:HD2	1:B:160:ARG:NH2	2.27	0.49
1:B:186:ARG:NH1	1:B:187:ASN:OD1	2.45	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:236:ILE:HA	1:B:255:ILE:O	2.13	0.48
1:A:43:LEU:HD11	1:A:88:PHE:HB2	1.95	0.48
1:B:25:SER:HB3	1:B:30:GLU:HG2	1.96	0.48
1:B:186:ARG:HG3	1:B:216:TYR:OH	2.14	0.47
1:A:125:ASP:HB2	1:A:170:ILE:HD12	1.97	0.46
1:B:67:HIS:HD2	2:B:402:HOH:O	1.97	0.46
1:B:131:ILE:O	1:B:135:ILE:HG12	2.16	0.46
1:B:46:TRP:CD1	1:B:61:ILE:HG12	2.52	0.45
1:B:157:LYS:CE	1:B:160:ARG:HH22	2.28	0.45
1:A:36:ILE:HG12	1:A:255:ILE:HG22	1.98	0.45
1:B:129:SER:N	1:B:167:ASP:OD1	2.46	0.45
1:B:294:PHE:CZ	1:B:300:TYR:HA	2.52	0.45
1:B:116:ARG:HD2	1:B:185:PHE:CZ	2.52	0.45
1:B:116:ARG:HD2	1:B:185:PHE:CE1	2.52	0.45
1:A:178:ASN:O	1:A:181:TRP:HB3	2.17	0.45
1:A:177:ARG:HD3	1:A:177:ARG:HA	1.81	0.45
1:B:92:ASP:OD2	1:B:177:ARG:NH1	2.50	0.45
1:A:254:ILE:CD1	1:A:284:LEU:HD21	2.47	0.44
1:A:215:ILE:HG23	1:A:255:ILE:CD1	2.47	0.44
1:B:125:ASP:CG	1:B:170:ILE:HG12	2.42	0.44
1:A:73:VAL:HG11	1:A:87:ILE:HD11	1.99	0.44
1:A:120:ASP:OD1	1:A:122:SER:OG	2.26	0.44
1:A:256:VAL:HG11	1:A:264:LEU:HD11	1.99	0.44
1:A:137:CYS:O	1:A:141:LEU:HG	2.18	0.43
1:A:73:VAL:HG11	1:A:87:ILE:CD1	2.48	0.43
1:B:120:ASP:OD1	1:B:122:SER:OG	2.36	0.43
1:B:128:LEU:HD22	1:B:275:VAL:HG22	2.01	0.43
1:A:37:ASP:C	1:A:37:ASP:OD1	2.63	0.42
1:A:289:LYS:NZ	2:A:406:HOH:O	2.51	0.42
1:B:128:LEU:HA	1:B:131:ILE:HD12	2.00	0.42
1:B:132:TYR:CE2	1:B:275:VAL:HG21	2.54	0.42
1:B:268:LEU:HD12	1:B:271:MET:HE3	2.02	0.41
1:A:112:MET:HE3	1:A:112:MET:HB2	1.84	0.41
1:B:114:ILE:HG21	1:B:196:ILE:HG12	2.02	0.41
1:B:135:ILE:HD11	1:B:273:SER:O	2.21	0.41
1:B:36:ILE:HD13	1:B:255:ILE:CG2	2.50	0.40
1:B:87:ILE:HG22	1:B:89:VAL:CG1	2.52	0.40
1:B:74:THR:O	1:B:78:ARG:HG3	2.21	0.40
1:B:94:SER:OG	1:B:97:GLN:HG3	2.21	0.40

All (2) 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:137:CYS:CB	1:B:137:CYS:SG[2_565]	1.45	0.75
1:A:137:CYS:SG	1:B:137:CYS:SG[2_565]	1.54	0.66

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	282/326 (86%)	271 (96%)	11 (4%)	0	100	100
1	B	270/326 (83%)	259 (96%)	11 (4%)	0	100	100
All	All	552/652 (85%)	530 (96%)	22 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	260/299 (87%)	258 (99%)	2 (1%)	73	81
1	B	252/299 (84%)	251 (100%)	1 (0%)	84	89
All	All	512/598 (86%)	509 (99%)	3 (1%)	78	86

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	96	ASN
1	A	98	LYS

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Mol	Chain	Res	Type
1	B	275	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	50	ASN
1	A	75	ASN
1	A	244	ASN
1	A	302	HIS
1	B	97	GLN

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	286/326 (87%)	0.94	33 (11%) 9 10	24, 36, 67, 104	0
1	B	278/326 (85%)	2.00	125 (44%) 0 1	38, 57, 79, 102	0
All	All	564/652 (86%)	1.46	158 (28%) 1 1	24, 49, 75, 104	0

All (158) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	162	ILE	7.3
1	B	280	TYR	5.7
1	A	143	THR	5.5
1	B	142	ARG	5.1
1	A	210	PHE	4.9
1	B	210	PHE	4.7
1	A	147	ARG	4.4
1	A	21	SER	4.4
1	B	269	SER	4.4
1	B	179	HIS	4.3
1	B	184	PHE	4.3
1	B	246	SER	4.3
1	A	198	ARG	4.3
1	B	141	LEU	4.1
1	B	24	VAL	4.1
1	A	141	LEU	3.9
1	B	231	TYR	3.8
1	B	166	GLN	3.8
1	B	159	LEU	3.7
1	B	198	ARG	3.7
1	B	191	LEU	3.6
1	A	280	TYR	3.6
1	B	150	TYR	3.5
1	B	154	LEU	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	237	SER	3.5
1	B	23	THR	3.5
1	B	287	GLY	3.5
1	A	142	ARG	3.5
1	B	53	ARG	3.5
1	B	78	ARG	3.5
1	B	262	PRO	3.4
1	B	27	ALA	3.4
1	B	197	PHE	3.4
1	A	246	SER	3.3
1	B	247	VAL	3.3
1	B	100	ALA	3.3
1	B	37	ASP	3.3
1	B	152	LEU	3.3
1	B	95	VAL	3.3
1	A	179	HIS	3.2
1	B	253	ALA	3.2
1	B	163	SER	3.1
1	B	194	GLY	3.1
1	B	151	LEU	3.1
1	A	66	GLN	3.1
1	B	170	ILE	3.1
1	B	293	ASN	3.0
1	B	174	ALA	3.0
1	B	180	ALA	3.0
1	B	271	MET	3.0
1	B	26	PHE	3.0
1	B	165	ALA	3.0
1	B	240	VAL	3.0
1	B	25	SER	3.0
1	B	270	PHE	2.9
1	A	164	LYS	2.9
1	B	242	ARG	2.9
1	B	52	GLU	2.9
1	B	168	SER	2.9
1	B	133	HIS	2.9
1	B	307	ILE	2.9
1	B	161	GLU	2.9
1	B	129	SER	2.9
1	A	244	ASN	2.9
1	B	248	ASN	2.9
1	B	193	ALA	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	232	ALA	2.9
1	A	245	ASP	2.8
1	B	128	LEU	2.8
1	B	122	SER	2.8
1	A	145	ASP	2.8
1	B	183	ASP	2.8
1	A	154	LEU	2.8
1	B	167	ASP	2.8
1	B	158	GLU	2.8
1	B	267	GLY	2.8
1	B	39	LYS	2.8
1	B	140	ARG	2.7
1	B	211	GLY	2.7
1	B	264	LEU	2.7
1	B	268	LEU	2.7
1	A	162	ILE	2.7
1	A	209	SER	2.7
1	B	96	ASN	2.7
1	B	274	LYS	2.7
1	B	182	PHE	2.7
1	B	99	THR	2.7
1	B	79	ILE	2.7
1	B	189	ALA	2.6
1	B	263	ALA	2.6
1	A	146	LYS	2.6
1	A	163	SER	2.6
1	B	22	GLN	2.6
1	B	188	LEU	2.6
1	A	243	ARG	2.6
1	B	135	ILE	2.6
1	B	28	GLY	2.6
1	B	278	HIS	2.6
1	B	164	LYS	2.6
1	B	294	PHE	2.5
1	B	38	GLU	2.5
1	B	33	LEU	2.5
1	B	109	GLU	2.5
1	B	275	VAL	2.5
1	B	55	LYS	2.5
1	B	178	ASN	2.5
1	B	59	VAL	2.5
1	B	131	ILE	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	309	PHE	2.5
1	B	241	ASP	2.4
1	A	57	ASP	2.4
1	B	252	SER	2.4
1	B	176	LYS	2.4
1	B	265	LEU	2.4
1	A	144	GLU	2.4
1	A	157	LYS	2.4
1	B	175	LYS	2.4
1	B	51	PRO	2.4
1	B	173	TYR	2.4
1	A	165	ALA	2.4
1	A	56	LYS	2.4
1	B	127	LYS	2.4
1	B	259	SER	2.4
1	B	229	THR	2.4
1	B	291	TYR	2.3
1	B	283	GLY	2.3
1	B	62	VAL	2.3
1	A	133	HIS	2.3
1	A	64	THR	2.3
1	B	70	LEU	2.3
1	B	125	ASP	2.3
1	B	220	ASP	2.3
1	B	221	MET	2.3
1	B	292	PHE	2.3
1	B	136	ILE	2.3
1	B	304	CYS	2.3
1	B	316	MET	2.3
1	B	281	TYR	2.3
1	B	254	ILE	2.2
1	A	247	VAL	2.2
1	B	187	ASN	2.2
1	B	239	HIS	2.2
1	B	137	CYS	2.2
1	B	36	ILE	2.1
1	B	147	ARG	2.1
1	A	23	THR	2.1
1	B	126	ARG	2.1
1	B	29	LYS	2.1
1	A	310	ASN	2.1
1	A	106	ARG	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	69	TYR	2.1
1	B	106	ARG	2.1
1	B	310	ASN	2.0
1	B	171	SER	2.0
1	B	209	SER	2.0
1	A	153	ASN	2.0
1	B	160	ARG	2.0
1	B	132	TYR	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.