



# Full wwPDB NMR Structure Validation Report ⓘ

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PDB ID : 1Q80  
Title : Solution structure and dynamics of Nereis sarcoplasmic calcium binding protein  
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Deposited on : 2003-08-20

This is a Full wwPDB NMR 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  
<http://wwpdb.org/validation/2016/NMRValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

Cyrange : Kirchner and Güntert (2011)  
NmrClust : Kelley et al. (1996)  
MolProbity : 4.02b-467  
Mogul : unknown  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
RCI : v\_1n\_11\_5\_13\_A (Berjanski et al., 2005)  
PANAV : Wang et al. (2010)  
ShiftChecker : rb-20027457  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20027457

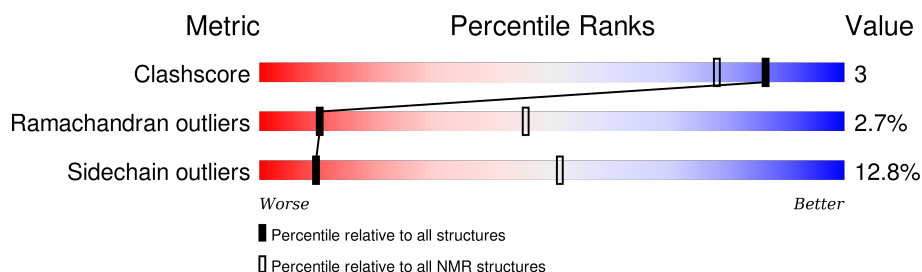
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*SOLUTION NMR*


The overall completeness of chemical shifts assignment is 51%.

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	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

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  $\geq 3$ , 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	174	 79% 17% •

## 2 Ensemble composition and analysis ⓘ

This entry contains 17 models. Model 9 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:1-A:174 (174)	0.87	9

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 2 clusters and 2 single-model clusters were found.

Cluster number	Models
1	2, 3, 4, 5, 7, 8, 9, 10, 13, 14, 15
2	1, 6, 12, 16
Single-model clusters	11; 17

### 3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 2678 atoms, of which 1310 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Sarcoplasmic calcium-binding protein.

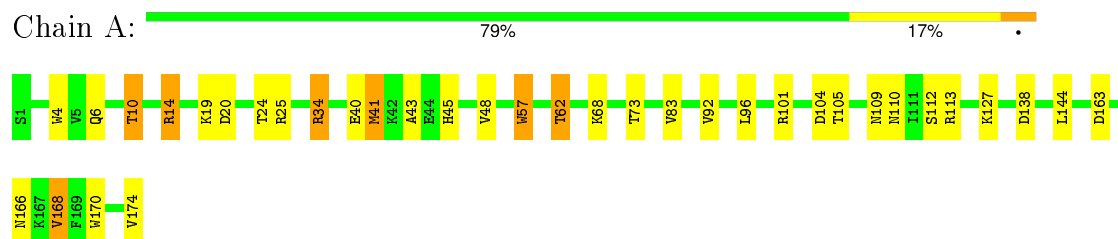
Mol	Chain	Residues	Atoms						Trace
1	A	174	Total	C	H	N	O	S	0
			2678	868	1310	218	272	10	

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

### 4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA and DNA 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: Sarcoplasmic calcium-binding protein

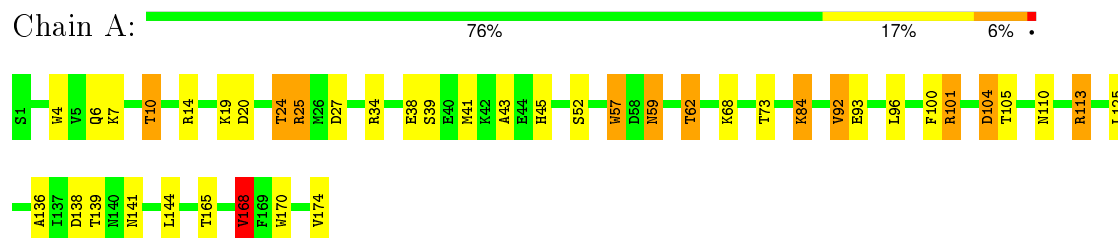


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

#### 4.2.1 Score per residue for model 1

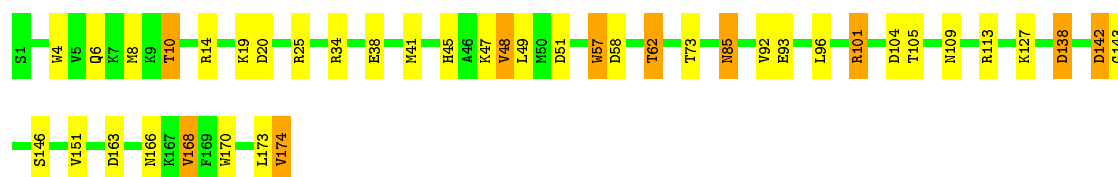
- Molecule 1: Sarcoplasmic calcium-binding protein



#### 4.2.2 Score per residue for model 2

- Molecule 1: Sarcoplasmic calcium-binding protein

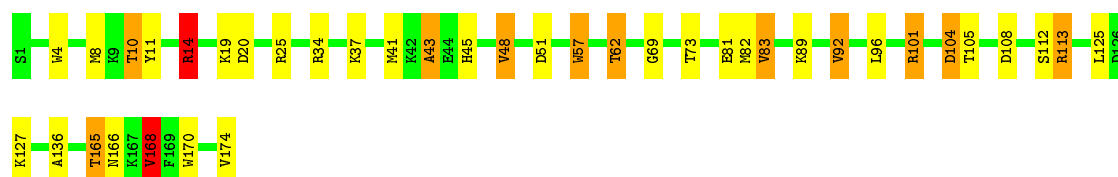




#### 4.2.3 Score per residue for model 3

- Molecule 1: Sarcoplasmic calcium-binding protein

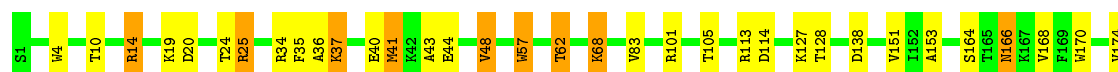
Chain A: 78% 15% 6%



#### 4.2.4 Score per residue for model 4

- Molecule 1: Sarcoplasmic calcium-binding protein

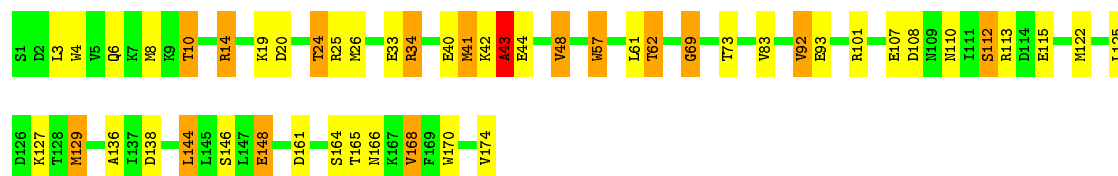
Chain A: 80% 14% 5%



#### 4.2.5 Score per residue for model 5

- Molecule 1: Sarcoplasmic calcium-binding protein

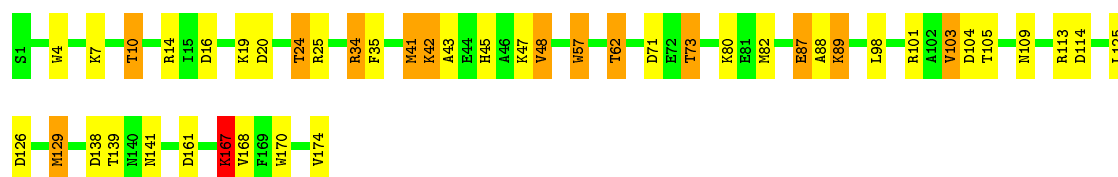
Chain A: 71% 20% 9%



#### 4.2.6 Score per residue for model 6

- Molecule 1: Sarcoplasmic calcium-binding protein

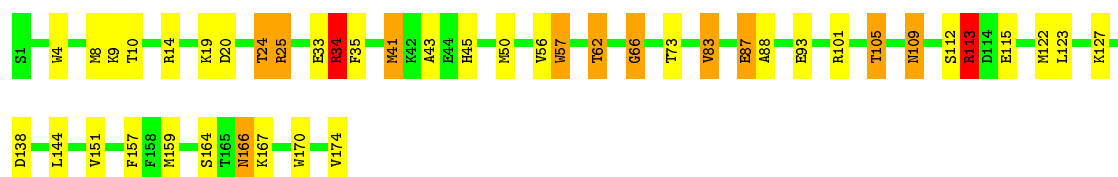
Chain A: 74% 18% 7%



#### 4.2.7 Score per residue for model 7

- Molecule 1: Sarcoplasmic calcium-binding protein

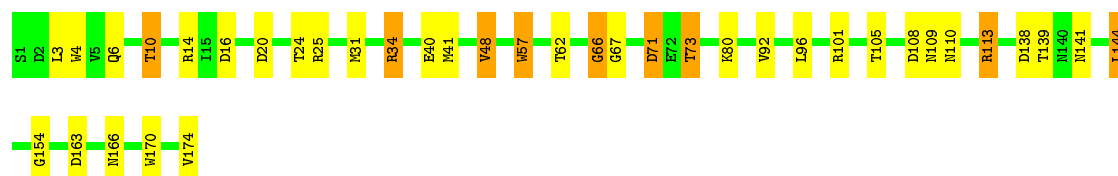
Chain A: 75% 18% 6%



#### 4.2.8 Score per residue for model 8

- Molecule 1: Sarcoplasmic calcium-binding protein

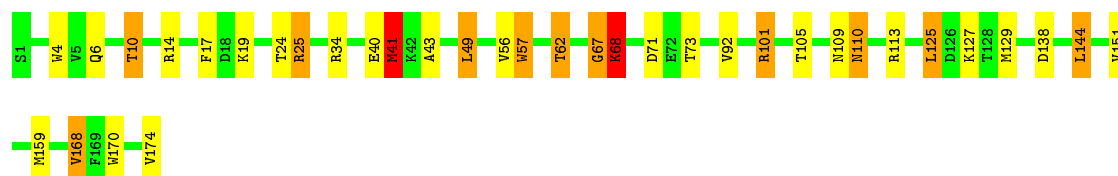
Chain A: 78% 17% 5%



#### 4.2.9 Score per residue for model 9 (medoid)

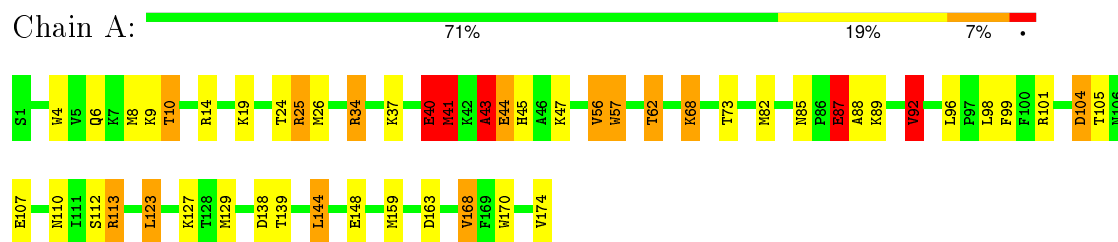
- Molecule 1: Sarcoplasmic calcium-binding protein

Chain A: 79% 13% 6%



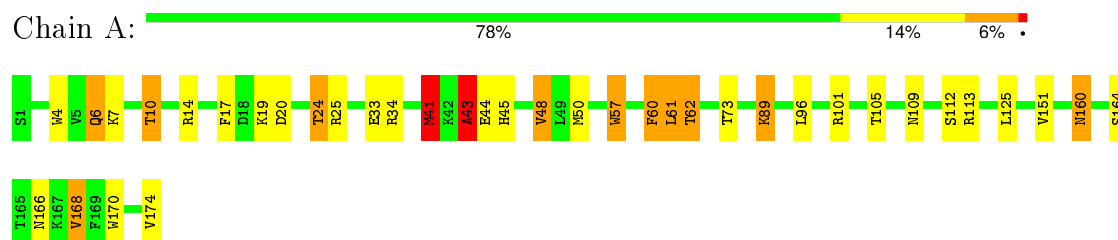
#### 4.2.10 Score per residue for model 10

- Molecule 1: Sarcoplasmic calcium-binding protein



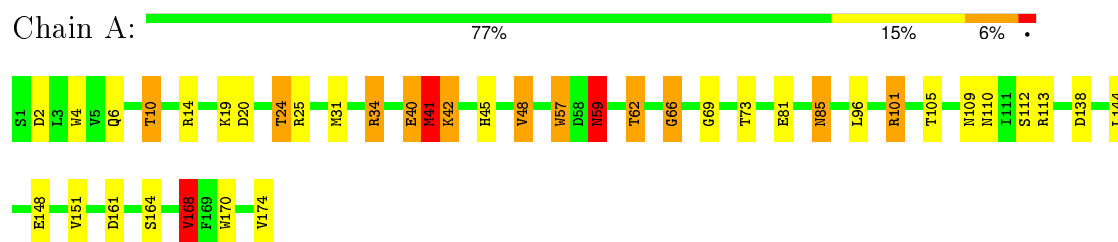
#### 4.2.11 Score per residue for model 11

- Molecule 1: Sarcoplasmic calcium-binding protein



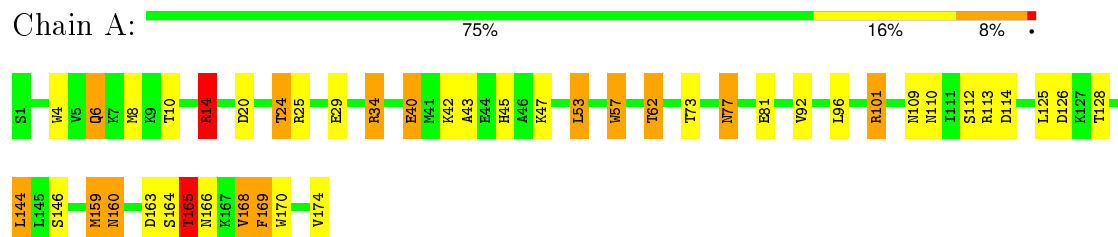
#### 4.2.12 Score per residue for model 12

- Molecule 1: Sarcoplasmic calcium-binding protein



#### 4.2.13 Score per residue for model 13

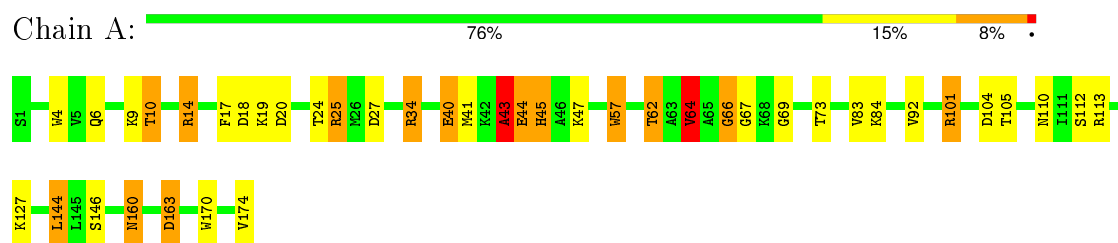
- Molecule 1: Sarcoplasmic calcium-binding protein





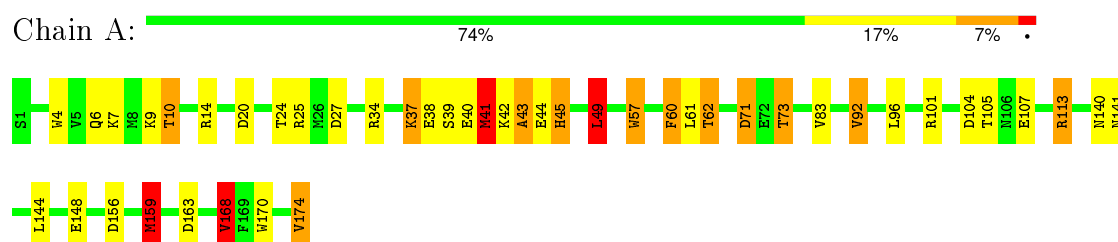
#### 4.2.14 Score per residue for model 14

- Molecule 1: Sarcoplasmic calcium-binding protein



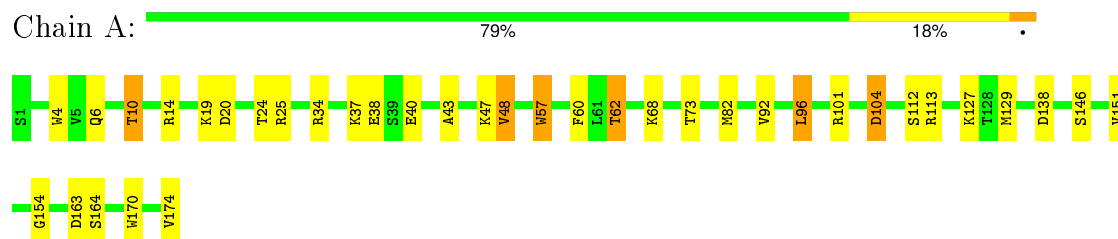
#### 4.2.15 Score per residue for model 15

- Molecule 1: Sarcoplasmic calcium-binding protein



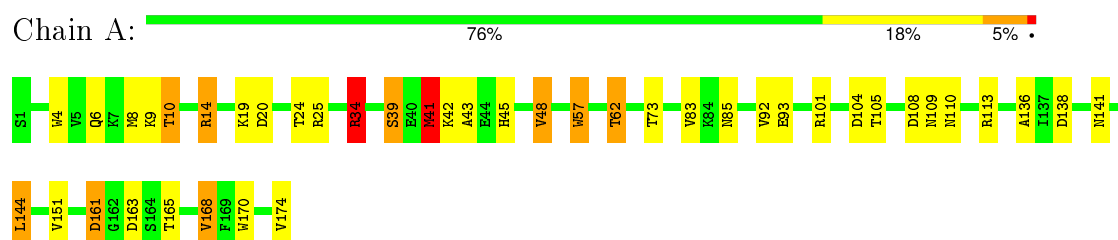
#### 4.2.16 Score per residue for model 16

- Molecule 1: Sarcoplasmic calcium-binding protein



#### 4.2.17 Score per residue for model 17

- Molecule 1: Sarcoplasmic calcium-binding protein



## 5 Refinement protocol and experimental data overview

The models were refined using the following method: *distance geometry, simulated annealing*.

Of the 17 calculated structures, 17 were deposited, based on the following criterion: *structures with the least restraint violations*.

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

Software name	Classification	Version
DGII	structure solution	2
DISCOVER	structure solution	3
DISCOVER	refinement	3

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)	BMRB entry 4129
Number of chemical shift lists	3
Total number of shifts	1210
Number of shifts mapped to atoms	1195
Number of unparsed shifts	0
Number of shifts with mapping errors	15
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	51%

No validations of the models with respect to experimental NMR restraints is performed at this time.

## 6 Model quality

### 6.1 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 (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	1.28±0.01	1±0/1396 (0.1±0.0%)	1.92±0.29	24±5/1880 (1.3±0.3%)
All	All	1.28	17/23732 (0.1%)	1.94	409/31960 (1.3%)

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	5.1±2.5
All	All	0	86

All unique bond outliers are listed below.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	174	VAL	C-OXT	7.58	1.37	1.23	17	17

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	43	ALA	O-C-N	-38.28	61.45	122.70	15	6
1	A	41	MET	O-C-N	-38.05	61.83	122.70	15	6
1	A	64	VAL	O-C-N	-37.76	62.28	122.70	14	1
1	A	68	LYS	O-C-N	-36.27	61.55	123.20	10	3
1	A	165	THR	O-C-N	-36.04	65.03	122.70	13	1
1	A	14	ARG	O-C-N	-33.73	68.74	122.70	5	1
1	A	83	VAL	O-C-N	-31.89	71.68	122.70	3	1
1	A	167	LYS	O-C-N	-30.03	74.65	122.70	6	1
1	A	44	GLU	O-C-N	-28.70	76.78	122.70	10	2
1	A	66	GLY	O-C-N	-26.89	77.48	123.20	12	4

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	37	LYS	O-C-N	-26.66	80.04	122.70	15	2
1	A	142	ASP	O-C-N	-26.55	78.07	123.20	2	1
1	A	60	PHE	O-C-N	-26.29	80.63	122.70	11	2
1	A	159	MET	O-C-N	-26.24	80.71	122.70	13	2
1	A	168	VAL	O-C-N	-25.91	81.25	122.70	11	8
1	A	40	GLU	O-C-N	-25.79	81.44	122.70	13	3
1	A	166	ASN	O-C-N	-24.82	82.99	122.70	7	1
1	A	125	LEU	O-C-N	-24.16	84.04	122.70	9	1
1	A	67	GLY	O-C-N	-23.96	84.37	122.70	9	1
1	A	161	ASP	O-C-N	-23.29	83.61	123.20	17	1
1	A	87	GLU	O-C-N	-22.98	85.92	122.70	6	3
1	A	163	ASP	O-C-N	-22.04	87.44	122.70	14	1
1	A	160	ASN	O-C-N	-21.43	88.41	122.70	14	1
1	A	43	ALA	CA-C-N	20.73	162.80	117.20	10	6
1	A	42	LYS	O-C-N	-20.55	89.81	122.70	6	1
1	A	68	LYS	CA-C-N	19.51	155.22	116.20	10	2
1	A	165	THR	CA-C-N	19.45	159.99	117.20	13	1
1	A	64	VAL	CA-C-N	17.80	156.35	117.20	14	1
1	A	41	MET	CA-C-N	17.22	155.09	117.20	15	1
1	A	59	ASN	OD1-CG-ND2	-17.10	82.56	121.90	12	2
1	A	6	GLN	OE1-CD-NE2	-17.01	82.78	121.90	11	2
1	A	85	ASN	OD1-CG-ND2	-16.87	83.11	121.90	12	2
1	A	160	ASN	OD1-CG-ND2	-16.81	83.23	121.90	14	2
1	A	77	ASN	OD1-CG-ND2	-16.74	83.41	121.90	13	1
1	A	166	ASN	OD1-CG-ND2	-16.49	83.96	121.90	4	1
1	A	56	VAL	CA-CB-CG1	13.90	131.75	110.90	9	1
1	A	68	LYS	CA-C-O	-12.35	94.17	120.10	10	1
1	A	41	MET	CA-C-O	-12.00	94.90	120.10	15	2
1	A	14	ARG	CA-C-O	-11.57	95.81	120.10	5	1
1	A	43	ALA	CA-C-O	-11.21	96.55	120.10	5	6
1	A	64	VAL	CA-C-O	-11.19	96.60	120.10	14	1
1	A	10	THR	CA-CB-CG2	10.79	127.51	112.40	11	4
1	A	165	THR	CA-C-O	-10.56	97.93	120.10	13	1
1	A	66	GLY	CA-C-O	-10.00	102.60	120.60	12	1
1	A	101	ARG	NE-CZ-NH1	9.97	125.29	120.30	13	17
1	A	25	ARG	NE-CZ-NH1	9.77	125.19	120.30	16	16
1	A	14	ARG	NE-CZ-NH1	9.69	125.14	120.30	9	17
1	A	103	VAL	CA-CB-CG1	9.49	125.13	110.90	6	1
1	A	92	VAL	CA-CB-CG1	9.28	124.83	110.90	10	12
1	A	113	ARG	NE-CZ-NH1	9.22	124.91	120.30	4	16
1	A	34	ARG	NE-CZ-NH1	9.10	124.85	120.30	2	14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	113	ARG	N-CA-CB	-9.04	94.32	110.60	14	2
1	A	41	MET	C-N-CA	8.72	143.51	121.70	5	1
1	A	83	VAL	CA-C-O	-8.70	101.83	120.10	3	1
1	A	25	ARG	NE-CZ-NH2	-8.67	115.97	120.30	6	8
1	A	144	LEU	CB-CG-CD1	8.22	124.97	111.00	15	7
1	A	34	ARG	NE-CZ-NH2	-8.05	116.28	120.30	15	5
1	A	84	LYS	CA-CB-CG	8.00	130.99	113.40	1	1
1	A	167	LYS	CA-C-O	-7.99	103.33	120.10	6	1
1	A	14	ARG	NE-CZ-NH2	-7.93	116.33	120.30	9	4
1	A	113	ARG	NE-CZ-NH2	-7.91	116.34	120.30	3	7
1	A	14	ARG	CA-C-N	7.55	133.82	117.20	5	1
1	A	44	GLU	CA-C-O	-7.20	104.98	120.10	10	2
1	A	53	LEU	CA-CB-CG	7.12	131.67	115.30	13	1
1	A	101	ARG	NE-CZ-NH2	-6.95	116.83	120.30	13	8
1	A	83	VAL	CB-CA-C	6.86	124.44	111.40	4	1
1	A	69	GLY	N-CA-C	6.84	130.19	113.10	5	1
1	A	104	ASP	N-CA-CB	-6.80	98.36	110.60	10	7
1	A	56	VAL	N-CA-CB	-6.67	96.84	111.50	9	2
1	A	49	LEU	CB-CA-C	6.63	122.81	110.20	9	2
1	A	56	VAL	CA-CB-CG2	6.63	120.84	110.90	7	1
1	A	168	VAL	CA-CB-CG1	6.60	120.80	110.90	13	4
1	A	53	LEU	CB-CA-C	6.49	122.54	110.20	13	1
1	A	62	THR	N-CA-CB	-6.49	97.97	110.30	6	16
1	A	99	PHE	CB-CG-CD2	-6.43	116.30	120.80	10	1
1	A	10	THR	OG1-CB-CG2	-6.42	95.24	110.00	11	1
1	A	128	THR	N-CA-CB	-6.38	98.19	110.30	4	1
1	A	85	ASN	N-CA-CB	-6.37	99.13	110.60	10	2
1	A	151	VAL	CA-CB-CG1	6.37	120.45	110.90	9	3
1	A	170	TRP	CD1-NE1-CE2	-6.20	103.42	109.00	14	17
1	A	56	VAL	CB-CA-C	6.19	123.17	111.40	9	1
1	A	83	VAL	CA-C-N	6.17	130.78	117.20	3	1
1	A	83	VAL	N-CA-CB	-6.11	98.06	111.50	4	1
1	A	57	TRP	CD1-NE1-CE2	-6.08	103.53	109.00	12	17
1	A	92	VAL	CA-CB-CG2	6.07	120.01	110.90	14	2
1	A	14	ARG	CB-CA-C	6.06	122.52	110.40	5	1
1	A	49	LEU	N-CA-CB	6.05	122.49	110.40	15	1
1	A	123	LEU	CB-CG-CD2	6.04	121.27	111.00	10	1
1	A	10	THR	N-CA-CB	5.99	121.67	110.30	4	2
1	A	48	VAL	CA-CB-CG1	5.98	119.88	110.90	16	10
1	A	37	LYS	CA-C-O	-5.98	107.54	120.10	15	1
1	A	159	MET	CA-CB-CG	5.85	123.25	113.30	15	1

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	142	ASP	CA-C-O	-5.83	107.86	120.10	2	1
1	A	4	TRP	CD1-NE1-CE2	-5.73	103.84	109.00	6	17
1	A	40	GLU	CA-C-O	-5.73	108.06	120.10	13	1
1	A	87	GLU	C-N-CA	5.73	136.02	121.70	6	3
1	A	56	VAL	CG1-CB-CG2	-5.70	101.78	110.90	9	3
1	A	51	ASP	CA-CB-CG	5.69	125.92	113.40	2	1
1	A	42	LYS	C-N-CA	5.66	135.84	121.70	6	1
1	A	164	SER	N-CA-CB	-5.62	102.06	110.50	7	1
1	A	96	LEU	CB-CA-C	5.57	120.78	110.20	12	1
1	A	99	PHE	CB-CG-CD1	5.53	124.67	120.80	10	1
1	A	35	PHE	N-CA-CB	-5.53	100.66	110.60	6	1
1	A	89	LYS	CA-CB-CG	5.51	125.51	113.40	6	2
1	A	41	MET	CA-CB-CG	5.48	122.62	113.30	17	1
1	A	45	HIS	CG-ND1-CE1	-5.47	98.59	105.70	1	10
1	A	62	THR	CA-CB-CG2	5.45	120.03	112.40	15	2
1	A	44	GLU	CA-C-N	5.44	129.18	117.20	10	1
1	A	24	THR	CA-CB-CG2	5.37	119.92	112.40	12	8
1	A	104	ASP	CB-CG-OD1	5.34	123.11	118.30	1	1
1	A	153	ALA	N-CA-CB	-5.28	102.71	110.10	4	1
1	A	148	GLU	N-CA-CB	-5.28	101.11	110.60	15	2
1	A	148	GLU	CA-CB-CG	5.23	124.92	113.40	12	2
1	A	125	LEU	CB-CG-CD1	5.23	119.90	111.00	6	1
1	A	93	GLU	N-CA-CB	-5.17	101.28	110.60	17	1
1	A	129	MET	CA-CB-CG	5.17	122.09	113.30	5	1
1	A	14	ARG	CB-CG-CD	5.16	125.02	111.60	13	1
1	A	9	LYS	N-CA-CB	-5.15	101.33	110.60	10	1
1	A	143	GLY	N-CA-C	5.10	125.84	113.10	2	1
1	A	169	PHE	N-CA-C	5.06	124.67	111.00	13	1
1	A	16	ASP	CB-CG-OD1	5.06	122.85	118.30	6	1
1	A	60	PHE	CB-CG-CD1	-5.04	117.27	120.80	16	1
1	A	83	VAL	CA-CB-CG1	5.04	118.45	110.90	7	1
1	A	67	GLY	CA-C-O	-5.03	111.55	120.60	9	1
1	A	37	LYS	CA-C-N	5.02	128.24	117.20	15	1
1	A	45	HIS	ND1-CE1-NE2	5.01	120.93	109.90	1	1
1	A	174	VAL	CA-CB-CG2	5.00	118.40	110.90	10	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	168	VAL	Mainchain	8
1	A	25	ARG	Sidechain	7
1	A	41	MET	Mainchain	6
1	A	43	ALA	Mainchain	6
1	A	34	ARG	Sidechain	6
1	A	66	GLY	Mainchain	4
1	A	14	ARG	Sidechain,Mainchain	4
1	A	87	GLU	Mainchain	3
1	A	68	LYS	Mainchain	3
1	A	40	GLU	Mainchain	3
1	A	6	GLN	Sidechain	2
1	A	160	ASN	Sidechain,Mainchain	2
1	A	60	PHE	Mainchain	2
1	A	45	HIS	Sidechain	2
1	A	166	ASN	Sidechain,Mainchain	2
1	A	159	MET	Mainchain	2
1	A	59	ASN	Sidechain	2
1	A	113	ARG	Sidechain	2
1	A	37	LYS	Mainchain	2
1	A	44	GLU	Mainchain	2
1	A	85	ASN	Sidechain	2
1	A	77	ASN	Sidechain	1
1	A	167	LYS	Mainchain	1
1	A	165	THR	Mainchain	1
1	A	67	GLY	Mainchain	1
1	A	161	ASP	Mainchain	1
1	A	142	ASP	Mainchain	1
1	A	163	ASP	Mainchain	1
1	A	64	VAL	Mainchain	1
1	A	42	LYS	Mainchain	1
1	A	157	PHE	Sidechain	1
1	A	83	VAL	Mainchain	1
1	A	125	LEU	Mainchain	1
1	A	100	PHE	Sidechain	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	1368	1310	1310	7±2
All	All	23256	22270	22253	117

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:136:ALA:HB2	1:A:165:THR:OG1	0.89	1.68	5	3
1:A:6:GLN:O	1:A:10:THR:OG1	0.81	1.97	14	11
1:A:41:MET:CB	1:A:105:THR:OG1	0.73	2.36	15	8
1:A:57:TRP:O	1:A:62:THR:OG1	0.68	2.11	7	17
1:A:41:MET:SD	1:A:105:THR:OG1	0.68	2.50	10	3
1:A:41:MET:HA	1:A:105:THR:OG1	0.66	1.90	11	7
1:A:41:MET:HB3	1:A:105:THR:OG1	0.65	1.91	17	7
1:A:136:ALA:CB	1:A:165:THR:OG1	0.65	2.45	3	2
1:A:41:MET:HB2	1:A:105:THR:OG1	0.58	1.98	1	3
1:A:136:ALA:HB2	1:A:165:THR:HG1	0.57	1.59	5	1
1:A:57:TRP:C	1:A:62:THR:HG1	0.55	2.02	10	7
1:A:110:ASN:CB	1:A:144:LEU:HD11	0.54	2.32	9	1
1:A:110:ASN:CB	1:A:144:LEU:HD12	0.53	2.34	5	8
1:A:71:ASP:OD1	1:A:73:THR:OG1	0.52	2.28	6	2
1:A:7:LYS:HA	1:A:10:THR:OG1	0.51	2.04	15	2
1:A:41:MET:HA	1:A:105:THR:HG1	0.51	1.66	11	1
1:A:57:TRP:C	1:A:62:THR:OG1	0.48	2.51	4	7
1:A:136:ALA:HB1	1:A:165:THR:OG1	0.48	2.09	3	1
1:A:126:ASP:O	1:A:129:MET:SD	0.48	2.72	6	1
1:A:36:ALA:HA	1:A:41:MET:SD	0.48	2.49	4	1
1:A:49:LEU:H	1:A:49:LEU:HD23	0.47	1.69	15	1
1:A:56:VAL:CG2	1:A:98:LEU:HB3	0.47	2.39	10	1
1:A:96:LEU:HD21	1:A:154:GLY:HA3	0.47	1.85	16	1
1:A:41:MET:CA	1:A:105:THR:OG1	0.46	2.62	11	3
1:A:126:ASP:OD2	1:A:128:THR:OG1	0.46	2.33	13	1
1:A:110:ASN:HB2	1:A:144:LEU:HD12	0.45	1.89	5	2
1:A:40:GLU:O	1:A:105:THR:OG1	0.44	2.27	8	2
1:A:41:MET:HG2	1:A:105:THR:OG1	0.44	2.11	4	1
1:A:14:ARG:HD3	1:A:125:LEU:HD11	0.43	1.89	3	1
1:A:112:SER:OG	1:A:115:GLU:OE1	0.43	2.36	7	2
1:A:96:LEU:HD23	1:A:151:VAL:HA	0.43	1.89	16	1
1:A:7:LYS:O	1:A:10:THR:OG1	0.42	2.32	6	1
1:A:96:LEU:HD22	1:A:154:GLY:HA3	0.41	1.92	8	1
1:A:71:ASP:OD2	1:A:73:THR:OG1	0.41	2.33	15	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:146:SER:OG	1:A:148:GLU:OE1	0.41	2.37	5	1
1:A:10:THR:OG1	1:A:11:TYR:N	0.40	2.54	3	1
1:A:39:SER:HB3	1:A:41:MET:SD	0.40	2.57	17	1
1:A:89:LYS:O	1:A:92:VAL:HG13	0.40	2.17	10	1
1:A:110:ASN:HB2	1:A:144:LEU:HD11	0.40	1.93	9	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	172/174 (99%)	154±2 (90±1%)	13±3 (8±2%)	5±1 (3±1%)	10	45
All	All	2924/2958 (99%)	2624 (90%)	222 (8%)	78 (3%)	10	45

All 25 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	138	ASP	12
1	A	43	ALA	12
1	A	163	ASP	6
1	A	164	SER	6
1	A	104	ASP	6
1	A	109	ASN	5
1	A	69	GLY	4
1	A	88	ALA	3
1	A	44	GLU	3
1	A	61	LEU	2
1	A	67	GLY	2
1	A	167	LYS	2
1	A	165	THR	2
1	A	107	GLU	2
1	A	64	VAL	1
1	A	169	PHE	1
1	A	173	LEU	1

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Mol	Chain	Res	Type	Models (Total)
1	A	40	GLU	1
1	A	16	ASP	1
1	A	42	LYS	1
1	A	68	LYS	1
1	A	41	MET	1
1	A	160	ASN	1
1	A	45	HIS	1
1	A	105	THR	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	148/148 (100%)	129±4 (87±3%)	19±4 (13±3%)	10	51
All	All	2516/2516 (100%)	2195 (87%)	321 (13%)	10	51

All 81 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	73	THR	16
1	A	20	ASP	15
1	A	19	LYS	14
1	A	10	THR	14
1	A	24	THR	14
1	A	48	VAL	10
1	A	127	LYS	9
1	A	34	ARG	8
1	A	112	SER	8
1	A	168	VAL	8
1	A	96	LEU	8
1	A	101	ARG	7
1	A	8	MET	7
1	A	47	LYS	6
1	A	166	ASN	6
1	A	40	GLU	6
1	A	113	ARG	6

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Mol	Chain	Res	Type	Models (Total)
1	A	83	VAL	5
1	A	141	ASN	5
1	A	129	MET	5
1	A	109	ASN	5
1	A	42	LYS	5
1	A	92	VAL	5
1	A	139	THR	4
1	A	125	LEU	4
1	A	151	VAL	4
1	A	82	MET	4
1	A	93	GLU	4
1	A	41	MET	4
1	A	159	MET	4
1	A	14	ARG	4
1	A	9	LYS	4
1	A	38	GLU	4
1	A	146	SER	4
1	A	108	ASP	4
1	A	161	ASP	3
1	A	33	GLU	3
1	A	81	GLU	3
1	A	71	ASP	3
1	A	27	ASP	3
1	A	39	SER	3
1	A	37	LYS	3
1	A	17	PHE	3
1	A	114	ASP	3
1	A	89	LYS	3
1	A	61	LEU	2
1	A	35	PHE	2
1	A	174	VAL	2
1	A	68	LYS	2
1	A	123	LEU	2
1	A	49	LEU	2
1	A	26	MET	2
1	A	144	LEU	2
1	A	84	LYS	2
1	A	50	MET	2
1	A	31	MET	2
1	A	122	MET	2
1	A	3	LEU	2
1	A	148	GLU	2

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Mol	Chain	Res	Type	Models (Total)
1	A	80	LYS	2
1	A	98	LEU	1
1	A	53	LEU	1
1	A	18	ASP	1
1	A	7	LYS	1
1	A	163	ASP	1
1	A	2	ASP	1
1	A	44	GLU	1
1	A	156	ASP	1
1	A	45	HIS	1
1	A	140	ASN	1
1	A	138	ASP	1
1	A	29	GLU	1
1	A	58	ASP	1
1	A	160	ASN	1
1	A	103	VAL	1
1	A	52	SER	1
1	A	59	ASN	1
1	A	87	GLU	1
1	A	110	ASN	1
1	A	107	GLU	1
1	A	51	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 carbohydrates 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 51% for the well-defined parts and 51% for the entire structure.

### 7.1 Chemical shift list 1

File name: BMRB entry 4129

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	1195
Number of shifts mapped to atoms	1195
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	6

#### 7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction $\pm$ precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	0	—	—
$^{13}\text{C}_\beta$	0	—	—
$^{13}\text{C}'$	0	—	—
$^{15}\text{N}$	165	$2.68 \pm 0.19$	Should be applied

#### 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 51%, i.e. 1064 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	$^1\text{H}$	$^{13}\text{C}$	$^{15}\text{N}$
Backbone	498/860 (58%)	333/343 (97%)	0/348 (0%)	165/169 (98%)
Sidechain	464/1029 (45%)	453/599 (76%)	0/391 (0%)	11/39 (28%)

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	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Aromatic	102/194 (53%)	99/105 (94%)	0/85 (0%)	3/4 (75%)
Overall	1064/2083 (51%)	885/1047 (85%)	0/824 (0%)	179/212 (84%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 51%, i.e. 1064 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Backbone	498/860 (58%)	333/343 (97%)	0/348 (0%)	165/169 (98%)
Sidechain	464/1029 (45%)	453/599 (76%)	0/391 (0%)	11/39 (28%)
Aromatic	102/194 (53%)	99/105 (94%)	0/85 (0%)	3/4 (75%)
Overall	1064/2083 (51%)	885/1047 (85%)	0/824 (0%)	179/212 (84%)

#### 7.1.4 Statistically unusual chemical shifts ⓘ

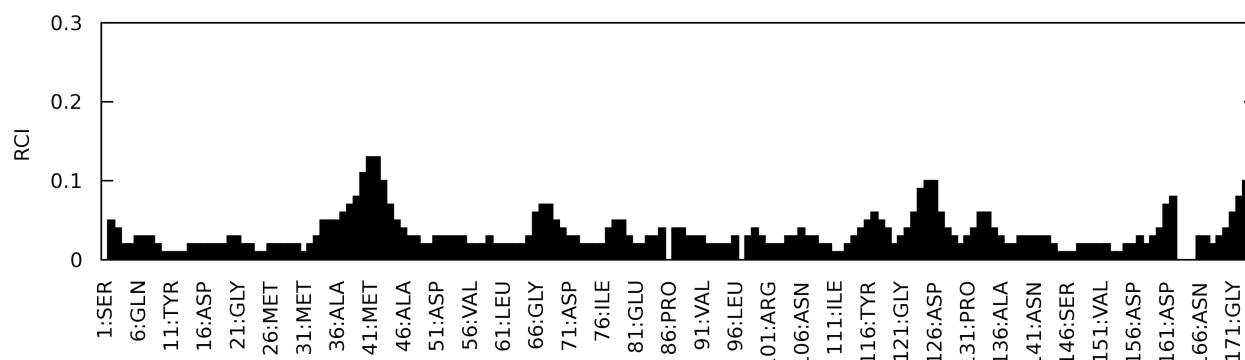
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

Mol	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	25	ARG	NE	115.80	92.63 – 76.73	19.6
1	A	14	ARG	NE	115.50	92.63 – 76.73	19.4
1	A	113	ARG	HG2	-0.06	2.92 – 0.22	-6.0
1	A	25	ARG	HB3	0.22	3.17 – 0.37	-5.5
1	A	154	GLY	HA3	1.81	5.80 – 2.00	-5.5
1	A	170	TRP	HE1	7.28	12.85 – 7.35	-5.1

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

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.

Random coil index (RCI) for chain A:



## 7.2 Chemical shift list 2

File name: BMRB entry 4129

Chemical shift list name: *assigned\_chem\_shift\_list\_2*

### 7.2.1 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	4
Number of shifts mapped to atoms	0
Number of unparsed shifts	0
Number of shifts with mapping errors	4
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	0

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

- Chain not found in structure. All 4 occurrences are reported below.

Chain	Res	Type	Atom	Shift Data		
				Value	Uncertainty	Ambiguity
UNMAPPED	1	SAC	HA	4.4	0.01	1
UNMAPPED	1	SAC	H3	1.84	0.01	1
UNMAPPED	1	SAC	HB2	4.33	0.01	2
UNMAPPED	1	SAC	H	9.54	0.01	1

### 7.2.2 Chemical shift referencing ⓘ

No chemical shift referencing corrections were calculated (not enough data).



### 7.2.3 Completeness of resonance assignments [i](#)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 0%, i.e. 0 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Backbone	0/860 (0%)	0/343 (0%)	0/348 (0%)	0/169 (0%)
Sidechain	0/1029 (0%)	0/599 (0%)	0/391 (0%)	0/39 (0%)
Aromatic	0/194 (0%)	0/105 (0%)	0/85 (0%)	0/4 (0%)
Overall	0/2083 (0%)	0/1047 (0%)	0/824 (0%)	0/212 (0%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 0%, i.e. 0 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Backbone	0/860 (0%)	0/343 (0%)	0/348 (0%)	0/169 (0%)
Sidechain	0/1029 (0%)	0/599 (0%)	0/391 (0%)	0/39 (0%)
Aromatic	0/194 (0%)	0/105 (0%)	0/85 (0%)	0/4 (0%)
Overall	0/2083 (0%)	0/1047 (0%)	0/824 (0%)	0/212 (0%)

### 7.2.4 Statistically unusual chemical shifts [i](#)

There are no statistically unusual chemical shifts.

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

No *random coil index* (RCI) plot could be generated from the current chemical shift list (assigned\_chem\_shift\_list\_2). RCI is only applicable to proteins.

## 7.3 Chemical shift list 3

File name: BMRB entry 4129

Chemical shift list name: *assigned\_chem\_shift\_list\_3*

### 7.3.1 Bookkeeping [i](#)

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	11
Number of shifts mapped to atoms	0
Number of unparsed shifts	0
Number of shifts with mapping errors	11
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	0

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

- Chain not found in structure. All 11 occurrences are reported below.

Chain	Res	Type	Atom	Shift Data		
				Value	Uncertainty	Ambiguity
UNMAPPED	5	VAL	H	9.08	0.01	1
UNMAPPED	9	LYS	H	8.95	0.01	1
UNMAPPED	160	ASN	H	8.35	0.01	1
UNMAPPED	114	ASP	H	8.34	0.01	1
UNMAPPED	162	GLY	H	8.83	0.01	1
UNMAPPED	8	MET	H	8.24	0.01	1
UNMAPPED	161	ASP	H	9.27	0.01	1
UNMAPPED	7	LYS	H	8.81	0.01	1
UNMAPPED	159	MET	H	8.83	0.01	1
UNMAPPED	80	LYS	H	8.73	0.01	1
UNMAPPED	84	LYS	H	6.88	0.01	1

### 7.3.2 Chemical shift referencing

No chemical shift referencing corrections were calculated (not enough data).

### 7.3.3 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 0%, i.e. 0 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Backbone	0/860 (0%)	0/343 (0%)	0/348 (0%)	0/169 (0%)
Sidechain	0/1029 (0%)	0/599 (0%)	0/391 (0%)	0/39 (0%)
Aromatic	0/194 (0%)	0/105 (0%)	0/85 (0%)	0/4 (0%)
Overall	0/2083 (0%)	0/1047 (0%)	0/824 (0%)	0/212 (0%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 0%, i.e. 0 atoms were assigned a chemical shift out of a possible 2083. 0 out of 23 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	$^1\text{H}$	$^{13}\text{C}$	$^{15}\text{N}$
Backbone	0/860 (0%)	0/343 (0%)	0/348 (0%)	0/169 (0%)
Sidechain	0/1029 (0%)	0/599 (0%)	0/391 (0%)	0/39 (0%)
Aromatic	0/194 (0%)	0/105 (0%)	0/85 (0%)	0/4 (0%)
Overall	0/2083 (0%)	0/1047 (0%)	0/824 (0%)	0/212 (0%)

### 7.3.4 Statistically unusual chemical shifts [i](#)

There are no statistically unusual chemical shifts.

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

No *random coil index* (RCI) plot could be generated from the current chemical shift list (assigned\_chem\_shift\_list\_3). RCI is only applicable to proteins.