



Full wwPDB NMR Structure Validation Report ⓘ

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PDB ID : 2JRK / pdb_00002jrk
BMRB ID : 15345
Title : NMR Structure and Epitope Mapping of Blo t 5
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Deposited on : 2007-06-27

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

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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

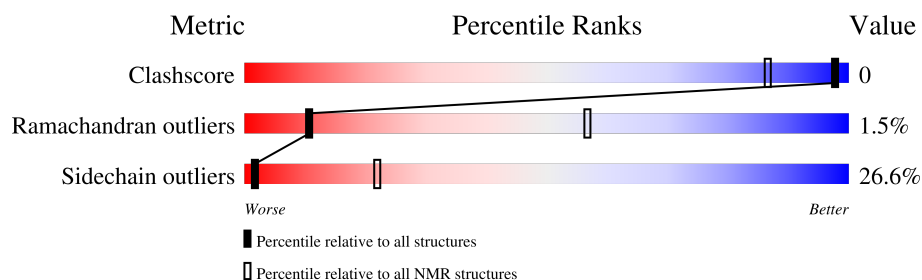
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 64%.

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	112	73% 14% 12%

2 Ensemble composition and analysis

This entry contains 10 models. Model 10 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *closest to the average*.

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:20-A:117 (98)	0.91	10

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. No single-model clusters were found.

Cluster number	Models
1	3, 4, 8, 10
2	5, 7, 9
3	1, 2, 6

3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 1699 atoms, of which 767 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Mite allergen Blo t 5.

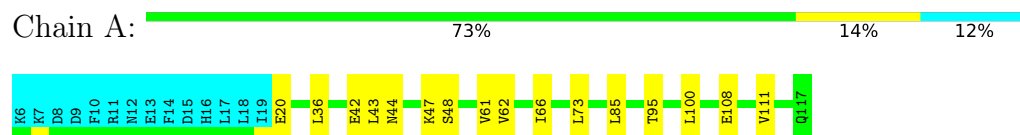
Mol	Chain	Residues	Atoms						Trace
1	A	112	Total	C	H	N	O	S	0
			1699	581	767	163	186	2	

4 Residue-property plots

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: Mite allergen Blo t 5

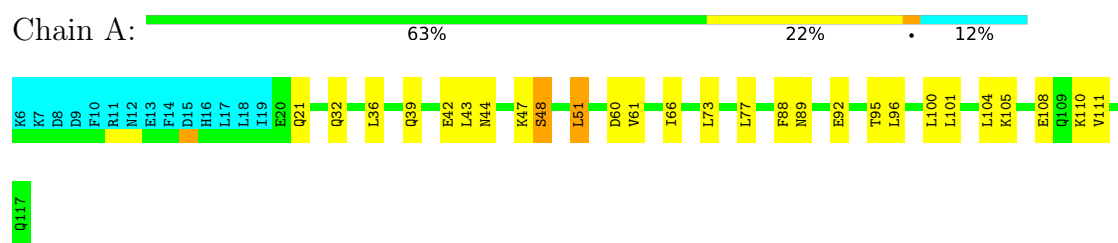


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

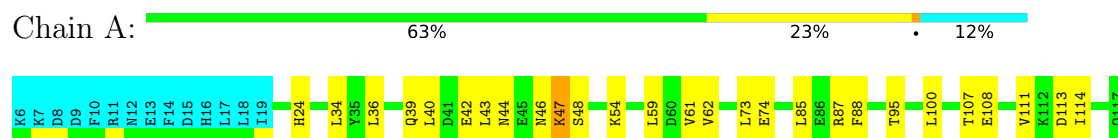
4.2.1 Score per residue for model 1

- Molecule 1: Mite allergen Blo t 5



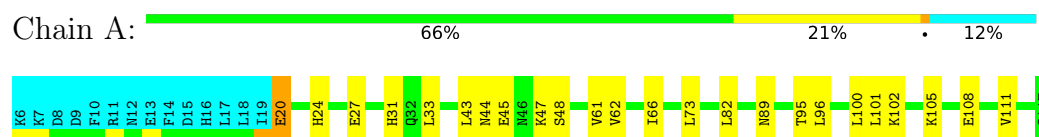
4.2.2 Score per residue for model 2

- Molecule 1: Mite allergen Blo t 5



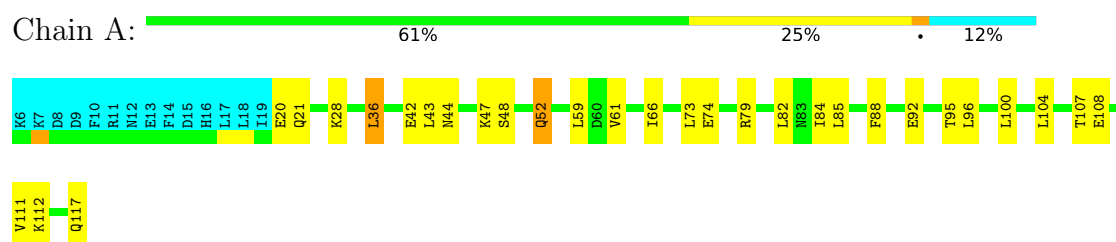
4.2.3 Score per residue for model 3

- Molecule 1: Mite allergen Blo t 5



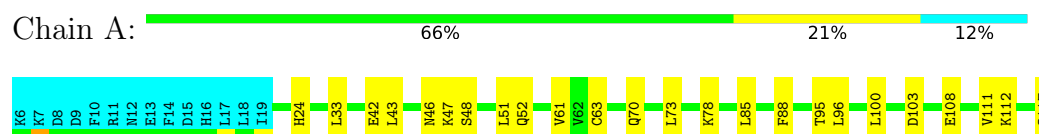
4.2.4 Score per residue for model 4

- Molecule 1: Mite allergen Blo t 5



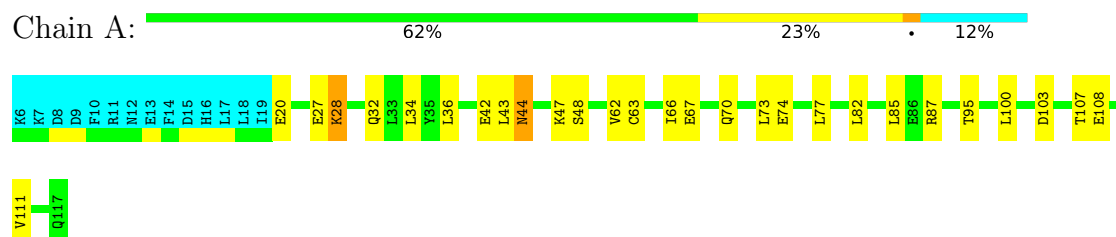
4.2.5 Score per residue for model 5

- Molecule 1: Mite allergen Blo t 5



4.2.6 Score per residue for model 6

- Molecule 1: Mite allergen Blo t 5



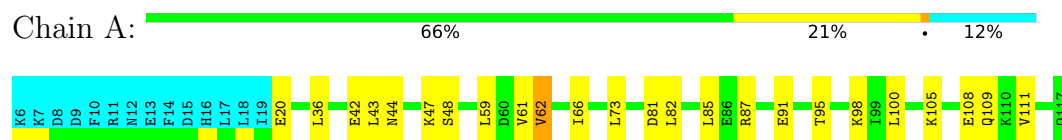
4.2.7 Score per residue for model 7

- Molecule 1: Mite allergen Blo t 5



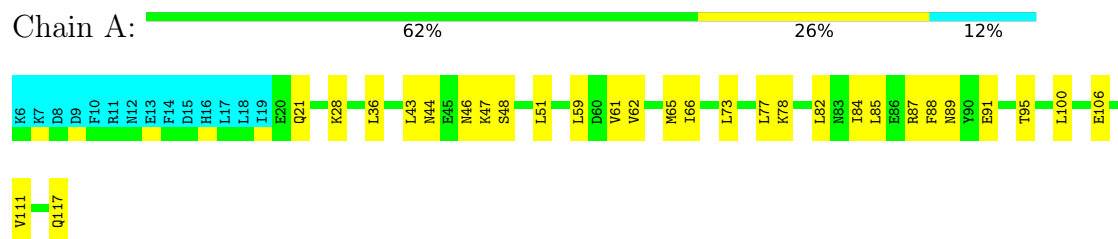
4.2.8 Score per residue for model 8

- Molecule 1: Mite allergen Blo t 5



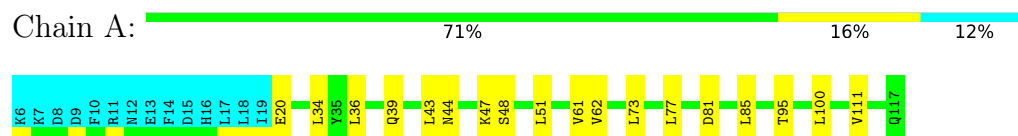
4.2.9 Score per residue for model 9

- Molecule 1: Mite allergen Blo t 5



4.2.10 Score per residue for model 10 (medoid)

- Molecule 1: Mite allergen Blo t 5



5 Refinement protocol and experimental data overview

The models were refined using the following method: *molecular dynamics*.

Of the 10 calculated structures, 10 were deposited, based on the following criterion: *target function*.

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

Software name	Classification	Version
CYANA	structure solution	
CYANA	refinement	

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	970
Number of shifts mapped to atoms	854
Number of unparsed shifts	0
Number of shifts with mapping errors	116
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	64%

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	0.86±0.03	0±0/811 (0.0± 0.0%)	1.46±0.04	1±1/1085 (0.1± 0.1%)
All	All	0.86	0/8110 (0.0%)	1.46	11/10850 (0.1%)

There are no bond-length outliers.

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	70	GLN	CA-C-N	5.73	126.30	119.94	5	1
1	A	70	GLN	C-N-CA	5.73	126.30	119.94	5	1
1	A	35	TYR	CA-C-N	5.19	127.75	120.28	7	1
1	A	35	TYR	C-N-CA	5.19	127.75	120.28	7	1
1	A	44	ASN	CA-CB-CG	5.16	117.76	112.60	6	1
1	A	101	LEU	CA-C-N	5.11	127.13	120.28	1	1
1	A	101	LEU	C-N-CA	5.11	127.13	120.28	1	1
1	A	28	LYS	CA-C-N	5.10	125.60	119.94	6	1
1	A	28	LYS	C-N-CA	5.10	125.60	119.94	6	1
1	A	62	VAL	CA-C-N	5.04	126.98	120.44	8	1
1	A	62	VAL	C-N-CA	5.04	126.98	120.44	8	1

There are no chirality outliers.

There are no planarity outliers.

6.2 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 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	806	669	816	1±1
All	All	8060	6690	8160	8

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 0.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:36:LEU:HD13	1:A:107:THR:HG21	0.74	1.60	6	1
1:A:33:LEU:HD11	1:A:103:ASP:HB3	0.55	1.78	7	1
1:A:59:LEU:HD23	1:A:59:LEU:C	0.53	2.29	2	1
1:A:33:LEU:HD11	1:A:103:ASP:CB	0.52	2.35	7	1
1:A:36:LEU:HD12	1:A:107:THR:HG22	0.49	1.84	4	2
1:A:40:LEU:HD21	1:A:59:LEU:HD22	0.47	1.87	2	1
1:A:47:LYS:HE2	1:A:114:ILE:CG2	0.42	2.44	2	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	97/112 (87%)	89±2 (92±2%)	6±2 (6±2%)	2±0 (2±1%)	11	57
All	All	970/1120 (87%)	892 (92%)	63 (6%)	15 (2%)	11	57

All 5 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	48	SER	10
1	A	20	GLU	2
1	A	51	LEU	1
1	A	52	GLN	1
1	A	82	LEU	1

6.3.2 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 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	89/103 (86%)	65±3 (73±4%)	24±3 (27±4%)	2	22
All	All	890/1030 (86%)	653 (73%)	237 (27%)	2	22

All 66 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	43	LEU	10
1	A	47	LYS	10
1	A	73	LEU	10
1	A	95	THR	10
1	A	100	LEU	10
1	A	111	VAL	10
1	A	61	VAL	9
1	A	44	ASN	8
1	A	108	GLU	8
1	A	85	LEU	8
1	A	36	LEU	7
1	A	42	GLU	7
1	A	62	VAL	7
1	A	66	ILE	6
1	A	88	PHE	5
1	A	21	GLN	4
1	A	51	LEU	4
1	A	77	LEU	4
1	A	96	LEU	4
1	A	34	LEU	4
1	A	87	ARG	4
1	A	20	GLU	4
1	A	82	LEU	4
1	A	59	LEU	4
1	A	117	GLN	4
1	A	39	GLN	3
1	A	89	ASN	3
1	A	105	LYS	3
1	A	24	HIS	3

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Mol	Chain	Res	Type	Models (Total)
1	A	46	ASN	3
1	A	74	GLU	3
1	A	27	GLU	3
1	A	28	LYS	3
1	A	52	GLN	3
1	A	84	ILE	3
1	A	112	LYS	3
1	A	32	GLN	2
1	A	92	GLU	2
1	A	104	LEU	2
1	A	33	LEU	2
1	A	63	CYS	2
1	A	78	LYS	2
1	A	103	ASP	2
1	A	81	ASP	2
1	A	91	GLU	2
1	A	48	SER	1
1	A	60	ASP	1
1	A	110	LYS	1
1	A	54	LYS	1
1	A	107	THR	1
1	A	113	ASP	1
1	A	31	HIS	1
1	A	45	GLU	1
1	A	101	LEU	1
1	A	102	LYS	1
1	A	79	ARG	1
1	A	67	GLU	1
1	A	70	GLN	1
1	A	30	GLU	1
1	A	41	ASP	1
1	A	50	GLU	1
1	A	75	ARG	1
1	A	98	LYS	1
1	A	109	GLN	1
1	A	65	MET	1
1	A	106	GLU	1

6.3.3 RNA ⓘ

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

The completeness of assignment taking into account all chemical shift lists is 64% for the well-defined parts and 60% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list_1*

7.1.1 Bookkeeping

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	970
Number of shifts mapped to atoms	854
Number of unparsed shifts	0
Number of shifts with mapping errors	116
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	1

The following assigned chemical shifts were not mapped to the molecules present in the coordinate file.

- No matching atom found in the structure. All 116 occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	6	LYS	H	8.587	0.05	1
1	A	6	LYS	HB2	1.753	0.05	9
1	A	6	LYS	HE2	2.965	0.05	9
1	A	6	LYS	HG2	1.421	0.05	9
1	A	7	LYS	HB2	1.724	0.05	9
1	A	7	LYS	HE2	2.944	0.05	9
1	A	7	LYS	HG2	1.328	0.05	9
1	A	9	ASP	HB2	2.602	0.05	9
1	A	10	PHE	HB2	3.187	0.05	9
1	A	11	ARG	HB2	1.793	0.05	9
1	A	11	ARG	HG2	1.542	0.05	9
1	A	12	ASN	HB2	2.759	0.05	9
1	A	13	GLU	HB2	2.007	0.05	9
1	A	13	GLU	HG2	2.057	0.05	9

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	23	ASN	HB2	2.74	0.05	9
1	A	24	HIS	HB2	3.268	0.05	9
1	A	27	GLU	HB2	2.125	0.05	9
1	A	27	GLU	HG2	2.359	0.05	9
1	A	28	LYS	HB2	1.813	0.05	9
1	A	28	LYS	HG2	1.315	0.05	9
1	A	30	GLU	HB2	2.195	0.05	9
1	A	30	GLU	HG2	2.485	0.05	9
1	A	31	HIS	HB2	3.331	0.05	9
1	A	32	GLN	HB2	2.098	0.05	9
1	A	32	GLN	HG2	2.471	0.05	9
1	A	33	LEU	HB2	2.026	0.05	9
1	A	34	LEU	HB2	1.794	0.05	9
1	A	35	TYR	HB2	3.159	0.05	9
1	A	36	LEU	HB2	2.056	0.05	9
1	A	37	GLN	HG2	2.29	0.05	9
1	A	38	HIS	HB2	3.367	0.05	9
1	A	40	LEU	HB2	2.066	0.05	9
1	A	41	ASP	HB2	2.888	0.05	9
1	A	42	GLU	HB2	2.026	0.05	9
1	A	42	GLU	HG2	2.241	0.05	9
1	A	44	ASN	HB2	2.816	0.05	9
1	A	45	GLU	HB2	2.096	0.05	9
1	A	45	GLU	HG2	2.232	0.05	9
1	A	46	ASN	HB2	2.768	0.05	9
1	A	47	LYS	HB2	2.036	0.05	9
1	A	47	LYS	HD2	1.74	0.05	9
1	A	47	LYS	HE2	3.059	0.05	9
1	A	47	LYS	HG2	1.349	0.05	9
1	A	48	SER	HB2	3.852	0.05	9
1	A	49	LYS	HB2	1.743	0.05	9
1	A	49	LYS	HD2	1.655	0.05	9
1	A	49	LYS	HE2	2.963	0.05	9
1	A	49	LYS	HG2	1.421	0.05	9
1	A	50	GLU	HB2	1.96	0.05	9
1	A	50	GLU	HG2	2.28	0.05	9
1	A	51	LEU	HB2	1.968	0.05	9
1	A	52	GLN	HB2	2.105	0.05	9
1	A	53	GLU	HB2	2.013	0.05	9
1	A	53	GLU	HG2	2.232	0.05	9
1	A	54	LYS	HB2	2.003	0.05	9

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	54	LYS	HG2	1.411	0.05	9
1	A	57	ARG	HB2	1.958	0.05	9
1	A	57	ARG	HD2	3.248	0.05	9
1	A	57	ARG	HG2	1.694	0.05	9
1	A	58	GLU	HB2	2.253	0.05	9
1	A	58	GLU	HG2	2.585	0.05	9
1	A	59	LEU	HB2	2.115	0.05	9
1	A	60	ASP	HB2	2.917	0.05	9
1	A	63	CYS	HB2	2.934	0.05	9
1	A	65	MET	HB2	2.345	0.05	9
1	A	65	MET	HG2	2.642	0.05	9
1	A	67	GLU	HB2	1.997	0.05	9
1	A	67	GLU	HG2	2.533	0.05	9
1	A	70	GLN	HG2	2.466	0.05	9
1	A	73	LEU	HB2	2.064	0.05	9
1	A	74	GLU	HB2	2.056	0.05	9
1	A	74	GLU	HG2	2.356	0.05	9
1	A	75	ARG	HB2	1.841	0.05	9
1	A	76	GLU	HB2	1.684	0.05	9
1	A	76	GLU	HG2	2.197	0.05	9
1	A	77	LEU	HB2	1.878	0.05	9
1	A	78	LYS	HB2	1.948	0.05	9
1	A	78	LYS	HG2	1.508	0.05	9
1	A	81	ASP	HB2	2.995	0.05	9
1	A	82	LEU	HB2	1.655	0.05	9
1	A	83	ASN	HB2	3.218	0.05	9
1	A	84	ILE	HG12	1.519	0.05	9
1	A	85	LEU	HB2	1.619	0.05	9
1	A	86	GLU	HB2	2.319	0.05	9
1	A	87	ARG	HB2	1.851	0.05	9
1	A	88	PHE	HB2	3.256	0.05	9
1	A	89	ASN	HB2	2.837	0.05	9
1	A	91	GLU	HB2	2.534	0.05	9
1	A	91	GLU	HG2	2.612	0.05	9
1	A	94	GLN	HB2	2.015	0.05	9
1	A	94	GLN	HG2	2.187	0.05	9
1	A	96	LEU	HB2	1.903	0.05	9
1	A	97	SER	HB2	3.881	0.05	9
1	A	98	LYS	HB2	1.997	0.05	9
1	A	98	LYS	HG2	1.382	0.05	9
1	A	100	LEU	HB2	1.812	0.05	9

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	101	LEU	HB2	1.763	0.05	9
1	A	102	LYS	HB2	1.909	0.05	9
1	A	102	LYS	HD2	1.675	0.05	9
1	A	102	LYS	HG2	1.45	0.05	9
1	A	103	ASP	HB2	2.593	0.05	9
1	A	104	LEU	HB2	2.153	0.05	9
1	A	105	LYS	HB2	2.104	0.05	9
1	A	105	LYS	HD2	1.694	0.05	9
1	A	105	LYS	HG2	1.607	0.05	9
1	A	106	GLU	HB2	2.109	0.05	9
1	A	106	GLU	HG2	2.514	0.05	9
1	A	108	GLU	HB2	2.176	0.05	9
1	A	108	GLU	HG2	2.38	0.05	9
1	A	110	LYS	HB2	1.877	0.05	9
1	A	110	LYS	HD2	1.33	0.05	9
1	A	110	LYS	HG2	1.467	0.05	9
1	A	113	ASP	HB2	2.686	0.05	9
1	A	114	ILE	HG12	1.298	0.05	9
1	A	115	GLN	HB2	2.026	0.05	9
1	A	115	GLN	HG2	2.376	0.05	9

7.1.2 Chemical shift referencing ⓘ

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction $\pm$ precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	106	-0.89 ± 0.09	Should be checked
$^{13}\text{C}_\beta$	102	-0.03 ± 0.07	None needed (< 0.5 ppm)
$^{13}\text{C}'$	0	—	None (insufficient data)
^{15}N	106	-0.31 ± 0.18	None needed (< 0.5 ppm)

7.1.3 Completeness of resonance assignments ⓘ

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 64%, i.e. 900 atoms were assigned a chemical shift out of a possible 1412. 0 out of 18 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	382/493 (77%)	188/199 (94%)	97/196 (49%)	97/98 (99%)

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	Total	¹H	¹³C	¹⁵N
Sidechain	518/870 (60%)	296/556 (53%)	222/277 (80%)	0/37 (0%)
Aromatic	0/49 (0%)	0/25 (0%)	0/21 (0%)	0/3 (0%)
Overall	900/1412 (64%)	484/780 (62%)	319/494 (65%)	97/138 (70%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 60%, i.e. 970 atoms were assigned a chemical shift out of a possible 1627. 0 out of 20 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹H	¹³C	¹⁵N
Backbone	415/563 (74%)	203/227 (89%)	106/224 (47%)	106/112 (95%)
Sidechain	555/988 (56%)	315/630 (50%)	240/315 (76%)	0/43 (0%)
Aromatic	0/76 (0%)	0/39 (0%)	0/33 (0%)	0/4 (0%)
Overall	970/1627 (60%)	518/896 (58%)	346/572 (60%)	106/159 (67%)

7.1.4 Statistically unusual chemical shifts [i](#)

The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	27	GLU	CG	29.90	30.20 – 42.01	-5.3

7.1.5 Random Coil Index (RCI) plots [i](#)

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition. If well-defined core and ill-defined regions are not identified then it is shown as gray bars.

Random coil index (RCI) for chain A:

