



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2026 – 08:42 AM UTC

PDB ID : 5DD6 / pdb_00005dd6
Title : Crystal structures in an anti-HIV antibody lineage from immunization of Rhesus macaques
Authors : Nicely, N.I.; Pemble IV, C.W.; Haynes, B.F.
Deposited on : 2015-08-24
Resolution : 1.70 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

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

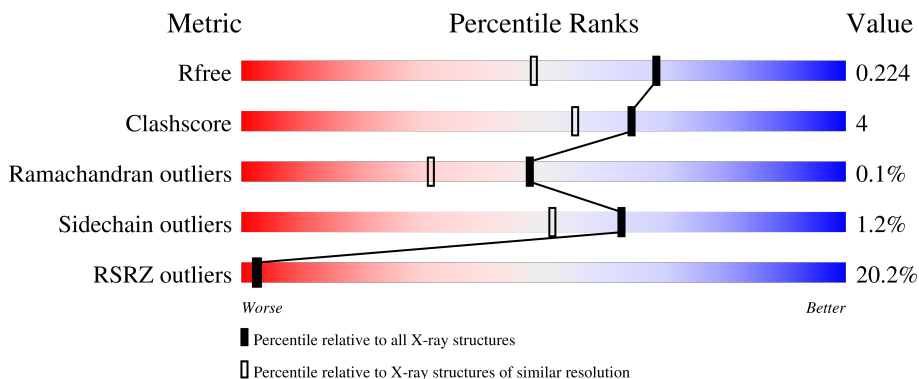
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	180053	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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 ≥ 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	233	46% 79% 12% 9%
1	H	233	15% 82% 11% 6%
2	B	214	8% 92% 7%
2	L	214	6% 91% 8%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6775 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 ANTI-HIV ANTIBODY DH570.mut58 FAB HEAVY CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	H	219	Total	C	N	O	S	0	5	0
			1685	1072	276	333	4			
1	A	213	Total	C	N	O	S	0	0	0
			1607	1027	263	313	4			

- Molecule 2 is a protein called ANTI-HIV ANTIBODY DH570.mut58 FAB LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	213	Total	C	N	O	S	0	2	0
			1629	1023	267	335	4			
2	B	213	Total	C	N	O	S	0	4	0
			1642	1030	269	339	4			

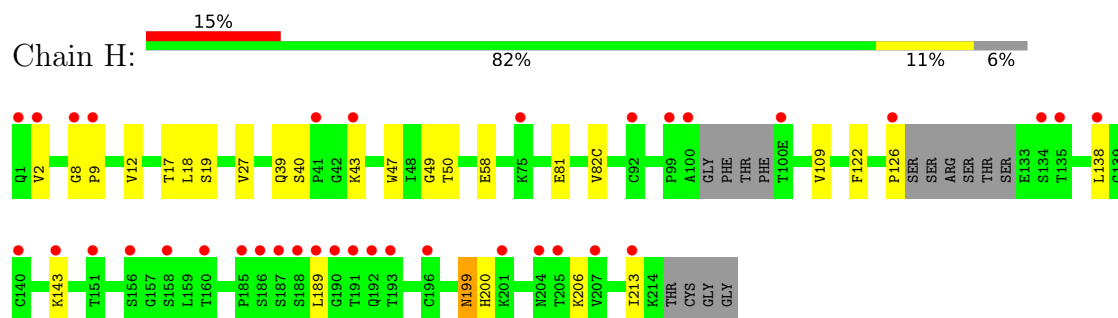
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	H	67	Total	O	0	0
			67	67		
3	L	76	Total	O	0	0
			76	76		
3	A	9	Total	O	0	0
			9	9		
3	B	60	Total	O	0	0
			60	60		

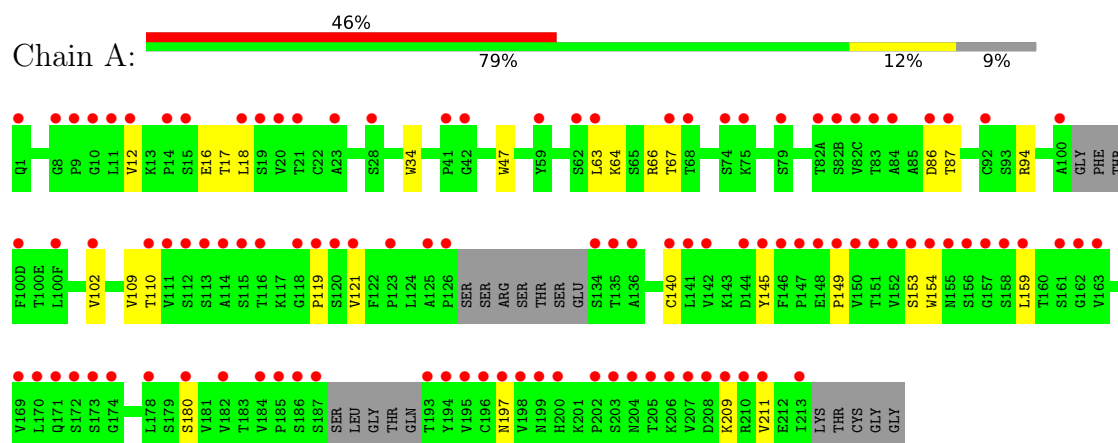
3 Residue-property plots [i](#)

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.

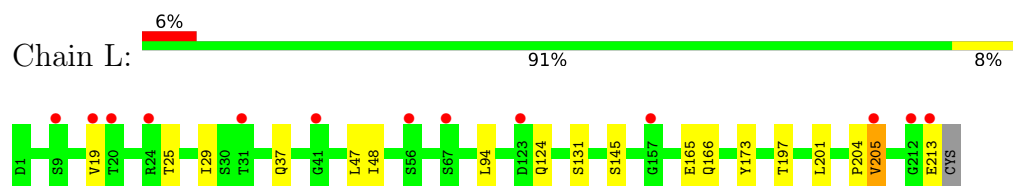
- Molecule 1: ANTI-HIV ANTIBODY DH570.mut58 FAB HEAVY CHAIN



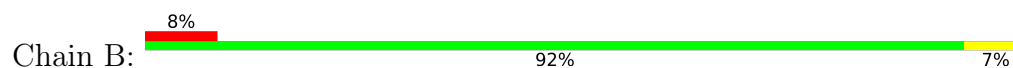
- Molecule 1: ANTI-HIV ANTIBODY DH570.mut58 FAB HEAVY CHAIN

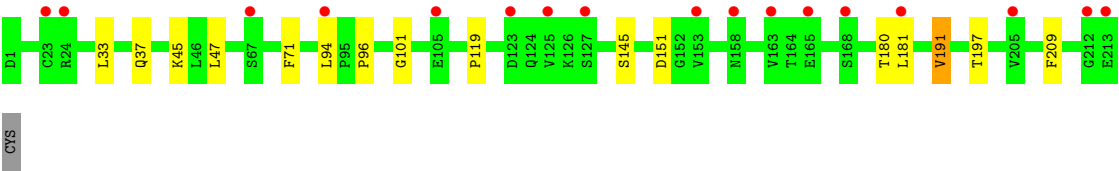


- Molecule 2: ANTI-HIV ANTIBODY DH570.mut58 FAB LIGHT CHAIN



- Molecule 2: ANTI-HIV ANTIBODY DH570.mut58 FAB LIGHT CHAIN





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	54.56Å 66.13Å 73.35Å 116.94° 104.73° 92.90°	Depositor
Resolution (Å)	29.39 – 1.70 29.39 – 1.70	Depositor EDS
% Data completeness (in resolution range)	92.0 (29.39-1.70) 92.1 (29.39-1.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.82 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.191 , 0.224 0.193 , 0.224	Depositor DCC
R_{free} test set	1982 reflections (2.07%)	wwPDB-VP
Wilson B-factor (Å ²)	20.3	Xtriage
Anisotropy	0.760	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6775	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.62% 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	0.35	0/1650	0.76	0/2255
1	H	0.45	0/1728	0.75	2/2362 (0.1%)
2	B	0.44	0/1677	0.74	1/2287 (0.0%)
2	L	0.43	0/1664	0.75	0/2269
All	All	0.42	0/6719	0.75	3/9173 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	8	GLY	CA-C-N	5.21	124.91	119.64
1	H	8	GLY	C-N-CA	5.21	124.91	119.64
2	B	101	GLY	N-CA-C	5.17	118.73	112.48

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	1607	0	1575	15	0
1	H	1685	0	1653	19	0
2	B	1642	0	1600	9	0
2	L	1629	0	1590	11	0
3	A	9	0	0	0	0
3	B	60	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	67	0	0	3	0
3	L	76	0	0	3	0
All	All	6775	0	6418	51	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 4.

All (51) 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:H:47:TRP:HE1	1:H:50[B]:THR:HG23	1.29	0.96
1:A:154:TRP:HH2	1:A:180:SER:HB2	1.49	0.76
1:A:121:VAL:O	1:A:209:LYS:NZ	2.29	0.65
1:H:39:GLN:NE2	3:H:302:HOH:O	2.30	0.62
2:L:213:GLU:OE1	3:L:301:HOH:O	2.16	0.62
1:A:12:VAL:HG21	1:A:18:LEU:HD13	1.84	0.60
1:H:189:LEU:HD13	1:H:213:ILE:HD11	1.85	0.59
1:A:154:TRP:CH2	1:A:180:SER:HB2	2.36	0.58
1:A:153:SER:OG	1:A:197:ASN:OD1	2.24	0.55
1:A:63:LEU:O	1:A:67:THR:HG22	2.07	0.54
1:H:199:ASN:OD1	1:H:206:LYS:NZ	2.38	0.54
2:L:145:SER:HB3	2:L:197:THR:OG1	2.08	0.53
2:L:37:GLN:HB2	2:L:47:LEU:HD11	1.91	0.53
1:H:18[A]:LEU:HD13	1:H:109:VAL:HG11	1.91	0.51
2:B:145:SER:HB2	2:B:197[A]:THR:OG1	2.10	0.51
1:A:119:PRO:HB3	1:A:145:TYR:HB3	1.94	0.49
2:L:25:THR:HG21	2:L:29:ILE:HD13	1.94	0.49
2:L:124:GLN:OE1	2:L:131:SER:N	2.43	0.49
1:A:16:GLU:HG2	1:A:17:THR:H	1.78	0.49
1:H:81[A]:GLU:HG2	3:H:329:HOH:O	2.13	0.48
1:H:50[B]:THR:HG22	3:H:335:HOH:O	2.13	0.48
2:L:197:THR:HG23	3:L:332:HOH:O	2.15	0.47
2:L:166:GLN:HG3	2:L:173:TYR:CZ	2.49	0.46
1:H:18[B]:LEU:HB2	1:H:82(C):VAL:HG11	1.98	0.46
1:A:66:ARG:HH22	1:A:86:ASP:CG	2.23	0.46
1:H:12:VAL:HG21	1:H:18[A]:LEU:HD13	1.98	0.46
1:A:47:TRP:CH2	2:B:94:LEU:HD11	2.51	0.46
1:A:87:THR:HG23	1:A:110:THR:HA	1.97	0.45
2:B:37:GLN:HB2	2:B:47:LEU:HD11	1.98	0.45
2:L:201:LEU:HD13	2:L:205[A]:VAL:HG12	1.98	0.45
1:H:9:PRO:HD3	1:H:19:SER:O	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:2:VAL:HG22	1:H:27:VAL:HG11	1.99	0.44
1:H:126:PRO:HD3	1:H:138:LEU:HD23	2.00	0.44
1:A:34:TRP:CZ3	1:A:94:ARG:HB2	2.53	0.43
2:B:180:THR:O	2:B:181:LEU:HD23	2.18	0.43
1:H:40:SER:HB2	1:H:43:LYS:HD2	2.01	0.43
1:H:122:PHE:HE2	1:H:143:LYS:HE2	1.84	0.42
1:H:17:THR:CG2	1:H:81[A]:GLU:HG3	2.50	0.42
2:L:165:GLU:OE1	3:L:302:HOH:O	2.21	0.42
1:H:199:ASN:HD22	1:H:200:HIS:N	2.18	0.42
1:A:18:LEU:CD1	1:A:109:VAL:HG11	2.50	0.42
1:A:47:TRP:CE3	2:B:96:PRO:HD2	2.55	0.42
2:B:45:LYS:HB3	2:B:45:LYS:HE2	1.80	0.42
2:L:197:THR:HG22	2:L:204:PRO:HG3	2.02	0.41
2:B:119:PRO:HB3	2:B:209:PHE:CE2	2.56	0.41
1:A:64:LYS:HB3	1:A:64:LYS:HE2	1.96	0.41
1:H:47:TRP:CZ2	1:H:49:GLY:HA2	2.55	0.41
2:B:33:LEU:HD22	2:B:71:PHE:CG	2.55	0.41
1:H:122:PHE:CE2	1:H:143:LYS:HE2	2.56	0.41
2:B:151:ASP:HA	2:B:191:VAL:HG13	2.02	0.41
1:H:58:GLU:HB3	2:L:94:LEU:HD11	2.03	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	205/233 (88%)	200 (98%)	4 (2%)	1 (0%)	24	12
1	H	218/233 (94%)	215 (99%)	3 (1%)	0	100	100
2	B	215/214 (100%)	210 (98%)	5 (2%)	0	100	100
2	L	213/214 (100%)	206 (97%)	7 (3%)	0	100	100
All	All	851/894 (95%)	831 (98%)	19 (2%)	1 (0%)	48	31

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	149	PRO

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	185/201 (92%)	181 (98%)	4 (2%)	45	29
1	H	195/201 (97%)	194 (100%)	1 (0%)	81	76
2	B	193/190 (102%)	192 (100%)	1 (0%)	81	76
2	L	191/190 (100%)	187 (98%)	4 (2%)	47	30
All	All	764/782 (98%)	754 (99%)	10 (1%)	63	48

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

Mol	Chain	Res	Type
1	H	199	ASN
2	L	19	VAL
2	L	48	ILE
2	L	205[A]	VAL
2	L	205[B]	VAL
1	A	102	VAL
1	A	140	CYS
1	A	159	LEU
1	A	211	VAL
2	B	191	VAL

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

Mol	Chain	Res	Type
1	H	164	HIS
2	L	138	ASN
1	A	171	GLN
2	B	137	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	213/233 (91%)	2.20	107 (50%) 0 0	29, 59, 88, 103	0
1	H	219/233 (93%)	0.94	36 (16%) 4 4	10, 31, 63, 77	5 (2%)
2	B	213/214 (99%)	0.76	17 (7%) 18 19	10, 32, 52, 78	4 (1%)
2	L	213/214 (99%)	0.66	13 (6%) 27 29	11, 32, 48, 78	2 (0%)
All	All	858/894 (95%)	1.14	173 (20%) 3 2	10, 36, 74, 103	11 (1%)

All (173) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	190	GLY	6.9
1	A	154	TRP	6.7
1	A	100(D)	PHE	6.6
1	A	126	PRO	6.5
1	A	100	ALA	5.1
1	A	14	PRO	4.9
1	A	195	VAL	4.9
1	A	198	VAL	4.8
1	A	116	THR	4.7
1	H	213	ILE	4.5
1	A	196	CYS	4.4
1	H	100(E)	THR	4.4
1	A	197	ASN	4.3
1	A	21	THR	4.3
1	A	115	SER	4.3
1	A	9	PRO	4.1
1	A	206	LYS	4.1
1	H	188	SER	4.0
1	A	172	SER	4.0
1	H	191	THR	3.9
1	A	186	SER	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	156	SER	3.8
1	A	152	VAL	3.8
1	A	199	ASN	3.8
1	H	100	ALA	3.8
1	A	209	LYS	3.7
1	A	170	LEU	3.7
1	H	134	SER	3.7
1	A	92	CYS	3.7
1	A	15	SER	3.7
1	A	75	LYS	3.6
1	A	211	VAL	3.6
1	A	151	THR	3.6
1	A	180	SER	3.6
2	B	94	LEU	3.6
1	A	171	GLN	3.5
1	A	185	PRO	3.5
1	A	118	GLY	3.5
1	A	113	SER	3.4
1	A	110	THR	3.4
1	A	121	VAL	3.4
1	A	205	THR	3.4
1	A	149	PRO	3.4
1	A	84	ALA	3.3
1	A	155	ASN	3.3
1	A	210	ARG	3.3
2	B	24	ARG	3.3
1	A	213	ILE	3.3
1	A	135	THR	3.3
1	H	41	PRO	3.2
1	A	140	CYS	3.2
1	A	12	VAL	3.2
1	A	184	VAL	3.2
1	A	150	VAL	3.2
1	A	169	VAL	3.2
1	A	193	THR	3.2
1	H	192	GLN	3.2
2	B	181	LEU	3.2
1	A	134	SER	3.2
1	A	86	ASP	3.2
2	L	123	ASP	3.2
1	A	207	VAL	3.2
1	H	205	THR	3.2

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Mol	Chain	Res	Type	RSRZ
1	H	158	SER	3.1
1	A	83	THR	3.1
1	A	187	SER	3.1
1	A	200	HIS	3.1
1	A	111	VAL	3.1
1	A	194	TYR	3.1
1	H	189	LEU	3.1
1	A	67	THR	3.1
1	H	187	SER	3.1
1	A	125	ALA	3.0
2	B	67	SER	3.0
1	A	8	GLY	3.0
2	L	157	GLY	3.0
1	A	74	SER	3.0
1	A	147	PRO	3.0
1	A	114	ALA	2.9
1	A	153	SER	2.9
1	A	182	VAL	2.9
1	A	112	SER	2.9
1	A	82(C)	VAL	2.9
1	A	145	TYR	2.9
1	A	146	PHE	2.8
1	H	207	VAL	2.8
1	A	136	ALA	2.8
1	A	157	GLY	2.8
1	A	59	TYR	2.8
1	A	11	LEU	2.8
1	A	10	GLY	2.8
1	A	202	PRO	2.8
1	A	204	ASN	2.8
1	H	8	GLY	2.8
1	A	142	VAL	2.7
2	B	123	ASP	2.7
1	A	68	THR	2.7
1	A	203	SER	2.7
2	L	213	GLU	2.7
2	L	9	SER	2.7
1	H	185	PRO	2.7
1	H	143	LYS	2.7
2	B	23	CYS	2.6
1	H	99	PRO	2.6
1	H	193	THR	2.6

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Mol	Chain	Res	Type	RSRZ
1	H	160	THR	2.6
2	B	213	GLU	2.6
1	H	196	CYS	2.6
1	A	159	LEU	2.6
1	A	20	VAL	2.6
2	L	205[A]	VAL	2.6
1	A	158	SER	2.6
1	A	148	GLU	2.6
1	H	140	CYS	2.5
2	B	168	SER	2.5
1	A	208	ASP	2.5
1	H	204	ASN	2.5
2	B	163	VAL	2.5
1	A	28	SER	2.5
1	A	120	SER	2.5
1	A	41	PRO	2.5
2	L	41	GLY	2.5
1	A	62	SER	2.5
1	A	100(F)	LEU	2.4
1	A	123	PRO	2.4
1	H	135	THR	2.4
1	A	87	THR	2.4
1	A	42	GLY	2.4
2	B	212	GLY	2.4
1	A	82(B)	SER	2.4
1	A	178	LEU	2.4
1	H	151	THR	2.4
1	A	161	SER	2.3
1	A	174	GLY	2.3
1	H	9	PRO	2.3
1	H	126	PRO	2.3
2	L	31	THR	2.3
1	A	1	GLN	2.3
2	L	24	ARG	2.3
1	A	144	ASP	2.3
2	L	20	THR	2.3
1	H	1	GLN	2.3
1	H	75	LYS	2.3
1	H	201	LYS	2.3
2	L	56	SER	2.2
1	A	79	SER	2.2
2	L	67	SER	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	119	PRO	2.2
2	B	205	VAL	2.2
1	A	19	SER	2.2
1	H	43	LYS	2.2
2	B	158	ASN	2.2
1	A	82(A)	THR	2.2
1	A	18	LEU	2.1
1	A	63	LEU	2.1
1	H	156	SER	2.1
2	B	127	SER	2.1
2	B	105	GLU	2.1
1	H	2	VAL	2.1
1	A	23	ALA	2.1
1	A	141	LEU	2.1
2	B	125	VAL	2.1
2	B	153	VAL	2.1
1	H	92	CYS	2.1
1	H	186	SER	2.1
1	A	163	VAL	2.0
1	H	138	LEU	2.0
2	B	165	GLU	2.0
1	A	162	GLY	2.0
2	L	212	GLY	2.0
1	A	173	SER	2.0
1	A	102	VAL	2.0
2	L	19	VAL	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 ⓘ

There are no such residues in this entry.