



Full wwPDB NMR Structure Validation Report ⓘ

Mar 5, 2026 – 11:51 AM UTC

PDB ID : 2BPR / pdb_00002bpr
Title : NMR STRUCTURE OF THE SUBSTRATE BINDING DOMAIN OF DNAK,
25 STRUCTURES
Authors : Wang, H.; Kurochkin, A.V.; Pang, Y.; Hu, W.; Flynn, G.C.; Zuiderweg, E.R.P.
Deposited on : 1998-08-11

This is a Full wwPDB NMR 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/NMRValidationReportHelp>

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
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
wwPDB-ShiftChecker : v1.2
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

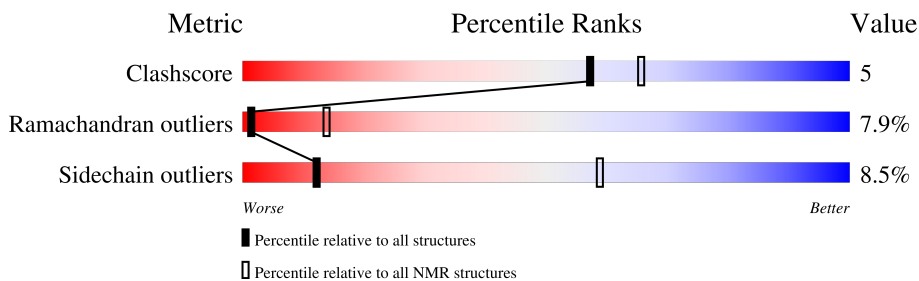
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	191	

2 Ensemble composition and analysis

This entry contains 25 models. Model 8 is the overall representative, medoid model (most similar to other models).

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:386-A:546 (161)	1.84	8

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 3 clusters and 2 single-model clusters were found.

Cluster number	Models
1	1, 3, 4, 7, 12, 17, 20, 21, 22, 25
2	2, 6, 8, 9, 10, 11, 13, 14, 15
3	5, 18, 19, 23
Single-model clusters	16; 24

3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 2656 atoms, of which 1331 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called DNAK.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	173	2656	812	1331	239	270	4	0

There are 4 discrepancies between the modelled and reference sequences:

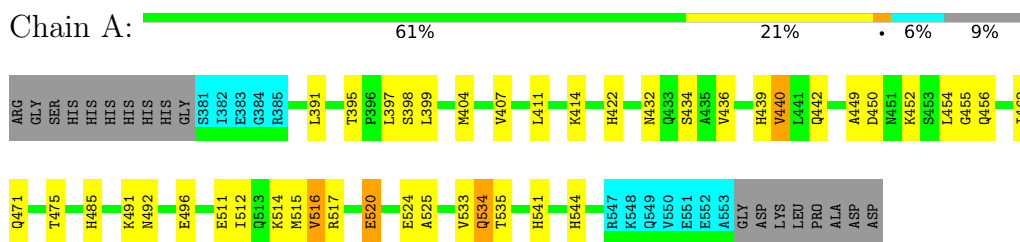
Chain	Residue	Modelled	Actual	Comment	Reference
A	381	SER	VAL	conflict	UNP P0A6Y8
A	382	ILE	LEU	conflict	UNP P0A6Y8
A	383	GLU	THR	conflict	UNP P0A6Y8
A	385	ARG	ASP	conflict	UNP P0A6Y8

4 Residue-property plots [i](#)

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: DNAK

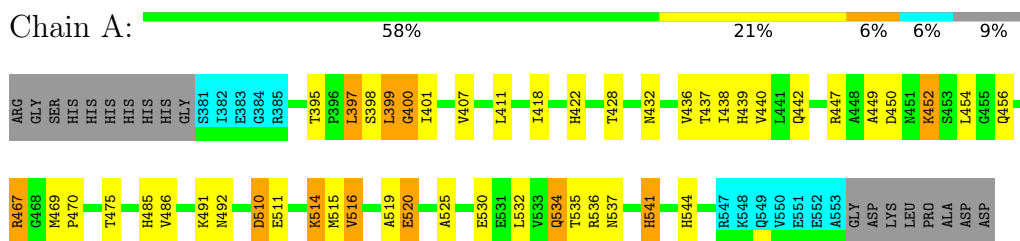


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

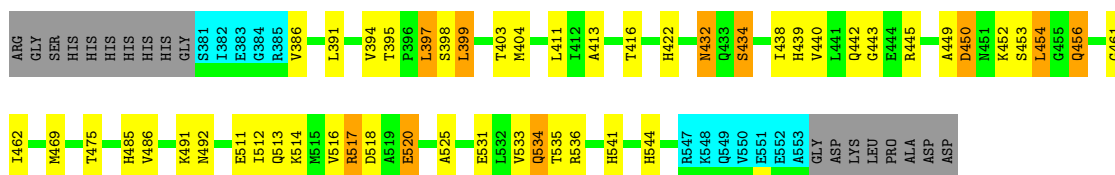
- Molecule 1: DNAK



4.2.2 Score per residue for model 2

- Molecule 1: DNAK

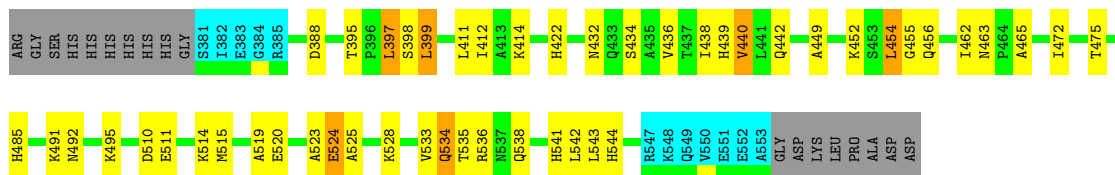




4.2.3 Score per residue for model 3

- Molecule 1: DNAK

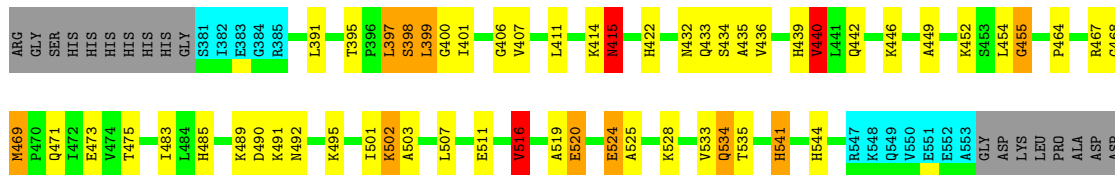
Chain A: 59% 23% 6% 9%



4.2.4 Score per residue for model 4

- Molecule 1: DNAK

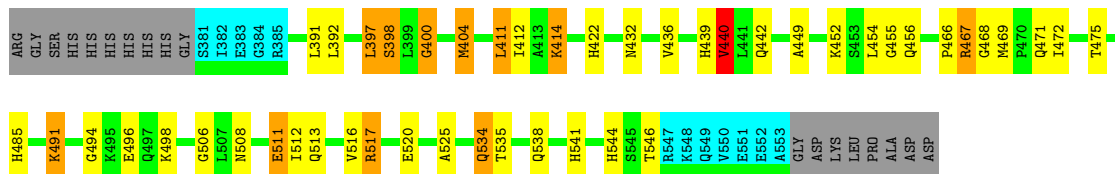
Chain A: 55% 23% 5% 6% 9%



4.2.5 Score per residue for model 5

- Molecule 1: DNAK

Chain A: 60% 18% 6% 6% 9%

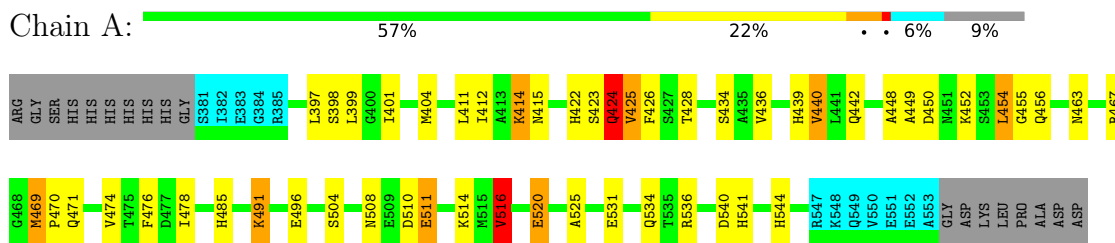


4.2.6 Score per residue for model 6

- Molecule 1: DNAK

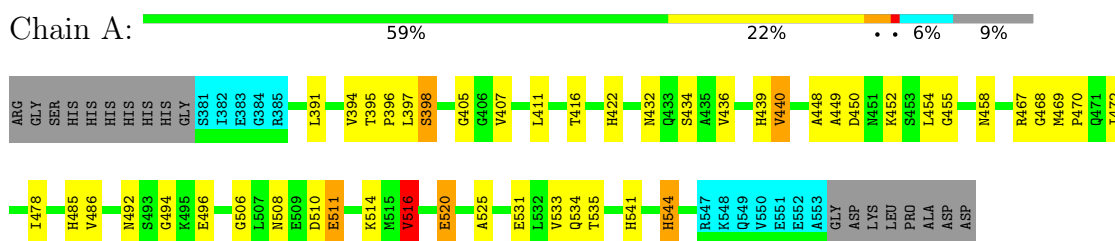
4.2.10 Score per residue for model 10

- Molecule 1: DNAK



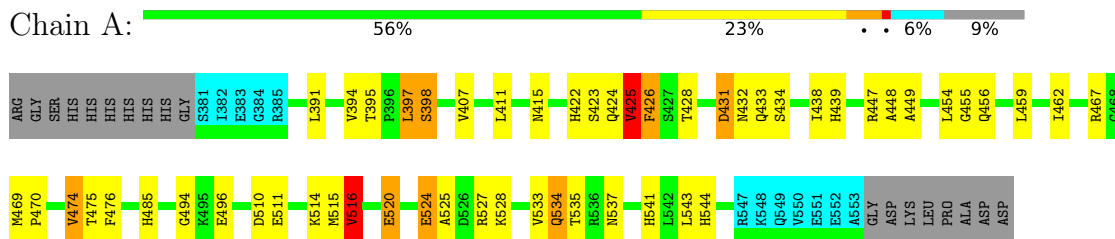
4.2.11 Score per residue for model 11

- Molecule 1: DNAK



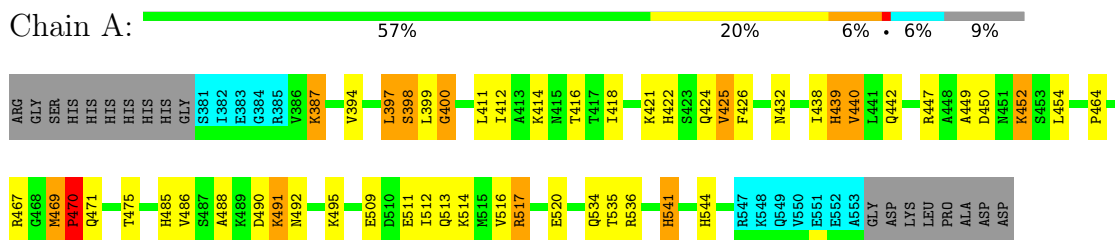
4.2.12 Score per residue for model 12

- Molecule 1: DNAK



4.2.13 Score per residue for model 13

- Molecule 1: DNAK





4.2.18 Score per residue for model 18

- Molecule 1: DNAK

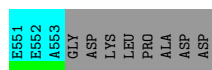
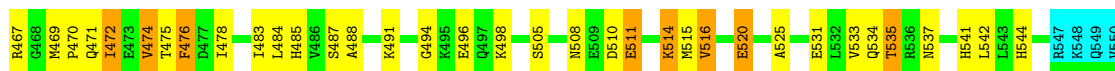
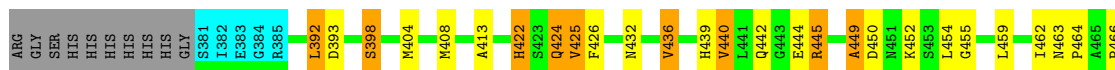
Chain A: 57% 21% 6% 6% 9%



4.2.19 Score per residue for model 19

- Molecule 1: DNAK

Chain A: 52% 24% 9% 6% 9%



4.2.20 Score per residue for model 20

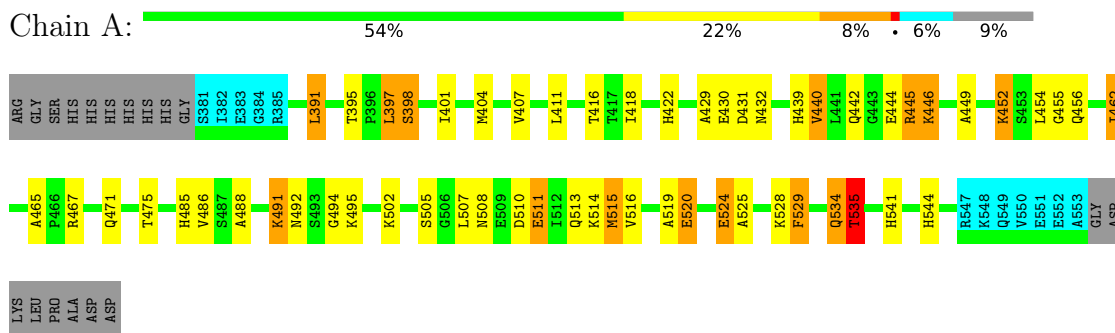
- Molecule 1: DNAK

Chain A: 57% 21% 6% 6% 9%



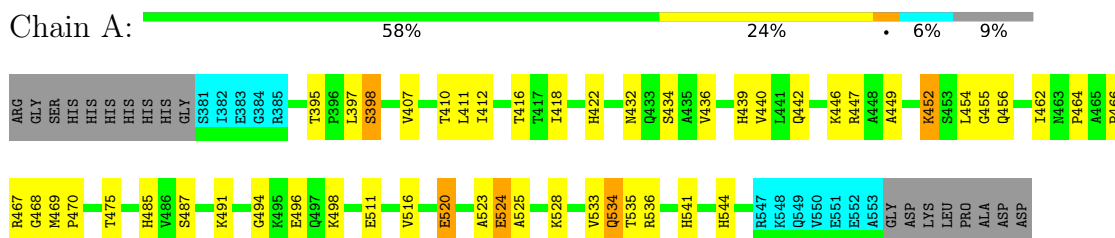
4.2.21 Score per residue for model 21

- Molecule 1: DNAK



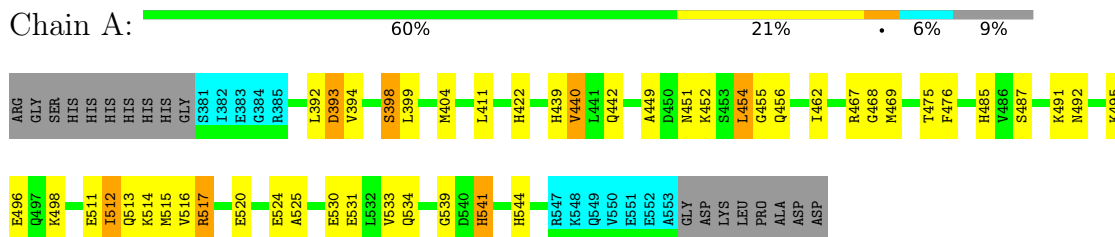
4.2.22 Score per residue for model 22

- Molecule 1: DNAK



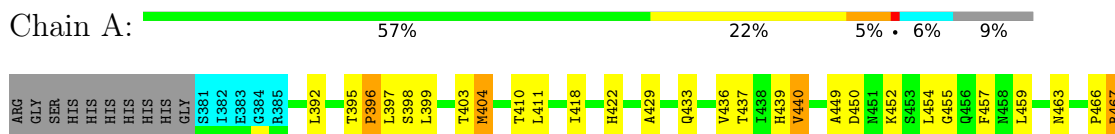
4.2.23 Score per residue for model 23

- Molecule 1: DNAK



4.2.24 Score per residue for model 24

- Molecule 1: DNAK





4.2.25 Score per residue for model 25

- Molecule 1: DNAK

Chain A: 57% 21% 6% 6% 9%



5 Refinement protocol and experimental data overview

The models were refined using the following method: *DISTANCE GEOMETRY AND RESTRAINED MOLECULAR DYNAMICS WITH SIMULATED ANNEALING*.

Of the 100 calculated structures, 25 were deposited, based on the following criterion: *TOTAL ENERGY*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
Discover	refinement	
BIOSYM	structure solution	

No chemical shift data was provided.

6 Model quality i

6.1 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 (average) 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	0.83±0.01	5±0/1242 (0.4± 0.0%)	2.04±0.06	52±4/1678 (3.1± 0.3%)
All	All	0.83	127/31050 (0.4%)	2.04	1300/41950 (3.1%)

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	Planarity
1	A	0.0±0.0	0.7±0.6
All	All	0	17

All unique bond outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	439	HIS	CG-CD2	5.79	1.42	1.35	16	2
1	A	439	HIS	ND1-CE1	5.37	1.38	1.32	20	25
1	A	541	HIS	ND1-CE1	5.37	1.38	1.32	19	25
1	A	422	HIS	ND1-CE1	5.36	1.38	1.32	24	25
1	A	544	HIS	ND1-CE1	5.34	1.37	1.32	12	25
1	A	485	HIS	ND1-CE1	5.34	1.37	1.32	8	25

All unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	511	GLU	N-CA-C	-20.01	88.11	113.12	8	24
1	A	438	ILE	N-CA-C	-13.71	88.97	108.17	2	3
1	A	393	ASP	N-CA-C	-13.41	94.44	113.21	14	5
1	A	439	HIS	CB-CA-C	13.07	136.42	110.42	13	1

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	449	ALA	N-CA-C	-12.82	94.53	111.71	18	25
1	A	520	GLU	N-CA-C	-12.82	97.77	113.41	21	25
1	A	529	PHE	CA-CB-CG	12.65	126.45	113.80	7	2
1	A	496	GLU	N-CA-C	12.53	126.97	109.18	12	7
1	A	520	GLU	N-CA-CB	12.43	128.78	110.26	8	18
1	A	454	LEU	N-CA-C	-12.17	95.40	110.61	17	25
1	A	439	HIS	ND1-CE1-NE2	12.14	120.54	108.40	20	25
1	A	485	HIS	ND1-CE1-NE2	12.13	120.53	108.40	19	25
1	A	544	HIS	ND1-CE1-NE2	12.11	120.51	108.40	6	25
1	A	454	LEU	CB-CA-C	12.08	130.03	111.18	4	24
1	A	422	HIS	ND1-CE1-NE2	12.05	120.45	108.40	3	25
1	A	541	HIS	ND1-CE1-NE2	12.04	120.44	108.40	14	25
1	A	434	SER	N-CA-CB	-11.96	90.29	110.49	4	5
1	A	474	VAL	N-CA-CB	-11.75	97.46	111.21	12	2
1	A	438	ILE	CB-CA-C	11.19	127.50	110.83	2	2
1	A	492	ASN	N-CA-C	-11.16	99.49	113.55	23	16
1	A	411	LEU	N-CA-CB	10.98	129.04	110.49	17	22
1	A	525	ALA	N-CA-C	-10.66	99.20	111.03	25	24
1	A	524	GLU	N-CA-C	-10.56	99.99	113.72	25	11
1	A	517	ARG	N-CA-C	-10.54	97.80	112.45	5	7
1	A	516	VAL	N-CA-C	-10.24	99.83	111.00	9	10
1	A	440	VAL	N-CA-C	10.14	121.67	110.21	13	14
1	A	392	LEU	CA-C-O	9.90	132.25	121.16	23	4
1	A	388	ASP	CA-C-O	9.80	123.62	117.94	3	1
1	A	533	VAL	N-CA-C	-9.78	103.90	112.12	22	6
1	A	439	HIS	CE1-NE2-CD2	-9.69	99.31	109.00	20	25
1	A	440	VAL	CB-CA-C	9.56	124.30	111.21	10	18
1	A	411	LEU	N-CA-C	-9.44	100.12	112.68	14	18
1	A	485	HIS	CE1-NE2-CD2	-9.42	99.58	109.00	19	25
1	A	544	HIS	CE1-NE2-CD2	-9.42	99.58	109.00	6	25
1	A	422	HIS	CE1-NE2-CD2	-9.37	99.63	109.00	8	25
1	A	541	HIS	CE1-NE2-CD2	-9.35	99.65	109.00	14	25
1	A	391	LEU	N-CA-C	-9.26	91.07	110.80	14	11
1	A	439	HIS	CA-C-O	9.19	133.65	120.51	13	2
1	A	433	GLN	N-CA-C	-9.19	100.99	113.30	4	3
1	A	440	VAL	N-CA-CB	-9.05	93.77	111.15	13	2
1	A	514	LYS	N-CA-C	-8.95	101.48	111.14	2	8
1	A	438	ILE	N-CA-CB	-8.93	102.60	111.89	3	2
1	A	455	GLY	N-CA-C	8.86	122.48	111.85	11	17
1	A	454	LEU	CA-C-O	8.56	129.05	120.32	20	9
1	A	516	VAL	N-CA-CB	8.56	127.12	110.95	15	3

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	399	LEU	N-CA-C	8.45	122.18	107.49	1	13
1	A	432	ASN	N-CA-C	-8.28	101.29	111.40	22	8
1	A	452	LYS	N-CA-C	-8.23	98.29	110.48	11	7
1	A	516	VAL	CA-CB-CG2	8.18	124.30	110.40	15	3
1	A	462	ILE	N-CA-C	-8.04	103.36	111.88	19	7
1	A	478	ILE	N-CA-C	-7.97	98.55	109.55	10	3
1	A	512	ILE	N-CA-C	-7.94	102.80	110.42	2	7
1	A	412	ILE	N-CA-C	-7.88	98.92	108.53	22	4
1	A	476	PHE	CA-CB-CG	7.79	121.59	113.80	15	3
1	A	410	THR	N-CA-C	7.53	121.15	110.23	20	5
1	A	435	ALA	N-CA-C	7.52	120.30	108.79	20	2
1	A	432	ASN	CA-CB-CG	7.41	120.01	112.60	8	6
1	A	534	GLN	N-CA-CB	7.41	123.01	110.49	7	16
1	A	423	SER	N-CA-C	7.39	121.18	108.02	12	2
1	A	392	LEU	O-C-N	7.36	131.87	122.89	23	1
1	A	449	ALA	N-CA-CB	7.35	123.33	111.20	7	13
1	A	437	THR	N-CA-C	-7.31	96.12	108.26	17	3
1	A	414	LYS	N-CA-CB	-7.30	99.81	110.26	8	8
1	A	436	VAL	N-CA-C	-7.24	97.09	108.81	10	4
1	A	516	VAL	CB-CA-C	-7.21	100.41	112.16	15	3
1	A	531	GLU	N-CA-C	-7.10	103.62	111.36	15	11
1	A	496	GLU	N-CA-CB	-7.07	100.05	111.22	12	1
1	A	451	ASN	N-CA-C	7.05	119.53	110.65	16	1
1	A	439	HIS	N-CA-C	-6.98	95.71	107.99	17	8
1	A	534	GLN	N-CA-C	-6.98	95.94	110.80	25	2
1	A	459	LEU	N-CA-CB	-6.87	100.07	111.20	24	2
1	A	398	SER	N-CA-CB	6.75	121.89	110.49	20	8
1	A	455	GLY	O-C-N	6.67	129.39	123.59	3	1
1	A	515	MET	N-CA-C	-6.56	104.54	112.54	20	7
1	A	469	MET	N-CA-C	6.56	124.30	109.81	10	1
1	A	472	ILE	N-CA-C	-6.55	98.68	108.12	19	1
1	A	456	GLN	CB-CA-C	6.54	123.44	110.42	1	2
1	A	450	ASP	N-CA-CB	-6.45	101.24	110.79	17	13
1	A	449	ALA	CA-C-O	6.43	126.20	119.51	25	3
1	A	485	HIS	CG-ND1-CE1	-6.42	98.38	109.30	20	25
1	A	459	LEU	N-CA-C	-6.42	98.81	109.46	12	3
1	A	514	LYS	N-CA-CB	6.42	120.18	110.30	7	1
1	A	544	HIS	CG-ND1-CE1	-6.41	98.40	109.30	12	25
1	A	422	HIS	CG-ND1-CE1	-6.40	98.42	109.30	24	25
1	A	541	HIS	CG-ND1-CE1	-6.40	98.42	109.30	15	25
1	A	392	LEU	CB-CA-C	6.39	119.12	110.94	24	1

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	399	LEU	CB-CA-C	-6.37	103.36	111.70	14	3
1	A	446	LYS	N-CA-C	6.36	117.90	110.97	4	1
1	A	439	HIS	CG-ND1-CE1	-6.33	98.54	109.30	14	25
1	A	469	MET	CB-CA-C	6.29	122.56	110.17	13	1
1	A	475	THR	N-CA-C	6.29	118.65	108.34	19	1
1	A	434	SER	N-CA-C	-6.26	104.27	112.41	15	2
1	A	415	ASN	N-CA-CB	6.26	121.06	110.49	4	5
1	A	396	PRO	N-CA-C	6.22	121.64	113.86	11	2
1	A	401	ILE	N-CA-C	-6.22	99.51	108.53	16	1
1	A	391	LEU	N-CA-CB	6.21	120.98	110.49	8	1
1	A	426	PHE	N-CA-CB	6.18	120.94	110.49	12	1
1	A	423	SER	N-CA-CB	-6.17	101.46	110.84	12	1
1	A	414	LYS	CB-CA-C	6.15	120.85	109.54	10	7
1	A	452	LYS	CB-CA-C	6.08	120.65	109.46	24	2
1	A	394	VAL	N-CA-C	6.04	117.86	109.29	23	1
1	A	441	LEU	CB-CA-C	-6.03	100.15	110.16	6	1
1	A	463	ASN	N-CA-C	6.02	117.47	109.83	17	1
1	A	386	VAL	N-CA-C	-6.00	107.65	113.53	2	1
1	A	441	LEU	N-CA-C	5.99	118.17	108.41	6	1
1	A	495	LYS	N-CA-C	-5.96	102.51	110.55	23	5
1	A	447	ARG	N-CA-C	-5.94	101.04	109.96	1	2
1	A	485	HIS	CB-CG-CD2	-5.93	123.49	131.20	19	16
1	A	530	GLU	N-CA-C	5.89	118.66	111.82	1	3
1	A	440	VAL	CA-CB-CG1	5.89	120.42	110.40	2	2
1	A	401	ILE	CA-CB-CG1	5.87	120.38	110.40	1	7
1	A	424	GLN	N-CA-C	5.86	117.39	108.07	12	3
1	A	402	GLU	N-CA-CB	-5.85	101.13	109.85	25	1
1	A	474	VAL	CA-CB-CG2	5.85	120.34	110.40	19	2
1	A	436	VAL	CB-CA-C	5.83	119.42	110.55	24	2
1	A	488	ALA	N-CA-C	-5.82	101.87	110.48	13	1
1	A	414	LYS	N-CA-C	-5.79	102.33	110.50	13	2
1	A	454	LEU	N-CA-CB	-5.78	103.16	111.54	4	1
1	A	450	ASP	CA-CB-CG	-5.78	106.82	112.60	2	3
1	A	453	SER	N-CA-C	5.78	118.08	109.59	2	1
1	A	470	PRO	CA-N-CD	-5.76	103.93	112.00	13	1
1	A	544	HIS	CB-CG-CD2	-5.76	123.72	131.20	19	17
1	A	409	THR	N-CA-C	-5.73	101.70	109.95	16	1
1	A	436	VAL	N-CA-CB	5.68	118.83	111.67	19	1
1	A	425	VAL	CA-CB-CG1	5.68	120.05	110.40	10	3
1	A	471	GLN	N-CA-C	5.67	117.31	109.54	7	3
1	A	413	ALA	N-CA-C	5.65	116.02	108.23	7	2

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	401	ILE	CA-CB-CG2	5.63	120.08	110.50	21	1
1	A	467	ARG	N-CA-C	5.63	122.78	110.80	8	3
1	A	512	ILE	CB-CA-C	5.62	119.73	112.14	9	1
1	A	394	VAL	N-CA-CB	-5.62	101.96	111.23	15	7
1	A	422	HIS	CB-CG-CD2	-5.61	123.91	131.20	8	21
1	A	519	ALA	CA-C-N	-5.61	112.22	121.92	20	8
1	A	519	ALA	C-N-CA	-5.61	112.22	121.92	20	8
1	A	456	GLN	N-CA-C	5.58	118.33	109.24	18	1
1	A	404	MET	N-CA-C	5.57	122.67	110.80	5	1
1	A	466	PRO	N-CA-C	5.56	123.49	113.70	15	1
1	A	478	ILE	CB-CA-C	5.56	118.90	110.62	16	1
1	A	439	HIS	CA-CB-CG	5.54	119.34	113.80	2	1
1	A	494	GLY	N-CA-C	-5.53	100.07	113.18	5	11
1	A	418	ILE	CB-CA-C	5.51	116.07	110.94	24	6
1	A	513	GLN	N-CA-C	5.47	118.75	111.75	21	1
1	A	469	MET	O-C-N	-5.46	115.04	121.32	6	3
1	A	483	ILE	CB-CA-C	5.45	118.89	110.28	20	2
1	A	448	ALA	N-CA-C	5.44	117.99	108.52	25	6
1	A	541	HIS	CB-CG-CD2	-5.40	124.18	131.20	23	24
1	A	533	VAL	CB-CA-C	5.40	116.20	110.91	22	2
1	A	532	LEU	N-CA-C	-5.39	106.62	114.12	1	2
1	A	392	LEU	N-CA-C	-5.37	98.51	107.80	5	1
1	A	518	ASP	N-CA-C	-5.36	105.52	111.36	2	1
1	A	485	HIS	ND1-CG-CD2	5.36	111.46	106.10	20	23
1	A	541	HIS	ND1-CG-CD2	5.34	111.44	106.10	9	25
1	A	544	HIS	ND1-CG-CD2	5.34	111.44	106.10	11	25
1	A	490	ASP	N-CA-CB	-5.33	101.94	110.63	6	1
1	A	423	SER	CB-CA-C	-5.33	104.44	111.42	10	1
1	A	422	HIS	ND1-CG-CD2	5.32	111.42	106.10	19	24
1	A	395	THR	O-C-N	-5.31	116.57	121.30	25	1
1	A	476	PHE	N-CA-CB	5.30	119.45	110.49	19	1
1	A	397	LEU	N-CA-C	-5.30	99.52	110.80	6	1
1	A	474	VAL	CB-CA-C	5.28	118.21	110.98	12	1
1	A	488	ALA	N-CA-CB	5.27	118.37	109.94	21	1
1	A	462	ILE	N-CA-CB	-5.25	102.56	111.23	15	1
1	A	439	HIS	ND1-CG-CD2	5.24	111.34	106.10	9	10
1	A	463	ASN	N-CA-CB	5.23	119.69	110.37	8	2
1	A	466	PRO	CB-CA-C	-5.23	104.56	112.04	15	1
1	A	391	LEU	CA-C-O	5.21	124.93	119.51	4	1
1	A	424	GLN	CB-CA-C	-5.21	100.05	110.42	10	1
1	A	415	ASN	N-CA-C	-5.20	105.76	113.40	10	1

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	533	VAL	CA-CB-CG1	5.19	119.23	110.40	15	1
1	A	535	THR	N-CA-C	5.17	121.82	110.80	25	1
1	A	535	THR	N-CA-CB	-5.17	101.76	110.49	20	1
1	A	406	GLY	N-CA-C	-5.15	100.97	113.18	4	1
1	A	501	ILE	N-CA-CB	-5.15	103.20	110.26	25	1
1	A	533	VAL	O-C-N	5.12	127.22	121.94	24	1
1	A	416	THR	N-CA-C	-5.12	100.39	108.73	14	1
1	A	412	ILE	CB-CA-C	5.11	117.25	110.91	13	1
1	A	400	GLY	N-CA-C	5.11	125.28	113.18	13	1
1	A	510	ASP	CA-C-O	5.10	125.52	120.32	1	1
1	A	493	SER	N-CA-C	-5.09	105.10	113.50	15	1
1	A	390	LEU	CB-CA-C	5.08	118.44	111.23	8	1
1	A	527	ARG	N-CA-C	-5.07	106.26	112.90	12	1
1	A	450	ASP	N-CA-C	-5.05	104.07	111.30	24	1
1	A	399	LEU	N-CA-CB	-5.05	102.21	110.95	13	1
1	A	398	SER	CB-CA-C	5.04	120.44	110.42	13	1
1	A	535	THR	CB-CA-C	5.03	120.44	110.42	21	1
1	A	443	GLY	N-CA-C	-5.03	100.38	110.69	2	1
1	A	425	VAL	O-C-N	5.01	128.83	122.57	12	1

There are no chirality outliers.

All unique planar outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	395	THR	Peptide	12
1	A	465	ALA	Peptide	4
1	A	469	MET	Peptide	1

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	1228	1233	1233	12±6
All	All	30700	30825	30825	293

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 5.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:442:GLN:O	1:A:452:LYS:HB2	1.31	1.25	20	3
1:A:471:GLN:O	1:A:491:LYS:HB2	1.29	1.27	10	4
1:A:524:GLU:O	1:A:528:LYS:HB3	1.25	1.30	22	4
1:A:513:GLN:O	1:A:517:ARG:HB2	1.23	1.28	6	4
1:A:442:GLN:O	1:A:452:LYS:HB3	1.21	1.30	9	18
1:A:510:ASP:O	1:A:514:LYS:HB2	1.18	1.30	19	9
1:A:510:ASP:O	1:A:514:LYS:HB3	1.09	1.46	14	7
1:A:442:GLN:HB3	1:A:452:LYS:HB3	1.09	1.16	13	2
1:A:524:GLU:O	1:A:528:LYS:CB	1.07	2.00	17	4
1:A:524:GLU:CA	1:A:528:LYS:HB2	1.07	1.79	17	3
1:A:513:GLN:O	1:A:517:ARG:CB	1.03	2.05	2	4
1:A:442:GLN:O	1:A:452:LYS:CB	1.03	2.05	16	18
1:A:516:VAL:HA	1:A:520:GLU:HB2	1.01	1.31	22	16
1:A:487:SER:OG	1:A:498:LYS:HB3	0.99	1.55	23	3
1:A:510:ASP:O	1:A:514:LYS:CB	0.98	2.11	10	10
1:A:471:GLN:HB3	1:A:491:LYS:HB2	0.98	1.30	7	5
1:A:430:GLU:HA	1:A:467:ARG:HG2	0.96	1.35	9	3
1:A:444:GLU:O	1:A:445:ARG:CB	0.96	2.13	19	4
1:A:471:GLN:O	1:A:491:LYS:CB	0.92	2.17	10	4
1:A:524:GLU:HB3	1:A:528:LYS:CG	0.88	1.98	17	3
1:A:442:GLN:HB3	1:A:452:LYS:CB	0.88	1.98	13	2
1:A:431:ASP:N	1:A:467:ARG:HB2	0.88	1.82	12	1
1:A:466:PRO:O	1:A:467:ARG:CB	0.86	2.21	5	1
1:A:487:SER:OG	1:A:498:LYS:CB	0.86	2.24	15	3
1:A:524:GLU:HA	1:A:528:LYS:HB2	0.85	1.49	12	3
1:A:471:GLN:HB3	1:A:491:LYS:HB3	0.82	1.50	20	2
1:A:524:GLU:HB3	1:A:528:LYS:HG3	0.82	1.50	17	2
1:A:430:GLU:HB3	1:A:467:ARG:HD2	0.81	1.52	21	1
1:A:524:GLU:CB	1:A:528:LYS:HB2	0.79	2.08	22	3
1:A:446:LYS:O	1:A:447:ARG:HB3	0.79	1.77	16	1
1:A:524:GLU:C	1:A:528:LYS:HB3	0.79	2.02	22	1
1:A:444:GLU:HG2	1:A:509:GLU:HB3	0.78	1.55	16	1
1:A:524:GLU:C	1:A:528:LYS:HB2	0.78	2.03	17	2
1:A:524:GLU:HB3	1:A:528:LYS:CB	0.77	2.10	22	3
1:A:444:GLU:O	1:A:445:ARG:HB2	0.73	1.82	8	4
1:A:471:GLN:O	1:A:491:LYS:HB3	0.73	1.84	15	3
1:A:442:GLN:CB	1:A:452:LYS:HB3	0.72	2.09	13	1
1:A:442:GLN:O	1:A:452:LYS:CG	0.72	2.37	4	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:524:GLU:C	1:A:528:LYS:CB	0.71	2.64	17	3
1:A:524:GLU:O	1:A:528:LYS:HB2	0.70	1.86	4	4
1:A:510:ASP:HB3	1:A:514:LYS:HB2	0.70	1.64	3	1
1:A:404:MET:HE3	1:A:536:ARG:HG3	0.69	1.64	14	1
1:A:471:GLN:HB2	1:A:491:LYS:CB	0.68	2.18	10	1
1:A:466:PRO:O	1:A:467:ARG:HB2	0.68	1.87	5	1
1:A:524:GLU:CB	1:A:528:LYS:CB	0.68	2.72	22	2
1:A:471:GLN:CB	1:A:491:LYS:HB3	0.68	2.19	21	1
1:A:473:GLU:HG3	1:A:489:LYS:HB3	0.67	1.65	16	1
1:A:508:ASN:HB3	1:A:511:GLU:HB2	0.67	1.65	5	1
1:A:442:GLN:HB3	1:A:452:LYS:HB2	0.67	1.66	4	1
1:A:516:VAL:HA	1:A:520:GLU:CB	0.67	2.18	21	9
1:A:444:GLU:O	1:A:445:ARG:HB3	0.66	1.86	19	1
1:A:487:SER:HB3	1:A:498:LYS:HG2	0.66	1.65	19	1
1:A:471:GLN:C	1:A:491:LYS:HB2	0.66	2.14	10	1
1:A:404:MET:HG3	1:A:536:ARG:HB2	0.66	1.66	14	1
1:A:524:GLU:CA	1:A:528:LYS:CB	0.65	2.75	22	2
1:A:429:ALA:O	1:A:467:ARG:HG3	0.64	1.92	25	1
1:A:404:MET:CG	1:A:536:ARG:HB2	0.63	2.23	14	1
1:A:473:GLU:O	1:A:489:LYS:HB3	0.62	1.95	4	2
1:A:487:SER:CB	1:A:498:LYS:HB3	0.62	2.24	15	2
1:A:524:GLU:HB3	1:A:528:LYS:HB2	0.61	1.71	12	2
1:A:471:GLN:HB2	1:A:491:LYS:HB3	0.61	1.72	21	2
1:A:471:GLN:CB	1:A:491:LYS:HB2	0.60	2.25	24	2
1:A:446:LYS:O	1:A:447:ARG:CB	0.60	2.45	16	1
1:A:466:PRO:O	1:A:467:ARG:HB3	0.60	1.97	24	2
1:A:431:ASP:H	1:A:467:ARG:HB2	0.58	1.58	12	1
1:A:471:GLN:HB3	1:A:491:LYS:CB	0.58	2.29	21	3
1:A:445:ARG:O	1:A:446:LYS:HB3	0.57	1.99	21	1
1:A:487:SER:OG	1:A:498:LYS:HB2	0.56	1.98	15	1
1:A:513:GLN:O	1:A:517:ARG:HB3	0.56	1.97	2	1
1:A:387:LYS:HB2	1:A:509:GLU:HB2	0.56	1.78	18	1
1:A:490:ASP:OD2	1:A:495:LYS:HB2	0.55	2.01	13	1
1:A:445:ARG:HB3	1:A:450:ASP:OD2	0.55	2.01	2	1
1:A:501:ILE:O	1:A:502:LYS:HB2	0.55	2.01	6	2
1:A:471:GLN:HB3	1:A:491:LYS:HG2	0.55	1.78	21	1
1:A:404:MET:HE3	1:A:536:ARG:CG	0.55	2.32	14	1
1:A:483:ILE:HG13	1:A:502:LYS:CB	0.53	2.33	4	1
1:A:483:ILE:HG13	1:A:502:LYS:HB3	0.52	1.81	4	1
1:A:471:GLN:CB	1:A:491:LYS:CB	0.52	2.87	21	2
1:A:524:GLU:OE1	1:A:528:LYS:HG2	0.52	2.04	17	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:508:ASN:HB3	1:A:511:GLU:CB	0.51	2.35	5	1
1:A:445:ARG:O	1:A:446:LYS:CB	0.51	2.58	21	1
1:A:400:GLY:O	1:A:440:VAL:HG13	0.51	2.05	1	2
1:A:508:ASN:O	1:A:511:GLU:HB3	0.50	2.06	14	11
1:A:516:VAL:CA	1:A:520:GLU:HB2	0.50	2.21	22	6
1:A:471:GLN:HB3	1:A:491:LYS:HG3	0.50	1.82	10	1
1:A:490:ASP:HB3	1:A:495:LYS:HB2	0.49	1.82	24	2
1:A:471:GLN:CB	1:A:491:LYS:HG3	0.49	2.38	10	1
1:A:517:ARG:HA	1:A:520:GLU:HB2	0.48	1.85	2	1
1:A:471:GLN:HB2	1:A:491:LYS:HB2	0.48	1.85	13	1
1:A:471:GLN:HB3	1:A:491:LYS:CG	0.47	2.38	21	1
1:A:398:SER:HA	1:A:413:ALA:HA	0.47	1.85	19	1
1:A:400:GLY:O	1:A:440:VAL:HA	0.46	2.11	1	5
1:A:404:MET:HE3	1:A:536:ARG:CB	0.46	2.41	14	1
1:A:474:VAL:HG12	1:A:488:ALA:HA	0.45	1.88	19	1
1:A:529:PHE:O	1:A:533:VAL:HG23	0.45	2.11	8	2
1:A:489:LYS:HD2	1:A:496:GLU:HB3	0.45	1.89	24	1
1:A:513:GLN:O	1:A:517:ARG:N	0.45	2.50	5	3
1:A:515:MET:O	1:A:520:GLU:N	0.44	2.50	20	5
1:A:449:ALA:O	1:A:515:MET:HE2	0.44	2.12	19	1
1:A:487:SER:CB	1:A:498:LYS:HG2	0.44	2.39	19	1
1:A:451:ASN:O	1:A:515:MET:HE1	0.43	2.12	23	1
1:A:424:GLN:O	1:A:474:VAL:HG22	0.43	2.12	19	1
1:A:471:GLN:HB2	1:A:491:LYS:CG	0.43	2.44	10	1
1:A:485:HIS:HD2	1:A:498:LYS:NZ	0.43	2.12	6	1
1:A:444:GLU:OE1	1:A:445:ARG:HB2	0.42	2.13	19	1
1:A:387:LYS:HB3	1:A:509:GLU:HG3	0.42	1.91	13	1
1:A:471:GLN:O	1:A:491:LYS:CG	0.41	2.68	13	1
1:A:442:GLN:CB	1:A:452:LYS:HB2	0.41	2.43	4	1
1:A:510:ASP:O	1:A:514:LYS:CG	0.41	2.69	1	1
1:A:387:LYS:CG	1:A:509:GLU:HG3	0.41	2.45	6	1
1:A:471:GLN:CB	1:A:491:LYS:CG	0.40	3.00	10	1
1:A:399:LEU:HB2	1:A:410:THR:HG22	0.40	1.92	16	1
1:A:404:MET:HG3	1:A:536:ARG:CB	0.40	2.43	14	1
1:A:401:ILE:HD13	1:A:440:VAL:HG13	0.40	1.92	8	1

6.3 Torsion angles [i](#)

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	161/191 (84%)	113±5 (70±3%)	36±5 (22±3%)	13±3 (8±2%)	1	14
All	All	4025/4775 (84%)	2814 (70%)	895 (22%)	316 (8%)	1	14

All 56 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	534	GLN	24
1	A	398	SER	22
1	A	535	THR	21
1	A	469	MET	19
1	A	397	LEU	18
1	A	467	ARG	18
1	A	456	GLN	15
1	A	468	GLY	12
1	A	536	ARG	11
1	A	470	PRO	9
1	A	404	MET	9
1	A	464	PRO	9
1	A	537	ASN	7
1	A	541	HIS	7
1	A	463	ASN	6
1	A	466	PRO	6
1	A	432	ASN	6
1	A	434	SER	6
1	A	445	ARG	6
1	A	446	LYS	6
1	A	506	GLY	5
1	A	447	ARG	5
1	A	533	VAL	5
1	A	425	VAL	4
1	A	426	PHE	4
1	A	523	ALA	3
1	A	538	GLN	3

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Mol	Chain	Res	Type	Models (Total)
1	A	415	ASN	3
1	A	503	ALA	3
1	A	431	ASP	3
1	A	504	SER	3
1	A	433	GLN	3
1	A	429	ALA	3
1	A	400	GLY	2
1	A	455	GLY	2
1	A	502	LYS	2
1	A	391	LEU	2
1	A	476	PHE	2
1	A	458	ASN	2
1	A	544	HIS	2
1	A	539	GLY	2
1	A	505	SER	2
1	A	461	GLY	1
1	A	543	LEU	1
1	A	427	SER	1
1	A	386	VAL	1
1	A	388	ASP	1
1	A	394	VAL	1
1	A	424	GLN	1
1	A	540	ASP	1
1	A	405	GLY	1
1	A	465	ALA	1
1	A	413	ALA	1
1	A	396	PRO	1
1	A	393	ASP	1
1	A	457	PHE	1

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	137/161 (85%)	125±3 (92±2%)	12±3 (8±2%)	12	59
All	All	3425/4025 (85%)	3134 (92%)	291 (8%)	12	59

All 70 unique residues with a non-rotameric sidechain are listed below. They are sorted by the

frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	475	THR	20
1	A	440	VAL	18
1	A	516	VAL	17
1	A	491	LYS	15
1	A	397	LEU	13
1	A	407	VAL	13
1	A	436	VAL	13
1	A	399	LEU	10
1	A	486	VAL	9
1	A	416	THR	9
1	A	454	LEU	9
1	A	428	THR	8
1	A	512	ILE	8
1	A	412	ILE	6
1	A	472	ILE	6
1	A	483	ILE	5
1	A	496	GLU	5
1	A	462	ILE	5
1	A	403	THR	4
1	A	542	LEU	4
1	A	507	LEU	4
1	A	411	LEU	4
1	A	484	LEU	4
1	A	535	THR	4
1	A	391	LEU	4
1	A	501	ILE	4
1	A	432	ASN	3
1	A	414	LYS	3
1	A	395	THR	3
1	A	398	SER	3
1	A	452	LYS	3
1	A	478	ILE	3
1	A	533	VAL	2
1	A	469	MET	2
1	A	546	THR	2
1	A	392	LEU	2
1	A	529	PHE	2
1	A	417	THR	2
1	A	459	LEU	2
1	A	434	SER	2
1	A	425	VAL	2
1	A	543	LEU	2

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Mol	Chain	Res	Type	Models (Total)
1	A	439	HIS	2
1	A	418	ILE	2
1	A	404	MET	2
1	A	489	LYS	2
1	A	456	GLN	1
1	A	415	ASN	1
1	A	498	LYS	1
1	A	495	LYS	1
1	A	424	GLN	1
1	A	474	VAL	1
1	A	476	PHE	1
1	A	387	LYS	1
1	A	421	LYS	1
1	A	470	PRO	1
1	A	433	GLN	1
1	A	528	LYS	1
1	A	499	ILE	1
1	A	401	ILE	1
1	A	427	SER	1
1	A	441	LEU	1
1	A	430	GLU	1
1	A	509	GLU	1
1	A	408	MET	1
1	A	422	HIS	1
1	A	532	LEU	1
1	A	502	LYS	1
1	A	396	PRO	1
1	A	490	ASP	1

6.3.3 RNA [i](#)

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.6 Ligand geometry [i](#)

There are no ligands in this entry.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided