



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:31 AM UTC

PDB ID : 6BRO / pdb_00006bro
Title : Crystal structure of ASK1-D3 ubiquitin ligase form1
Authors : Shabek, N.; Zheng, N.
Deposited on : 2017-11-30
Resolution : 2.50 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

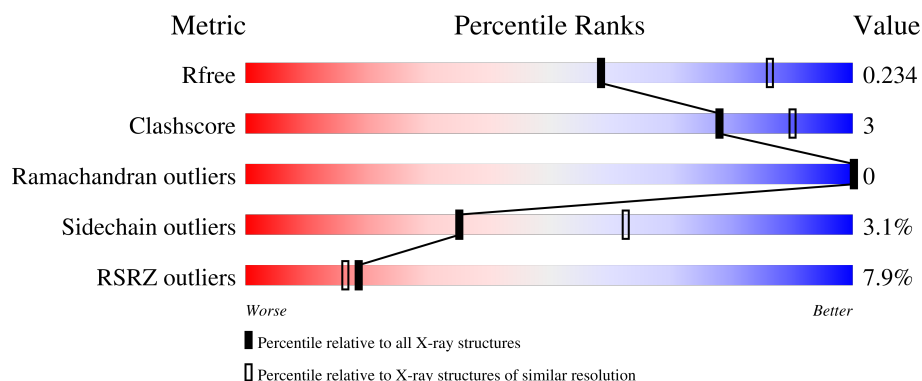
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	B	688	5% 82% 7% 11%
1	D	688	5% 82% 6% 11%
2	A	160	13% 59% 12% • 27%
2	C	160	16% 61% 11% • 27%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 11832 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 F-box/LRR-repeat MAX2 homolog.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	614	Total	C	N	O	S	0	0	0
			4766	3034	837	865	30			
1	D	610	Total	C	N	O	S	0	0	0
			4728	3011	827	861	29			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	509	GLU	-	cloning artifact	UNP Q5VMP0
B	510	ASN	-	cloning artifact	UNP Q5VMP0
B	511	LEU	-	cloning artifact	UNP Q5VMP0
B	512	TYR	-	cloning artifact	UNP Q5VMP0
B	513	PHE	-	cloning artifact	UNP Q5VMP0
B	514	GLN	-	cloning artifact	UNP Q5VMP0
B	515	SER	-	cloning artifact	UNP Q5VMP0
D	509	GLU	-	cloning artifact	UNP Q5VMP0
D	510	ASN	-	cloning artifact	UNP Q5VMP0
D	511	LEU	-	cloning artifact	UNP Q5VMP0
D	512	TYR	-	cloning artifact	UNP Q5VMP0
D	513	PHE	-	cloning artifact	UNP Q5VMP0
D	514	GLN	-	cloning artifact	UNP Q5VMP0
D	515	SER	-	cloning artifact	UNP Q5VMP0

- Molecule 2 is a protein called SKP1-like protein 1A.

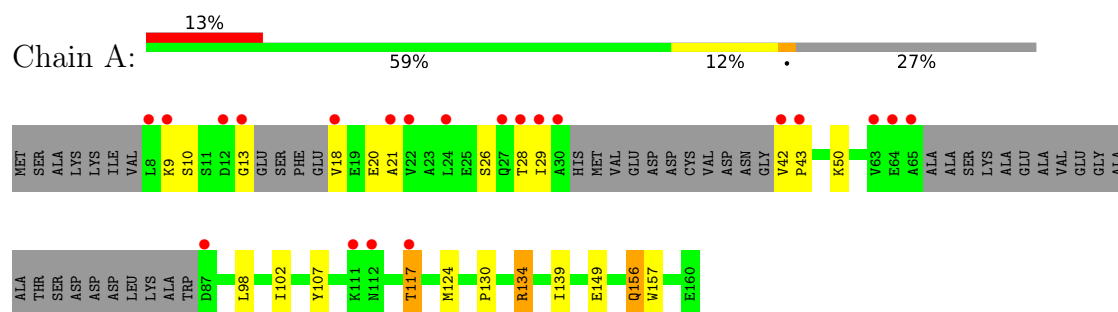
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	117	Total	C	N	O	S	0	0	0
			934	590	152	188	4			
2	C	117	Total	C	N	O	S	0	0	0
			938	594	152	188	4			

- Molecule 3 is water.

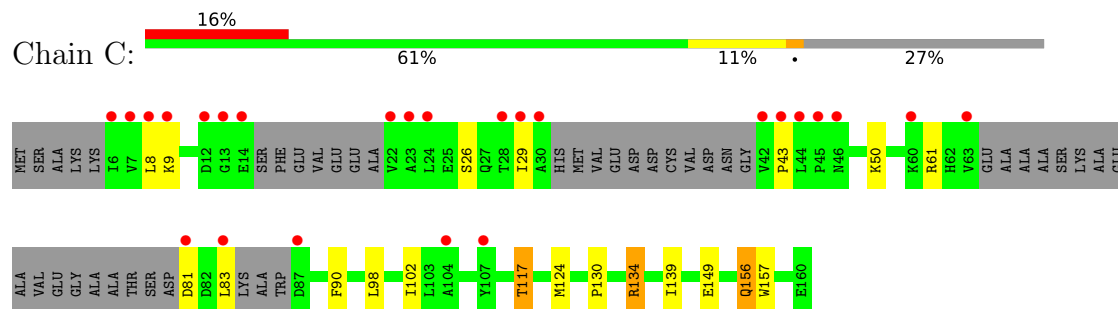
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	232	Total 232	O 232	0	0
3	A	21	Total 21	O 21	0	0
3	D	187	Total 187	O 187	0	0
3	C	26	Total 26	O 26	0	0

- Molecule 1: F-box/LRR-repeat MAX2 homolog





• Molecule 2: SKP1-like protein 1A



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	233.73Å 79.73Å 153.44Å 90.00° 128.59° 90.00°	Depositor
Resolution (Å)	119.93 – 2.50 119.93 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.6 (119.93-2.50) 98.6 (119.93-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.13	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.52 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.202 , 0.234 0.203 , 0.234	Depositor DCC
R_{free} test set	3700 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	30.5	Xtriage
Anisotropy	0.304	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 30.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.138 for -h-2*k,l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11832	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 4.05% 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	B	0.72	0/4874	0.95	1/6627 (0.0%)
1	D	0.71	0/4835	0.95	1/6574 (0.0%)
2	A	0.69	0/944	1.09	0/1272
2	C	0.66	0/947	1.07	0/1275
All	All	0.71	0/11600	0.97	2/15748 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	695	ASP	N-CA-C	7.13	118.70	111.07
1	B	695	ASP	N-CA-C	7.12	118.69	111.07

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	B	4766	0	4784	23	0
1	D	4728	0	4740	22	0
2	A	934	0	929	13	0
2	C	938	0	936	12	0
3	A	21	0	0	0	0
3	B	232	0	0	0	0
3	C	26	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	187	0	0	1	0
All	All	11832	0	11389	63	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 3.

All (63) 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)
2:A:102:ILE:HG12	2:A:117:THR:HG23	1.53	0.90
2:C:102:ILE:HG12	2:C:117:THR:HG23	1.54	0.89
2:A:134:ARG:HG3	2:A:139:ILE:HB	1.73	0.70
2:C:134:ARG:HG3	2:C:139:ILE:HB	1.73	0.69
1:B:70:PHE:HB2	2:A:157:TRP:CH2	2.30	0.67
1:B:565:ARG:HD3	1:B:566:PRO:HD2	1.78	0.65
1:D:647:VAL:HG11	1:D:667:GLU:HG3	1.78	0.64
1:B:647:VAL:HG11	1:B:667:GLU:HG3	1.78	0.63
1:D:410:LEU:O	1:D:436:THR:HG23	2.00	0.61
1:B:410:LEU:O	1:B:436:THR:HG23	2.01	0.61
1:D:70:PHE:HB2	2:C:157:TRP:CH2	2.37	0.60
2:A:28:THR:HG21	2:A:107:TYR:O	2.02	0.59
1:B:40:ARG:HG2	2:A:130:PRO:HD3	1.86	0.58
2:C:98:LEU:CD2	2:C:124:MET:HE1	2.35	0.56
2:A:98:LEU:CD2	2:A:124:MET:HE1	2.35	0.56
1:D:159:LEU:HD13	1:D:194:LEU:HG	1.89	0.55
1:D:40:ARG:HG2	2:C:130:PRO:HD3	1.87	0.54
1:B:159:LEU:HD13	1:B:194:LEU:HG	1.89	0.54
1:B:266:CYS:HB2	1:B:268:PHE:CE2	2.43	0.53
1:B:609:LEU:HD23	1:B:612:ARG:HH11	1.75	0.52
1:D:266:CYS:HB2	1:D:268:PHE:CE2	2.44	0.52
1:B:562:THR:HA	1:B:565:ARG:N	2.26	0.50
1:D:662:HIS:HA	1:D:685:ARG:O	2.11	0.50
1:B:662:HIS:HA	1:B:685:ARG:O	2.11	0.49
1:D:203:GLU:HG2	1:D:232:HIS:HB2	1.94	0.49
1:B:203:GLU:HG2	1:B:232:HIS:HB2	1.95	0.49
1:D:665:THR:HG22	1:D:667:GLU:H	1.78	0.48
2:C:9:LYS:HB2	2:C:43:PRO:HA	1.96	0.48
1:B:62:ARG:HH12	2:A:156:GLN:HG3	1.79	0.48
1:B:358:PHE:HD1	1:B:386:SER:HB3	1.79	0.48
2:A:9:LYS:HB2	2:A:43:PRO:HA	1.95	0.47
2:C:61:ARG:HH22	2:C:90:PHE:HB2	1.79	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:388:TYR:HE1	1:B:390:LYS:HG2	1.80	0.46
1:D:358:PHE:HD1	1:D:386:SER:HB3	1.79	0.46
1:B:566:PRO:HD3	1:B:610:TRP:CH2	2.51	0.45
2:A:26:SER:HB3	2:A:29:ILE:HD12	1.98	0.45
2:A:20:GLU:HG2	2:A:21:ALA:H	1.80	0.45
2:C:26:SER:HB3	2:C:29:ILE:HD12	1.97	0.45
1:D:369:LYS:HE3	3:D:969:HOH:O	2.16	0.45
1:D:559:ASP:HB2	1:D:561:ARG:HH21	1.82	0.44
1:D:388:TYR:HE1	1:D:390:LYS:HG2	1.81	0.44
1:D:227:THR:HG21	1:D:255:SER:HB3	2.00	0.44
2:C:61:ARG:NH2	2:C:90:PHE:HB2	2.33	0.44
2:A:102:ILE:HG12	2:A:117:THR:CG2	2.37	0.44
1:B:474:ASN:OD1	1:B:474:ASN:N	2.51	0.43
1:B:415:ILE:HD11	1:B:426:ILE:HD11	2.01	0.42
1:D:338:ASN:HD21	1:D:393:GLN:HE22	1.68	0.42
1:B:659:LEU:O	1:B:682:MET:HA	2.19	0.42
2:A:10:SER:HB3	2:A:13:GLY:H	1.85	0.42
1:D:659:LEU:O	1:D:682:MET:HA	2.20	0.42
1:D:62:ARG:HH12	2:C:156:GLN:HG3	1.83	0.42
1:B:260:ARG:HH22	1:B:290:ARG:CZ	2.33	0.41
1:B:227:THR:HG21	1:B:255:SER:HB3	2.01	0.41
1:D:415:ILE:HD11	1:D:426:ILE:HD11	2.03	0.41
1:B:338:ASN:HD21	1:B:393:GLN:HE22	1.67	0.41
1:D:659:LEU:HB3	1:D:682:MET:HG3	2.03	0.41
1:B:26:LEU:HD22	1:B:51:ALA:HA	2.03	0.41
1:D:26:LEU:HD22	1:D:51:ALA:HA	2.03	0.41
1:D:44:ALA:O	2:C:134:ARG:HD2	2.21	0.41
1:D:612:ARG:O	1:D:616:HIS:HB2	2.21	0.41
2:C:102:ILE:HG12	2:C:117:THR:CG2	2.38	0.41
1:B:689:TYR:HA	1:B:690:PRO:HA	1.85	0.40
2:A:42:VAL:N	2:A:43:PRO:HD3	2.36	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	B	600/688 (87%)	587 (98%)	13 (2%)	0	100	100
1	D	596/688 (87%)	584 (98%)	12 (2%)	0	100	100
2	A	109/160 (68%)	106 (97%)	3 (3%)	0	100	100
2	C	107/160 (67%)	105 (98%)	2 (2%)	0	100	100
All	All	1412/1696 (83%)	1382 (98%)	30 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	B	518/575 (90%)	506 (98%)	12 (2%)	44	72
1	D	513/575 (89%)	500 (98%)	13 (2%)	42	69
2	A	104/137 (76%)	98 (94%)	6 (6%)	18	38
2	C	106/137 (77%)	98 (92%)	8 (8%)	12	26
All	All	1241/1424 (87%)	1202 (97%)	39 (3%)	35	62

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	29	LEU
1	B	197	THR
1	B	227	THR
1	B	273	SER
1	B	306	ILE
1	B	380	VAL
1	B	386	SER
1	B	574	LEU
1	B	620	SER
1	B	641	SER

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Mol	Chain	Res	Type
1	B	682	MET
1	B	693	GLU
2	A	18	VAL
2	A	50	LYS
2	A	117	THR
2	A	134	ARG
2	A	149	GLU
2	A	156	GLN
1	D	29	LEU
1	D	197	THR
1	D	227	THR
1	D	235	LEU
1	D	273	SER
1	D	306	ILE
1	D	307	GLN
1	D	380	VAL
1	D	386	SER
1	D	574	LEU
1	D	592	GLU
1	D	682	MET
1	D	693	GLU
2	C	8	LEU
2	C	50	LYS
2	C	81	ASP
2	C	83	LEU
2	C	117	THR
2	C	134	ARG
2	C	149	GLU
2	C	156	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	393	GLN
1	B	666	HIS
1	B	694	ASN
2	A	95	GLN
2	A	109	ASN
2	A	156	GLN
1	D	393	GLN
1	D	444	HIS
1	D	474	ASN

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Mol	Chain	Res	Type
1	D	622	GLN
1	D	639	HIS
1	D	694	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	B	614/688 (89%)	-0.01	35 (5%)	29 26	20, 29, 65, 107	0
1	D	610/688 (88%)	0.03	34 (5%)	30 26	21, 31, 71, 108	0
2	A	117/160 (73%)	1.15	21 (17%)	3 3	24, 52, 104, 112	0
2	C	117/160 (73%)	1.15	25 (21%)	2 2	28, 56, 113, 119	0
All	All	1458/1696 (85%)	0.19	115 (7%)	18 16	20, 31, 89, 119	0

All (115) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	42	VAL	8.4
1	D	696	LEU	8.1
1	D	125	PRO	7.7
1	B	125	PRO	7.6
1	B	637	VAL	7.6
1	D	302	ALA	7.3
2	A	18	VAL	6.8
2	A	13	GLY	6.6
1	D	372	TRP	6.6
2	C	63	VAL	6.6
2	C	83	LEU	6.2
1	B	696	LEU	6.2
2	A	42	VAL	5.9
1	D	373	LEU	5.7
1	D	566	PRO	5.7
1	B	697	MET	5.6
1	B	373	LEU	5.6
1	B	302	ALA	5.6
2	A	21	ALA	5.5
2	A	63	VAL	5.4
1	B	560	CYS	5.3

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Mol	Chain	Res	Type	RSRZ
2	C	22	VAL	4.9
1	D	560	CYS	4.8
1	B	474	ASN	4.7
2	C	7	VAL	4.5
2	C	6	ILE	4.3
1	D	635	LYS	4.3
2	A	65	ALA	4.2
1	B	562	THR	4.1
2	A	24	LEU	4.0
1	B	103	PRO	4.0
1	B	561	ARG	3.9
2	C	14	GLU	3.8
1	B	372	TRP	3.8
2	A	30	ALA	3.7
1	B	565	ARG	3.7
1	D	669	PHE	3.6
2	A	28	THR	3.4
1	B	127	ALA	3.4
1	D	306	ILE	3.4
2	C	30	ALA	3.4
1	D	475	THR	3.3
1	D	666	HIS	3.3
2	A	87	ASP	3.2
1	D	75	HIS	3.2
2	A	64	GLU	3.2
1	D	127	ALA	3.2
2	C	24	LEU	3.2
1	B	126	GLU	3.2
1	B	669	PHE	3.1
1	D	634	ASP	3.1
2	A	9	LYS	3.1
1	D	568	PRO	3.1
2	A	8	LEU	3.1
2	C	87	ASP	3.1
1	D	561	ARG	3.1
1	D	5	GLU	3.0
1	B	128	ILE	2.9
2	C	43	PRO	2.9
2	A	27	GLN	2.9
2	C	107	TYR	2.9
1	D	670	MET	2.9
1	B	638	HIS	2.9

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Mol	Chain	Res	Type	RSRZ
1	D	374	HIS	2.9
2	C	8	LEU	2.8
2	C	12	ASP	2.8
2	A	43	PRO	2.8
1	D	668	HIS	2.8
1	D	567	ALA	2.7
2	C	13	GLY	2.7
1	B	594	VAL	2.7
1	B	371	SER	2.7
2	A	22	VAL	2.6
2	C	44	LEU	2.6
1	B	9	GLU	2.6
2	C	60	LYS	2.6
1	D	103	PRO	2.5
2	C	29	ILE	2.5
1	B	305	ASN	2.5
1	B	559	ASP	2.5
1	D	559	ASP	2.5
2	C	9	LYS	2.5
1	D	694	ASN	2.5
2	C	45	PRO	2.4
1	D	641	SER	2.4
2	C	23	ALA	2.4
1	B	476	THR	2.4
2	C	46	ASN	2.4
2	A	12	ASP	2.4
1	D	665	THR	2.3
2	A	111	LYS	2.3
1	D	474	ASN	2.3
2	A	112	ASN	2.3
1	B	76	ALA	2.3
1	B	622	GLN	2.3
1	D	695	ASP	2.3
1	B	5	GLU	2.3
1	D	300	PHE	2.3
1	D	639	HIS	2.2
1	D	667	GLU	2.2
1	B	567	ALA	2.2
2	C	104	ALA	2.2
1	B	374	HIS	2.2
1	B	633	GLN	2.2
1	B	667	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
2	C	28	THR	2.1
1	B	271	ARG	2.1
2	C	81	ASP	2.1
1	D	371	SER	2.1
1	B	102	PRO	2.1
1	B	75	HIS	2.1
2	A	117	THR	2.1
1	B	670	MET	2.1
1	D	301	GLU	2.0
2	A	29	ILE	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.