



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 08:08 PM JST

PDB ID : 8H4O
Title : Crystal Structure of nucleotide-free Irgb6_T95D mutant
Authors : Saijo-Hamano, Y.; Okuma, H.; Sakai, N.; Kato, T.; Imasaki, T.; Nitta, R.
Deposited on : 2022-10-11
Resolution : 2.05 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

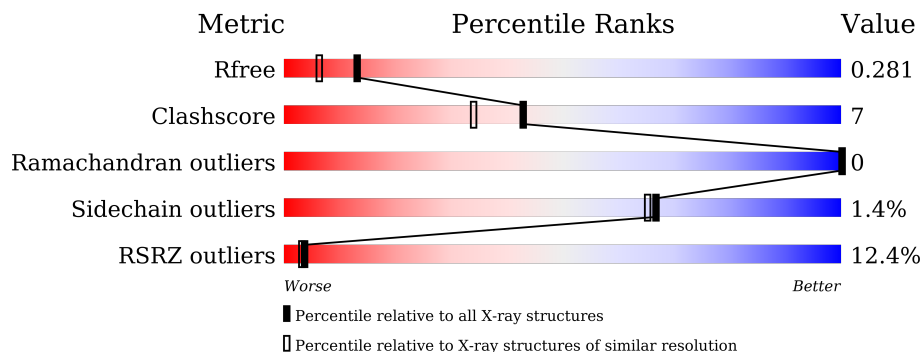
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.05 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	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (2.04-2.04)

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	417	 6% 82% 12% 5%
1	B	417	 17% 76% 18% 5%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6489 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 T-cell-specific guanine nucleotide triphosphate-binding protein 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	397	3197	2068	515	603	11	0	0	0
1	B	396	3195	2066	517	601	11	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP Q3T9E4
A	0	PRO	-	expression tag	UNP Q3T9E4
A	95	ASP	THR	engineered mutation	UNP Q3T9E4
B	-1	GLY	-	expression tag	UNP Q3T9E4
B	0	PRO	-	expression tag	UNP Q3T9E4
B	95	ASP	THR	engineered mutation	UNP Q3T9E4

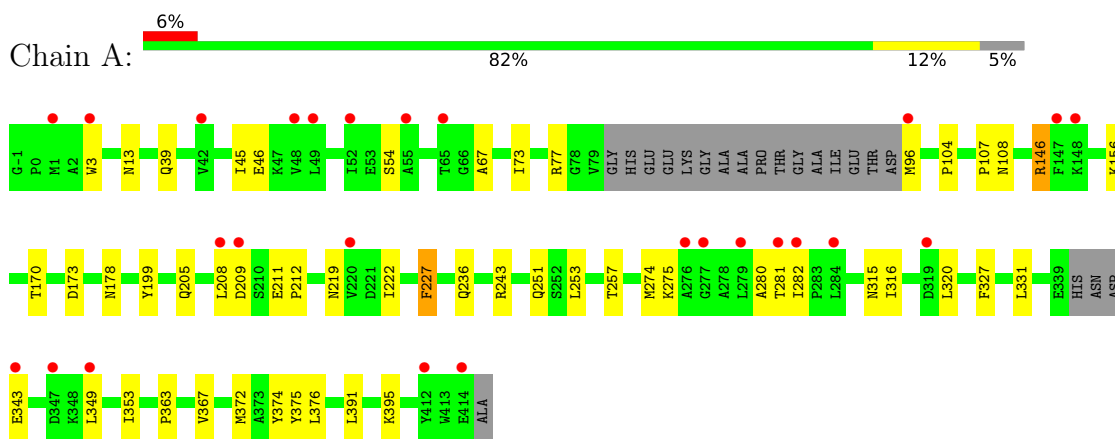
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	71	Total 71	O 71	0	0
2	B	26	Total 26	O 26	0	0

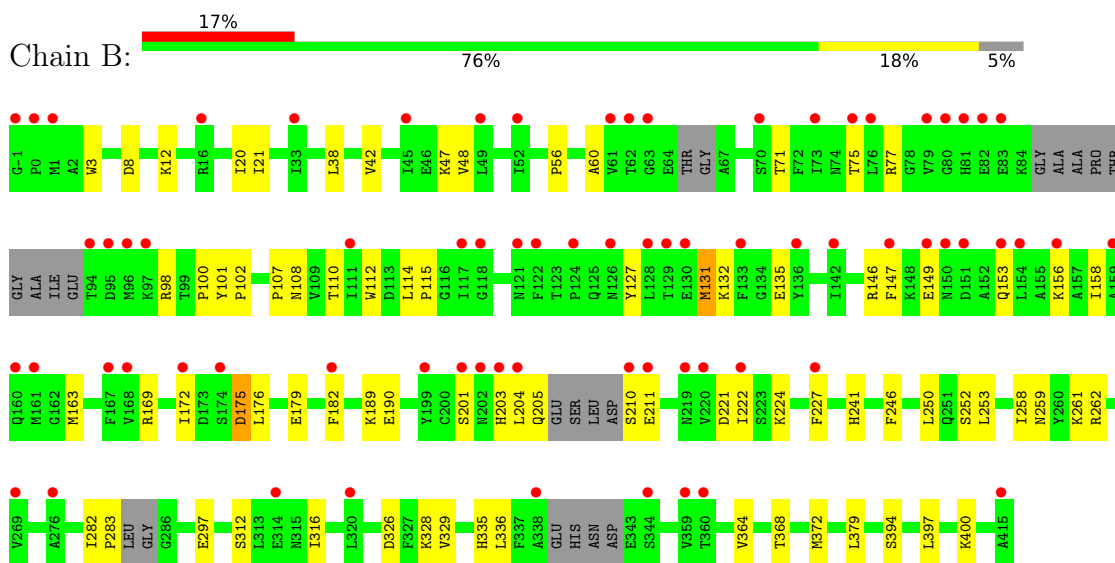
3 Residue-property plots [i](#)

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: T-cell-specific guanine nucleotide triphosphate-binding protein 2



- Molecule 1: T-cell-specific guanine nucleotide triphosphate-binding protein 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	71.53Å 80.61Å 147.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.55 – 2.05 40.55 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.3 (40.55-2.05) 99.3 (40.55-2.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.20 (at 2.05Å)	Xtrriage
Refinement program	PHENIX 1.20_4459: ???	Depositor
R, R_{free}	0.226 , 0.283 0.224 , 0.281	Depositor DCC
R_{free} test set	1999 reflections (3.68%)	wwPDB-VP
Wilson B-factor (Å ²)	46.8	Xtrriage
Anisotropy	0.239	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 52.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6489	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.10% 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	0/3271	0.58	0/4423
1	B	0.40	0/3267	0.57	0/4412
All	All	0.43	0/6538	0.57	0/8835

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	146	ARG	Sidechain

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	3197	0	3183	40	0
1	B	3195	0	3175	52	0
2	A	71	0	0	4	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	26	0	0	0	0
All	All	6489	0	6358	87	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 7.

All (87) 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:169:ARG:NH2	1:B:175:ASP:OD2	2.05	0.90
1:A:280:ALA:HB3	1:A:367:VAL:HG21	1.64	0.78
1:B:252:SER:HB3	1:B:258:ILE:HD11	1.65	0.78
1:A:236:GLN:O	2:A:501:HOH:O	2.08	0.72
1:A:349:LEU:HD11	1:A:376:LEU:HD21	1.72	0.72
1:B:397:LEU:HD23	1:B:397:LEU:O	1.93	0.69
1:A:243:ARG:NH2	2:A:501:HOH:O	2.24	0.69
1:B:282:ILE:HG13	1:B:283:PRO:HD2	1.75	0.67
1:A:96:MET:N	2:A:503:HOH:O	2.27	0.66
1:A:363:PRO:HG3	1:A:374:TYR:CD2	2.30	0.66
1:A:54:SER:HB3	1:B:107:PRO:HG3	1.78	0.66
1:B:210:SER:OG	1:B:211:GLU:N	2.26	0.65
1:B:190:GLU:OE1	1:B:190:GLU:N	2.31	0.63
1:B:328:LYS:O	1:B:335:HIS:NE2	2.33	0.62
1:B:201:SER:HA	1:B:204:LEU:HD12	1.82	0.60
1:A:349:LEU:HD13	1:A:372:MET:SD	2.42	0.60
1:B:149:GLU:HG2	1:B:203:HIS:NE2	2.18	0.59
1:B:3:TRP:CZ3	1:B:38:LEU:HD21	2.38	0.58
1:A:107:PRO:HB3	1:B:100:PRO:HB2	1.87	0.57
1:B:21:ILE:HG22	1:B:48:VAL:HG11	1.87	0.56
1:A:45:ILE:HD13	1:A:274:MET:HE2	1.87	0.56
1:B:336:LEU:HD21	1:B:379:LEU:HG	1.90	0.54
1:B:259:ASN:OD1	1:B:262:ARG:NH1	2.41	0.53
1:A:251:GLN:O	1:A:257:THR:HG21	2.08	0.53
1:B:149:GLU:O	1:B:153:GLN:HG2	2.09	0.53
1:B:98:ARG:NH1	1:B:132:LYS:HD2	2.24	0.52
1:A:73:ILE:O	1:A:77:ARG:HG3	2.08	0.52
1:B:326:ASP:O	1:B:329:VAL:HG12	2.10	0.52
1:A:320:LEU:HD21	1:A:395:LYS:HA	1.91	0.52
1:A:251:GLN:CB	1:A:253:LEU:HD23	2.40	0.52
1:A:67:ALA:O	1:A:170:THR:HG21	2.11	0.51
1:B:115:PRO:O	1:B:127:TYR:OH	2.17	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:222:ILE:HB	1:B:227:PHE:CD1	2.46	0.51
1:B:77:ARG:NH2	1:B:101:TYR:HD2	2.09	0.50
1:A:282:ILE:CG2	1:B:42:VAL:HG11	2.42	0.50
1:A:222:ILE:HG22	1:A:227:PHE:CE2	2.46	0.50
1:B:222:ILE:HD11	1:B:253:LEU:HB2	1.94	0.50
1:A:77:ARG:HB3	1:A:104:PRO:HD3	1.94	0.49
1:B:115:PRO:HD2	1:B:131:MET:CE	2.42	0.49
1:A:170:THR:OG1	1:A:219:ASN:OD1	2.24	0.48
1:A:327:PHE:CE2	1:A:331:LEU:HD11	2.49	0.48
1:A:39:GLN:CD	1:B:282:ILE:HD11	2.34	0.48
1:B:246:PHE:O	1:B:250:LEU:HD22	2.13	0.47
1:A:349:LEU:HD11	1:A:376:LEU:CD2	2.43	0.47
1:A:205:GLN:HG2	1:A:211:GLU:HA	1.95	0.47
1:B:169:ARG:HG3	1:B:172:ILE:HD11	1.97	0.47
1:A:280:ALA:O	1:A:367:VAL:HG22	2.16	0.46
1:A:316:ILE:CD1	1:A:391:LEU:HD13	2.45	0.46
1:A:178:ASN:ND2	2:A:502:HOH:O	2.15	0.46
1:A:251:GLN:HB2	1:A:253:LEU:HD23	1.97	0.46
1:B:146:ARG:HG3	1:B:147:PHE:N	2.30	0.46
1:B:221:ASP:HB3	1:B:224:LYS:CD	2.45	0.46
1:B:250:LEU:O	1:B:261:LYS:NZ	2.42	0.46
1:B:176:LEU:HD21	1:B:189:LYS:HG3	1.98	0.45
1:B:60:ALA:HB1	1:B:114:LEU:HD22	1.97	0.45
1:B:71:THR:O	1:B:75:THR:OG1	2.25	0.45
1:B:312:SER:O	1:B:316:ILE:HD12	2.17	0.45
1:A:208:LEU:HD12	1:A:212:PRO:HG3	1.98	0.45
1:B:179:GLU:HA	1:B:182:PHE:HD2	1.80	0.45
1:B:8:ASP:OD2	1:B:12:LYS:NZ	2.40	0.44
1:B:158:ILE:HG23	1:B:163:MET:HB2	1.99	0.44
1:B:368:THR:HG22	1:B:372:MET:CE	2.48	0.44
1:B:156:LYS:HD2	1:B:156:LYS:HA	1.80	0.44
1:A:46:GLU:HG2	1:A:275:LYS:HG3	2.00	0.44
1:B:20:ILE:O	1:B:241:HIS:HD2	2.01	0.44
1:B:169:ARG:HG3	1:B:172:ILE:CD1	2.48	0.44
1:A:282:ILE:HG21	1:B:42:VAL:HG11	2.00	0.43
1:A:353:ILE:HG12	1:A:375:TYR:CD2	2.54	0.43
1:A:173:ASP:OD1	1:A:173:ASP:N	2.47	0.43
1:A:108:ASN:OD1	1:A:108:ASN:N	2.46	0.42
1:B:297:GLU:HA	1:B:297:GLU:OE1	2.18	0.42
1:B:56:PRO:HA	1:B:108:ASN:HB3	2.02	0.42
1:B:205:GLN:OE1	1:B:211:GLU:HG2	2.20	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:3:TRP:NE1	1:B:364:VAL:HB	2.34	0.42
1:A:343:GLU:O	1:A:343:GLU:HG2	2.20	0.42
1:B:189:LYS:HB3	1:B:190:GLU:OE1	2.20	0.42
1:A:320:LEU:HD23	1:A:320:LEU:HA	1.87	0.41
1:A:349:LEU:HD23	1:A:349:LEU:HA	1.84	0.41
1:B:132:LYS:HB3	1:B:135:GLU:HG3	2.01	0.41
1:A:146:ARG:HD3	1:A:199:TYR:CE1	2.56	0.41
1:B:102:PRO:HA	1:B:110:THR:HA	2.02	0.41
1:B:368:THR:HG22	1:B:372:MET:HE3	2.02	0.41
1:A:327:PHE:HE2	1:A:331:LEU:HD11	1.86	0.41
1:A:316:ILE:H	1:A:316:ILE:HG13	1.59	0.40
1:A:3:TRP:CD1	1:A:3:TRP:N	2.87	0.40
1:B:47:LYS:HD3	1:B:47:LYS:HA	1.88	0.40
1:B:100:PRO:HB3	1:B:112:TRP:CH2	2.56	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	391/417 (94%)	381 (97%)	10 (3%)	0	100	100
1	B	384/417 (92%)	371 (97%)	13 (3%)	0	100	100
All	All	775/834 (93%)	752 (97%)	23 (3%)	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	352/365 (96%)	346 (98%)	6 (2%)	60	57
1	B	351/365 (96%)	347 (99%)	4 (1%)	73	73
All	All	703/730 (96%)	693 (99%)	10 (1%)	67	65

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ASN
1	A	156	LYS
1	A	209	ASP
1	A	227	PHE
1	A	281	THR
1	A	315	ASN
1	B	131	MET
1	B	175	ASP
1	B	394	SER
1	B	400	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN
1	A	236	GLN
1	B	39	GLN
1	B	108	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 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, 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	397/417 (95%)	0.49	26 (6%) 18 20	32, 49, 73, 88	0
1	B	396/417 (94%)	1.09	72 (18%) 1 1	36, 61, 98, 117	0
All	All	793/834 (95%)	0.79	98 (12%) 4 3	32, 54, 91, 117	0

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	160	GLN	6.0
1	B	94	THR	5.8
1	B	203	HIS	5.1
1	B	360	THR	5.0
1	B	124	PRO	4.8
1	B	359	VAL	4.7
1	B	118	GLY	4.7
1	B	210	SER	4.6
1	B	121	ASN	4.6
1	A	343	GLU	4.4
1	B	-1	GLY	4.3
1	B	81	HIS	4.2
1	B	199	TYR	4.2
1	B	128	LEU	4.2
1	B	220	VAL	4.1
1	B	202	ASN	4.1
1	B	97	LYS	4.0
1	B	149	GLU	4.0
1	B	142	ILE	3.8
1	B	95	ASP	3.8
1	B	172	ILE	3.8
1	B	147	PHE	3.8
1	A	147	PHE	3.7
1	B	1	MET	3.7

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	3.6
1	B	161	MET	3.6
1	B	75	THR	3.6
1	B	122	PHE	3.5
1	B	117	ILE	3.5
1	B	344	SER	3.5
1	A	3	TRP	3.5
1	A	96	MET	3.4
1	B	62	THR	3.4
1	B	96	MET	3.4
1	B	79	VAL	3.4
1	B	219	ASN	3.3
1	B	80	GLY	3.3
1	B	82	GLU	3.2
1	B	133	PHE	3.2
1	A	52	ILE	3.1
1	B	0	PRO	3.1
1	B	156	LYS	3.1
1	A	414	GLU	3.1
1	B	227	PHE	3.1
1	A	282	ILE	3.1
1	A	65	THR	3.0
1	B	76	LEU	3.0
1	B	111	ILE	3.0
1	B	338	ALA	3.0
1	A	319	ASP	2.9
1	B	49	LEU	2.9
1	B	45	ILE	2.9
1	B	73	ILE	2.8
1	B	159	ALA	2.8
1	B	63	GLY	2.8
1	A	49	LEU	2.8
1	B	83	GLU	2.7
1	A	48	VAL	2.7
1	A	281	THR	2.7
1	B	126	ASN	2.7
1	B	276	ALA	2.7
1	B	154	LEU	2.7
1	B	52	ILE	2.7
1	A	148	LYS	2.6
1	B	182	PHE	2.6
1	B	201	SER	2.6

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	42	VAL	2.6
1	B	168	VAL	2.5
1	B	314	GLU	2.5
1	A	412	TYR	2.5
1	B	167	PHE	2.4
1	B	222	ILE	2.4
1	B	129	THR	2.4
1	B	70	SER	2.4
1	A	284	LEU	2.4
1	A	276	ALA	2.4
1	B	150	ASN	2.3
1	A	220	VAL	2.3
1	B	61	VAL	2.3
1	A	208	LEU	2.3
1	B	16	ARG	2.3
1	B	174	SER	2.2
1	B	211	GLU	2.2
1	B	151	ASP	2.2
1	B	269	VAL	2.2
1	A	209	ASP	2.2
1	B	153	GLN	2.1
1	A	277	GLY	2.1
1	B	136	TYR	2.1
1	A	349	LEU	2.1
1	A	55	ALA	2.1
1	B	130	GLU	2.0
1	A	279	LEU	2.0
1	B	33	ILE	2.0
1	B	204	LEU	2.0
1	B	320	LEU	2.0
1	B	415	ALA	2.0
1	A	347	ASP	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

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.