



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 08:33 AM UTC

PDB ID : 9CQJ / pdb\_00009cqj  
Title : CRYSTAL STRUCTURE OF GAGA-DOG HSP47(36-418) IN COMPLEX  
WITH ADNECTIN-53  
Authors : Sheriff, S.  
Deposited on : 2024-07-19  
Resolution : 2.08 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	:	4-5-2 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

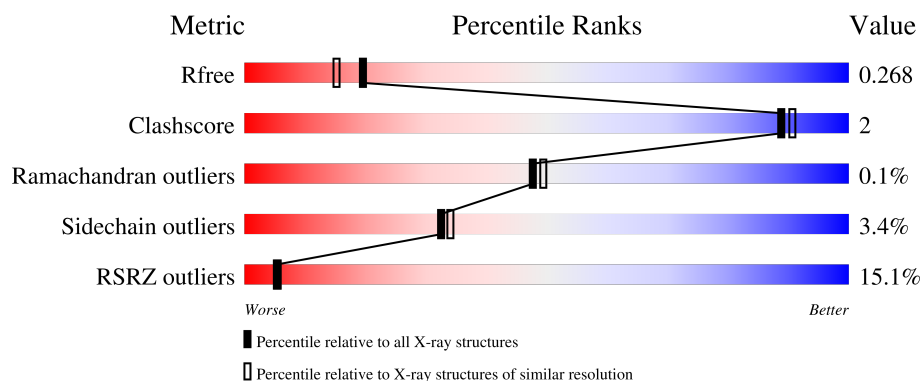
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.08 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	8172 (2.10-2.06)
Clashscore	190562	8714 (2.10-2.06)
Ramachandran outliers	187476	8641 (2.10-2.06)
Sidechain outliers	187428	8642 (2.10-2.06)
RSRZ outliers	180081	8177 (2.10-2.06)

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	387	
1	B	387	
2	D	103	
2	E	103	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14354 atoms, of which 7024 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 Serpin H1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	380	Total	C	H	N	O	S	2851	0	0
			5753	1851	2851	498	540	13			
1	B	377	Total	C	H	N	O	S	2837	0	0
			5715	1840	2837	490	536	12			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	32	GLY	-	expression tag	UNP C7C419
A	33	ALA	-	expression tag	UNP C7C419
A	34	GLY	-	expression tag	UNP C7C419
A	35	ALA	-	expression tag	UNP C7C419
B	32	GLY	-	expression tag	UNP C7C419
B	33	ALA	-	expression tag	UNP C7C419
B	34	GLY	-	expression tag	UNP C7C419
B	35	ALA	-	expression tag	UNP C7C419

- Molecule 2 is a protein called anti-HSP47 Adnectin-53.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	D	96	Total	C	H	N	O		671	0	0
			1396	463	671	118	144				
2	E	95	Total	C	H	N	O		665	0	0
			1380	456	665	117	142				

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	48	Total	O	0	1
			49	49		
3	B	25	Total	O	0	0
			25	25		

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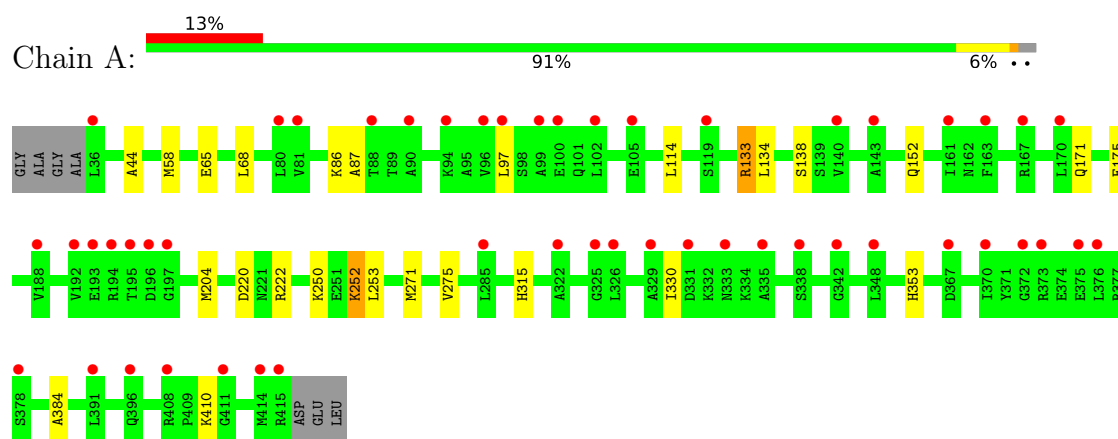
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	D	19	Total	O	0	0
			19	19		
3	E	17	Total	O	0	0
			17	17		

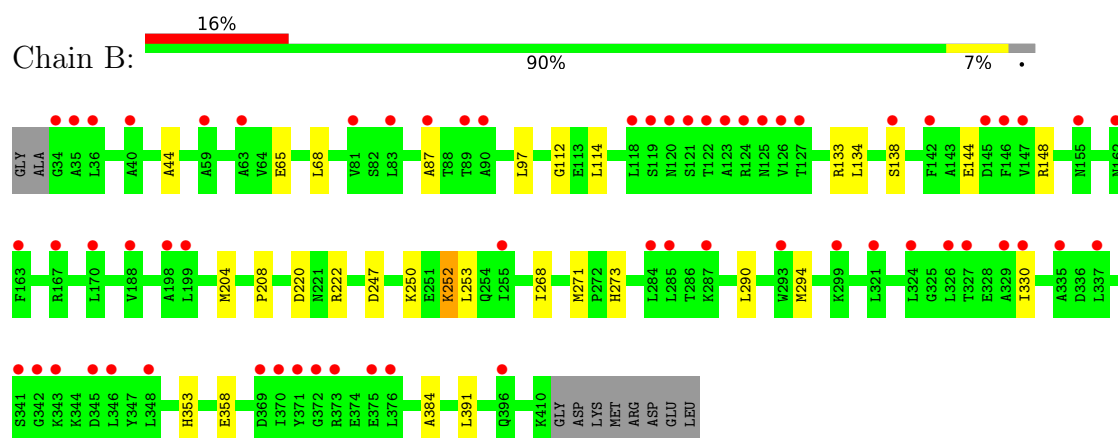
### 3 Residue-property plots [i](#)

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.

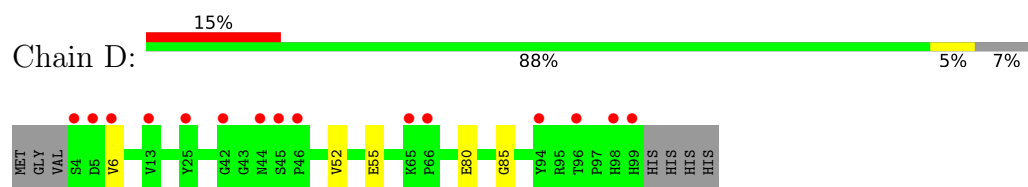
#### • Molecule 1: Serpin H1

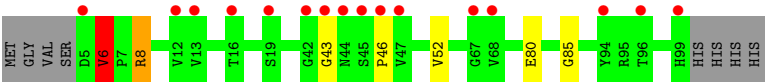
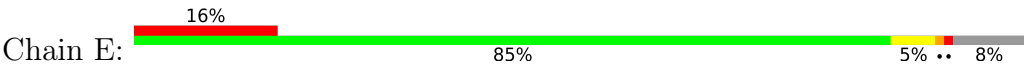


#### • Molecule 1: Serpin H1



#### • Molecule 2: anti-HSP47 Adnectin-53





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.81Å 129.06Å 78.22Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	78.22 – 2.08 78.22 – 2.08	Depositor EDS
% Data completeness (in resolution range)	87.2 (78.22-2.08) 87.2 (78.22-2.08)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.61 (at 2.07Å)	Xtriage
Refinement program	BUSTER 2.11.8	Depositor
R, $R_{free}$	0.248 , 0.273 (Not available) , 0.268	Depositor DCC
$R_{free}$ test set	2359 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	48.5	Xtriage
Anisotropy	0.018	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 38.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	14354	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.24% of the height of the origin peak. No significant pseudotranslation is detected.*

<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	0.77	2/2962 (0.1%)	0.98	0/4009
1	B	0.76	2/2938 (0.1%)	0.96	0/3977
2	D	0.77	0/747	0.99	0/1029
2	E	0.81	0/736	0.97	1/1014 (0.1%)
All	All	0.77	4/7383 (0.1%)	0.97	1/10029 (0.0%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	65	GLU	CA-C	7.12	1.56	1.52
1	B	65	GLU	CA-C	6.71	1.56	1.52
1	B	87	ALA	CA-C	6.16	1.61	1.52
1	A	87	ALA	CA-C	6.13	1.60	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	6	VAL	CB-CA-C	5.00	114.23	109.33

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	2902	2851	2852	11	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2878	2837	2837	12	0
2	D	725	671	671	1	1
2	E	715	665	665	3	0
3	A	49	0	0	0	0
3	B	25	0	0	1	0
3	D	19	0	0	0	0
3	E	17	0	0	0	0
All	All	7330	7024	7025	27	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 2.

All (27) 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:A:250:LYS:O	1:A:252:LYS:HE3	1.99	0.62
1:B:250:LYS:O	1:B:252:LYS:HE3	2.00	0.61
1:B:290:LEU:O	1:B:294:MET:HG2	2.02	0.60
2:E:43:GLY:O	2:E:46:PRO:HD3	2.03	0.58
1:B:220:ASP:OD1	1:B:222:ARG:HD3	2.04	0.58
1:A:220:ASP:OD1	1:A:222:ARG:HD3	2.03	0.58
1:B:144:GLU:O	1:B:148:ARG:HG2	2.05	0.57
1:A:58:MET:HE1	1:A:315:HIS:CG	2.41	0.54
2:D:80:GLU:O	2:D:85:GLY:HA3	2.10	0.52
2:E:80:GLU:O	2:E:85:GLY:HA3	2.11	0.50
1:A:271:MET:SD	1:A:384:ALA:HA	2.53	0.49
1:B:247:ASP:OD1	1:B:273:HIS:NE2	2.40	0.49
1:A:204:MET:HE1	1:A:353:HIS:CE1	2.47	0.48
1:A:58:MET:HE1	1:A:315:HIS:CE1	2.48	0.48
1:B:204:MET:HE1	1:B:353:HIS:CE1	2.48	0.47
1:B:271:MET:SD	1:B:384:ALA:HA	2.54	0.47
1:A:44:ALA:HB2	1:A:114:LEU:HD21	1.96	0.46
1:A:58:MET:HE1	1:A:315:HIS:CD2	2.51	0.46
1:A:58:MET:CE	1:A:315:HIS:ND1	2.79	0.45
1:B:44:ALA:HB2	1:B:114:LEU:HD21	1.99	0.45
1:B:208:PRO:HD2	1:B:358:GLU:O	2.18	0.44
1:B:112:GLY:HA3	3:B:516:HOH:O	2.19	0.43
1:A:58:MET:CE	1:A:315:HIS:CE1	3.02	0.42
1:B:268:ILE:CD1	1:B:294:MET:HE1	2.50	0.42
1:B:268:ILE:HD13	1:B:294:MET:HE1	2.01	0.42
1:A:171:GLN:O	1:A:175:GLU:HG2	2.19	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:6:VAL:O	2:E:8:ARG:HD3	2.20	0.41

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:133:ARG:HH22	2:D:55:GLU:OE1[2_555]	1.47	0.13

## 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	378/387 (98%)	362 (96%)	15 (4%)	1 (0%)	36	36
1	B	375/387 (97%)	360 (96%)	15 (4%)	0	100	100
2	D	94/103 (91%)	92 (98%)	2 (2%)	0	100	100
2	E	93/103 (90%)	90 (97%)	3 (3%)	0	100	100
All	All	940/980 (96%)	904 (96%)	35 (4%)	1 (0%)	48	49

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	410	LYS

### 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	300/328 (92%)	289 (96%)	11 (4%)	30	31
1	B	298/328 (91%)	289 (97%)	9 (3%)	36	39
2	D	74/86 (86%)	72 (97%)	2 (3%)	39	43
2	E	73/86 (85%)	70 (96%)	3 (4%)	27	27
All	All	745/828 (90%)	720 (97%)	25 (3%)	32	34

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	68	LEU
1	A	86	LYS
1	A	97	LEU
1	A	133	ARG
1	A	134	LEU
1	A	138	SER
1	A	152	GLN
1	A	252	LYS
1	A	253	LEU
1	A	275	VAL
1	A	330	ILE
1	B	68	LEU
1	B	97	LEU
1	B	133	ARG
1	B	134	LEU
1	B	138	SER
1	B	252	LYS
1	B	253	LEU
1	B	330	ILE
1	B	391	LEU
2	D	6	VAL
2	D	52	VAL
2	E	6	VAL
2	E	8	ARG
2	E	52	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	125	ASN

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Mol	Chain	Res	Type
1	A	320	HIS
1	A	353	HIS
1	B	209	HIS
1	B	320	HIS
1	B	353	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 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, 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	380/387 (98%)	0.90	50 (13%) <b>7</b> <b>7</b>	15, 26, 48, 59	0
1	B	377/387 (97%)	1.03	62 (16%) <b>4</b> <b>4</b>	16, 28, 52, 65	0
2	D	96/103 (93%)	1.14	15 (15%) <b>5</b> <b>5</b>	18, 28, 48, 60	0
2	E	95/103 (92%)	1.15	16 (16%) <b>4</b> <b>4</b>	17, 28, 45, 55	0
All	All	948/980 (96%)	1.00	143 (15%) <b>5</b> <b>5</b>	15, 27, 50, 65	0

All (143) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	163	PHE	5.7
1	B	126	VAL	5.5
1	A	99	ALA	4.7
1	B	342	GLY	4.6
2	D	42	GLY	4.6
2	D	4	SER	4.5
1	A	96	VAL	4.5
2	E	45	SER	4.4
1	B	122	THR	4.4
2	D	45	SER	4.3
1	B	163	PHE	4.2
1	B	346	LEU	4.1
2	E	99	HIS	4.1
1	B	125	ASN	4.0
1	B	145	ASP	3.9
1	B	326	LEU	3.8
1	B	198	ALA	3.8
2	E	5	ASP	3.8
2	E	43	GLY	3.8
2	D	96	THR	3.7
1	B	119	SER	3.6

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Mol	Chain	Res	Type	RSRZ
1	B	170	LEU	3.6
1	A	372	GLY	3.5
2	E	96	THR	3.5
1	B	188	VAL	3.4
1	B	123	ALA	3.4
1	B	118	LEU	3.4
1	A	192	VAL	3.3
1	A	375	GLU	3.2
1	B	287	LYS	3.2
1	A	195	THR	3.1
1	A	414	MET	3.1
1	B	329	ALA	3.1
2	D	44	ASN	3.1
2	D	46	PRO	3.1
1	B	337	LEU	3.1
1	B	348	LEU	3.1
1	A	329	ALA	3.0
1	A	97	LEU	3.0
1	B	371	TYR	3.0
1	B	120	ASN	3.0
1	A	94	LYS	3.0
1	B	376	LEU	2.9
2	D	5	ASP	2.9
1	B	142	PHE	2.9
1	A	102	LEU	2.8
1	B	121	SER	2.8
2	E	44	ASN	2.8
1	A	331	ASP	2.8
1	A	370	ILE	2.8
1	B	330	ILE	2.8
1	B	35	ALA	2.8
1	A	188	VAL	2.8
2	D	99	HIS	2.8
1	A	88	THR	2.8
1	B	343	LYS	2.8
1	B	124	ARG	2.7
1	B	40	ALA	2.7
1	A	376	LEU	2.7
1	A	170	LEU	2.7
2	D	13	VAL	2.7
1	A	119	SER	2.7
1	B	375	GLU	2.7

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Mol	Chain	Res	Type	RSRZ
2	E	46	PRO	2.7
1	A	161	ILE	2.7
1	B	370	ILE	2.7
1	B	199	LEU	2.6
1	B	34	GLY	2.6
1	B	87	ALA	2.6
1	A	140	VAL	2.6
1	A	90	ALA	2.6
2	E	42	GLY	2.6
1	B	63	ALA	2.6
1	A	196	ASP	2.6
1	B	369	ASP	2.6
1	B	324	LEU	2.6
1	A	333	ASN	2.5
1	B	327	THR	2.5
1	A	197	GLY	2.5
1	A	167	ARG	2.5
1	A	338	SER	2.5
1	B	147	VAL	2.5
1	B	138	SER	2.5
1	A	81	VAL	2.4
1	A	326	LEU	2.4
1	A	373	ARG	2.4
1	A	325	GLY	2.4
2	D	98	HIS	2.4
1	A	194	ARG	2.4
1	A	415	ARG	2.4
1	B	127	THR	2.4
2	E	16	THR	2.4
1	A	391	LEU	2.3
1	B	83	LEU	2.3
1	A	411	GLY	2.3
1	A	105	GLU	2.3
1	B	335	ALA	2.3
2	E	67	GLY	2.3
2	D	65	LYS	2.3
1	B	255	ILE	2.3
2	E	12	VAL	2.3
1	B	89	THR	2.3
1	A	143	ALA	2.3
1	B	284	LEU	2.3
1	A	378	SER	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	341	SER	2.3
2	E	47	VAL	2.3
1	B	90	ALA	2.3
1	A	36	LEU	2.3
1	B	36	LEU	2.3
1	A	408	ARG	2.2
1	A	335	ALA	2.2
1	A	342	GLY	2.2
1	A	193	GLU	2.2
1	B	155	ASN	2.2
1	B	81	VAL	2.2
1	B	345	ASP	2.2
1	A	100	GLU	2.2
1	B	285	LEU	2.2
1	B	167	ARG	2.2
1	B	373	ARG	2.2
1	B	146	PHE	2.2
1	A	396	GLN	2.1
1	B	299	LYS	2.1
2	E	94	TYR	2.1
2	E	13	VAL	2.1
2	E	19	SER	2.1
2	D	6	VAL	2.1
2	E	68	VAL	2.1
1	A	322	ALA	2.1
1	A	80	LEU	2.1
1	B	321	LEU	2.1
2	D	25	TYR	2.1
1	A	285	LEU	2.0
1	A	348	LEU	2.0
1	B	162	ASN	2.0
1	A	367	ASP	2.0
1	B	59	ALA	2.0
1	B	293	TRP	2.0
1	B	396	GLN	2.0
2	D	66	PRO	2.0
1	B	372	GLY	2.0
2	D	94	TYR	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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.