



Full wwPDB NMR Structure Validation Report ⓘ

May 29, 2020 – 07:52 am BST

PDB ID : 5NF8
Title : Solution structure of detergent-solubilized Rcf1, a yeast mitochondrial inner membrane protein involved in respiratory Complex III/IV supercomplex formation
Authors : Zhou, S.; Pettersson, P.; Sjöholm, J.; Sjöstrand, D.; Hogbom, M.; Brzezinski, P.; Maler, L.; Adelroth, P.
Deposited on : 2017-03-13

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 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
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : 2.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

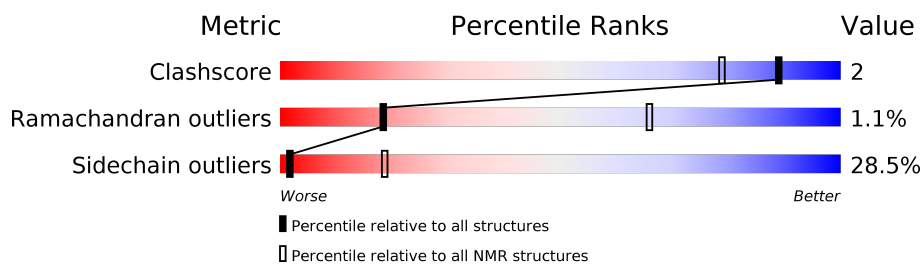
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 40%.

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	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

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	174	 71% 14% 6% 9%
1	B	174	 60% 25% 6% 9%

2 Ensemble composition and analysis i

This entry contains 15 models. Model 13 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

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:12-A:159, B:12-B:159 (296)	1.10	13

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 4 single-model clusters were found.

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

3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 5272 atoms, of which 2684 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Respiratory supercomplex factor 1, mitochondrial.

Mol	Chain	Residues	Atoms						Trace
1	A	159	Total	C	H	N	O	S	0
			2636	816	1342	232	239	7	
1	B	159	Total	C	H	N	O	S	0
			2636	816	1342	232	239	7	

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	160	GLU	-	expression tag	UNP B3LLM2
A	161	PHE	-	expression tag	UNP B3LLM2
A	162	ARG	-	expression tag	UNP B3LLM2
A	163	VAL	-	expression tag	UNP B3LLM2
A	164	PRO	-	expression tag	UNP B3LLM2
A	165	GLY	-	expression tag	UNP B3LLM2
A	166	SER	-	expression tag	UNP B3LLM2
A	167	HIS	-	expression tag	UNP B3LLM2
A	168	HIS	-	expression tag	UNP B3LLM2
A	169	HIS	-	expression tag	UNP B3LLM2
A	170	HIS	-	expression tag	UNP B3LLM2
A	171	HIS	-	expression tag	UNP B3LLM2
A	172	HIS	-	expression tag	UNP B3LLM2
A	173	HIS	-	expression tag	UNP B3LLM2
A	174	HIS	-	expression tag	UNP B3LLM2
B	160	GLU	-	expression tag	UNP B3LLM2
B	161	PHE	-	expression tag	UNP B3LLM2
B	162	ARG	-	expression tag	UNP B3LLM2
B	163	VAL	-	expression tag	UNP B3LLM2
B	164	PRO	-	expression tag	UNP B3LLM2
B	165	GLY	-	expression tag	UNP B3LLM2
B	166	SER	-	expression tag	UNP B3LLM2
B	167	HIS	-	expression tag	UNP B3LLM2
B	168	HIS	-	expression tag	UNP B3LLM2
B	169	HIS	-	expression tag	UNP B3LLM2
B	170	HIS	-	expression tag	UNP B3LLM2
B	171	HIS	-	expression tag	UNP B3LLM2
B	172	HIS	-	expression tag	UNP B3LLM2
B	173	HIS	-	expression tag	UNP B3LLM2

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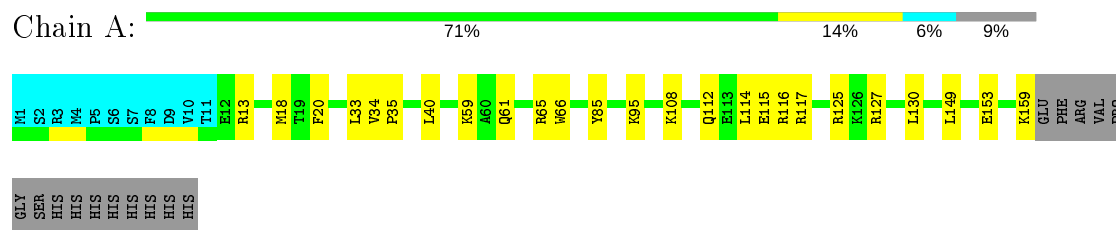
Chain	Residue	Modelled	Actual	Comment	Reference
B	174	HIS	-	expression tag	UNP B3LLM2

4 Residue-property plots

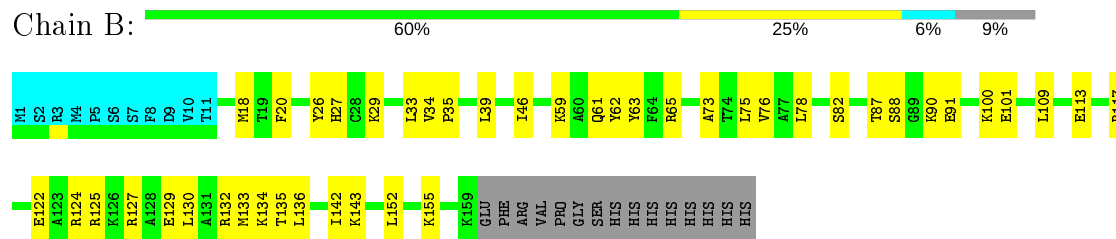
4.1 Average score per residue in the NMR ensemble

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: Respiratory supercomplex factor 1, mitochondrial



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

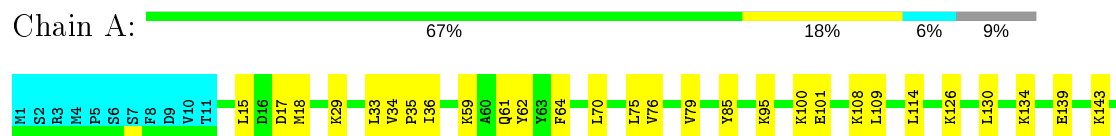


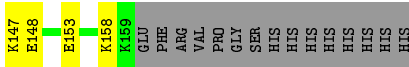
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

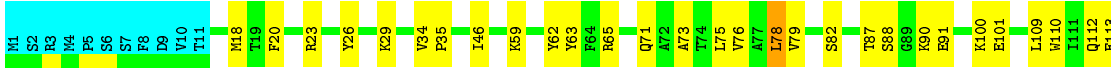
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial





- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

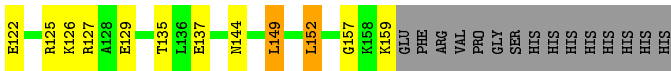
Chain B: 59% 25% 6% 9%



4.2.2 Score per residue for model 2

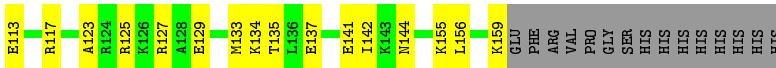
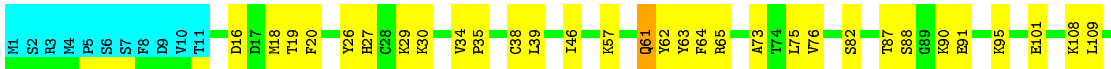
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain A: 63% 21% 6% 9%



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

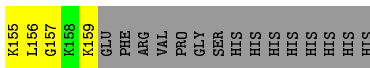
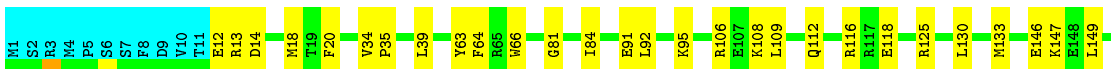
Chain B: 58% 26% 6% 9%



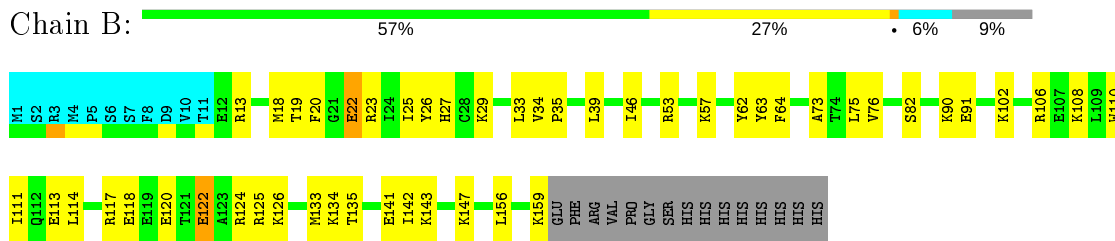
4.2.3 Score per residue for model 3

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain A: 67% 18% 6% 9%

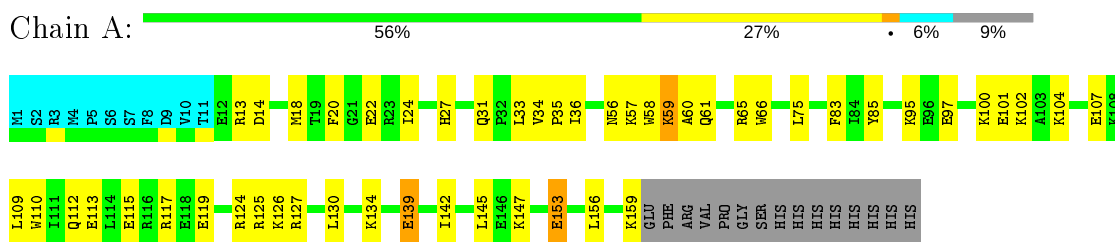


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

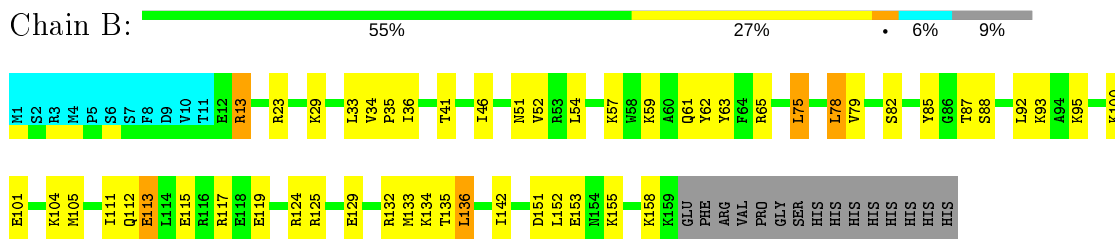


4.2.4 Score per residue for model 4

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

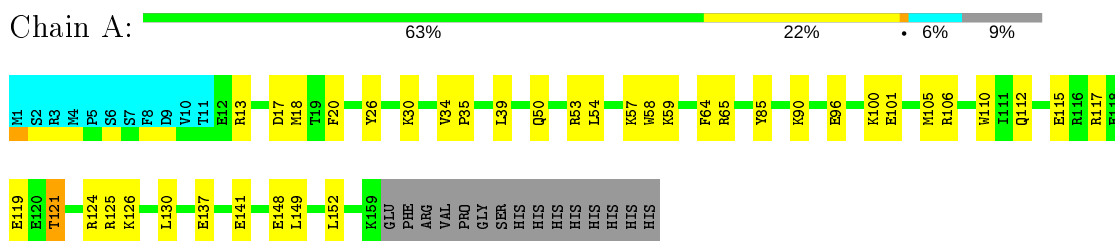


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

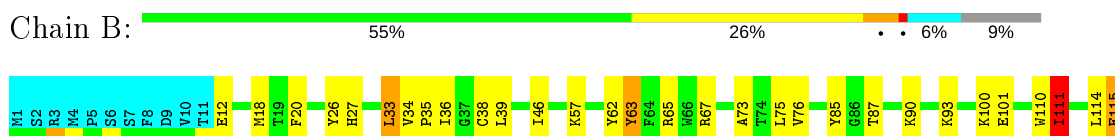


4.2.5 Score per residue for model 5

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial



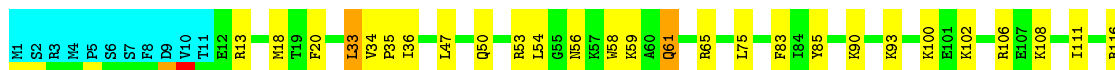
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial



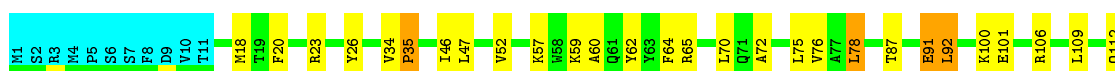


4.2.6 Score per residue for model 6

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial



4.2.7 Score per residue for model 7

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

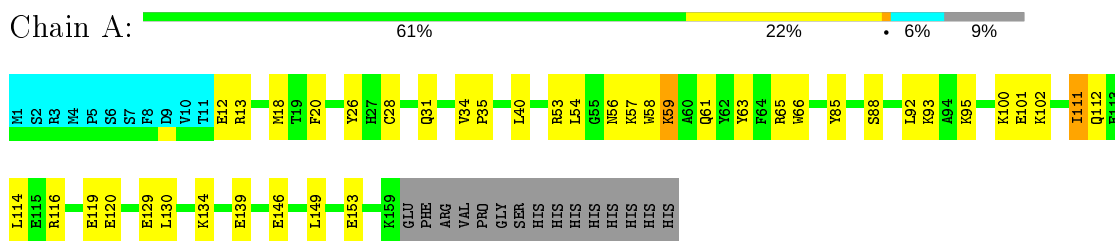


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

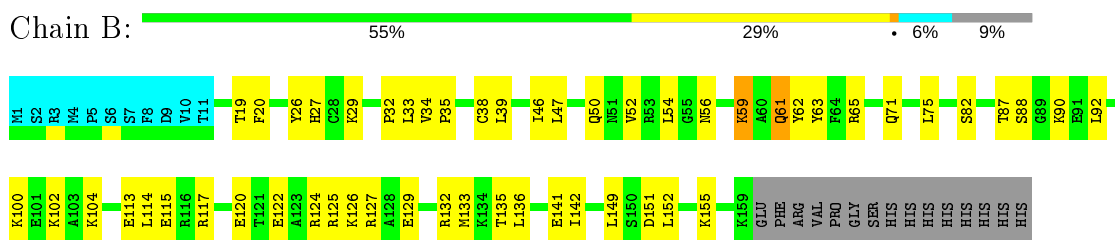


4.2.8 Score per residue for model 8

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

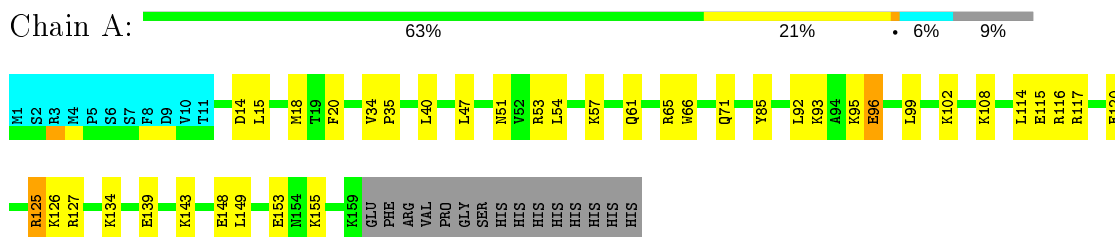


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

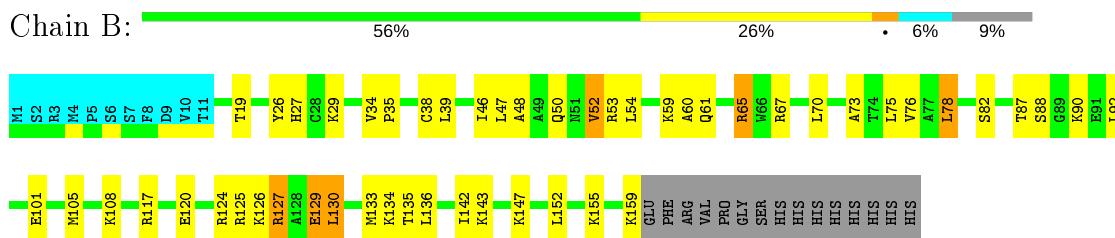


4.2.9 Score per residue for model 9

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

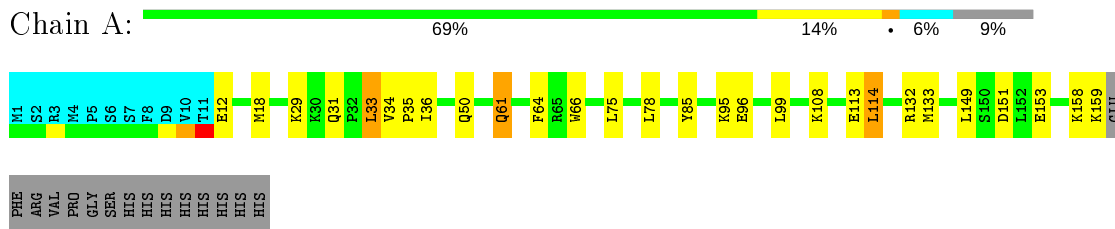


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

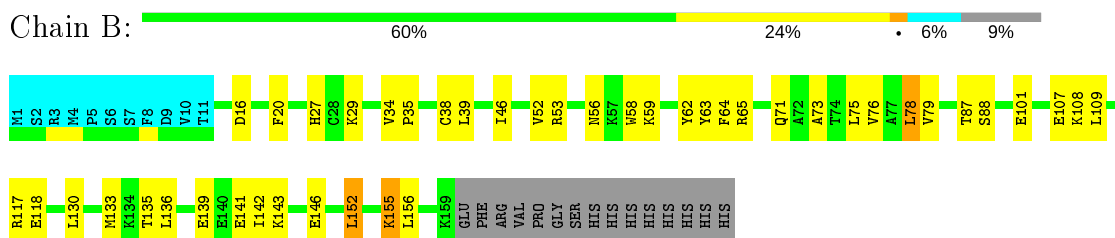


4.2.10 Score per residue for model 10

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

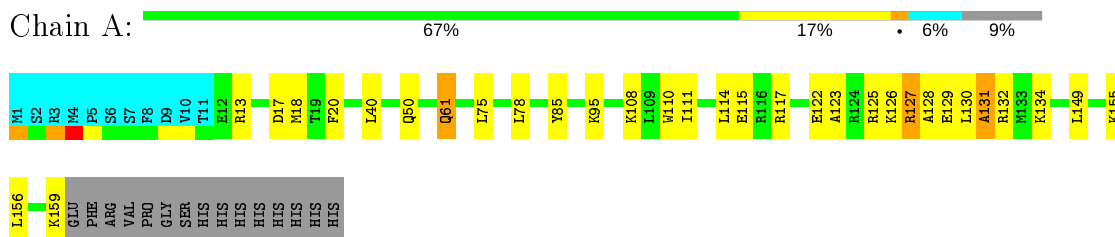


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

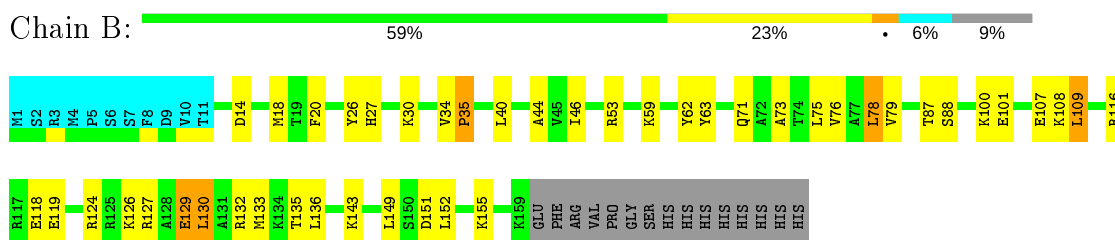


4.2.11 Score per residue for model 11

- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

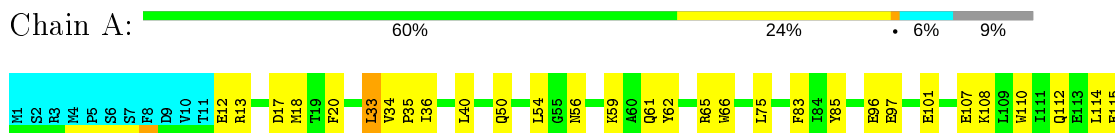


- Molecule 1: Respiratory supercomplex factor 1, mitochondrial



4.2.12 Score per residue for model 12

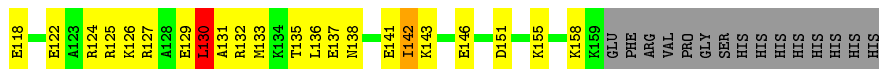
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial





- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

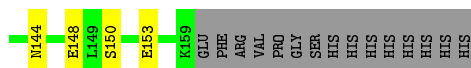
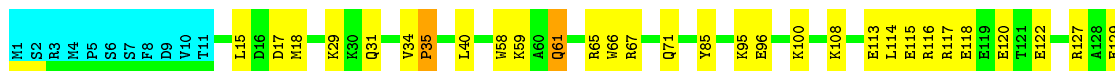
Chain B: 56% 27% 6% 9%



4.2.13 Score per residue for model 13 (medoid)

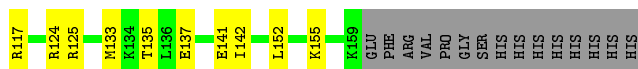
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain A: 66% 18% 6% 9%



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

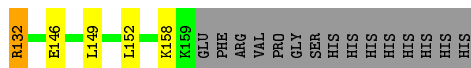
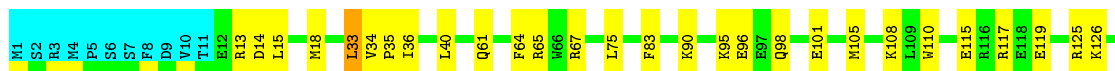
Chain B: 63% 22% 6% 9%



4.2.14 Score per residue for model 14

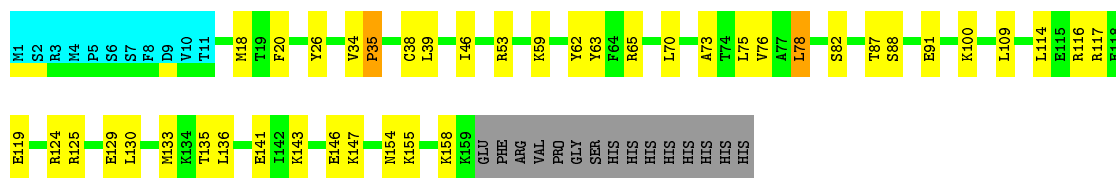
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain A: 66% 18% 6% 9%



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

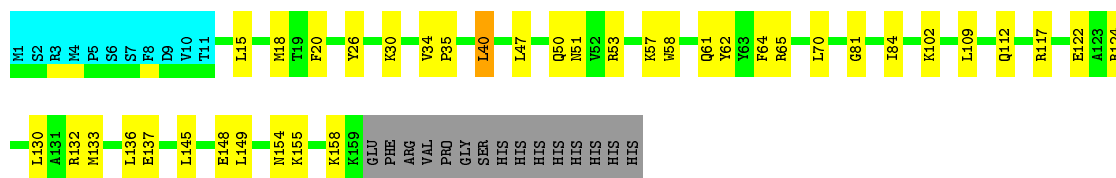
Chain B: 



4.2.15 Score per residue for model 15

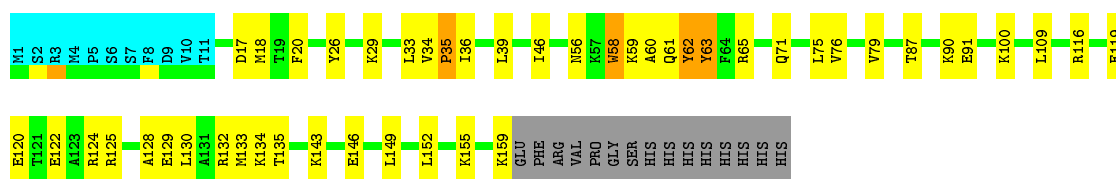
- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain A: 



- Molecule 1: Respiratory supercomplex factor 1, mitochondrial

Chain B: 



5 Refinement protocol and experimental data overview

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

Of the 100 calculated structures, 15 were deposited, based on the following criterion: *structures with the lowest energy*.

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

Software name	Classification	Version
CNS	structure calculation	

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)	input_cs.cif
Number of chemical shift lists	1
Total number of shifts	1779
Number of shifts mapped to atoms	1779
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	40%

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

6 Model quality i

6.1 Standard geometry i

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

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	1209	1258	1257	3±1
1	B	1209	1258	1257	6±2
All	All	36270	37740	37710	130

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:B:78:LEU:HD11	1:B:95:LYS:HE2	0.81	1.53	4	1
1:B:127:ARG:HA	1:B:130:LEU:HD23	0.71	1.62	5	1
1:B:149:LEU:HA	1:B:152:LEU:HD12	0.67	1.66	7	2
1:B:78:LEU:C	1:B:78:LEU:HD13	0.66	2.11	1	5
1:B:33:LEU:HD22	1:B:36:ILE:HD12	0.62	1.71	5	2
1:B:131:ALA:HB1	1:B:134:LYS:HG3	0.60	1.72	5	1
1:B:78:LEU:HD22	1:B:78:LEU:O	0.59	1.97	6	3
1:B:78:LEU:O	1:B:78:LEU:HD22	0.55	2.02	10	4
1:B:78:LEU:HD13	1:B:78:LEU:C	0.54	2.23	9	2
1:B:73:ALA:O	1:B:76:VAL:HG22	0.54	2.03	1	9
1:A:33:LEU:HD22	1:A:36:ILE:HD12	0.54	1.80	4	1
1:A:40:LEU:HD11	1:A:145:LEU:HD23	0.54	1.79	15	1
1:A:149:LEU:HA	1:A:152:LEU:HD23	0.53	1.79	2	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:B:34:VAL:HB	1:B:35:PRO:HD3	0.52	1.82	10	15
1:A:149:LEU:HA	1:A:152:LEU:HD12	0.52	1.80	5	1
1:A:33:LEU:HB2	1:A:36:ILE:HG22	0.51	1.81	1	1
1:A:130:LEU:O	1:A:131:ALA:CB	0.51	2.58	11	1
1:B:108:LYS:HB2	1:B:111:ILE:HD12	0.50	1.82	3	1
1:A:81:GLY:O	1:A:84:ILE:HG22	0.50	2.06	7	3
1:A:34:VAL:HB	1:A:35:PRO:HD3	0.50	1.84	3	13
1:B:33:LEU:HD22	1:B:36:ILE:CD1	0.50	2.36	5	1
1:B:76:VAL:O	1:B:79:VAL:HG12	0.50	2.07	13	2
1:B:91:GLU:HG3	1:B:92:LEU:N	0.49	2.21	6	1
1:B:78:LEU:HD13	1:B:79:VAL:N	0.48	2.23	11	3
1:B:56:ASN:HA	1:B:59:LYS:HD3	0.48	1.85	8	1
1:B:52:VAL:HG22	1:B:65:ARG:NH2	0.48	2.24	10	1
1:B:60:ALA:HB1	1:B:62:TYR:CZ	0.48	2.43	15	1
1:B:33:LEU:CD2	1:B:36:ILE:HD12	0.47	2.40	12	2
1:B:129:GLU:O	1:B:130:LEU:C	0.47	2.53	11	1
1:B:40:LEU:O	1:B:44:ALA:HB2	0.47	2.09	11	1
1:A:56:ASN:O	1:A:60:ALA:HB2	0.46	2.11	4	1
1:A:33:LEU:CB	1:A:36:ILE:HG22	0.46	2.40	1	1
1:B:72:ALA:O	1:B:76:VAL:HG13	0.46	2.09	6	1
1:B:34:VAL:HB	1:B:35:PRO:CD	0.46	2.41	8	6
1:B:152:LEU:HA	1:B:155:LYS:CE	0.45	2.41	10	1
1:B:138:ASN:O	1:B:142:ILE:HG23	0.45	2.10	6	2
1:A:33:LEU:HD13	1:A:36:ILE:HD12	0.45	1.88	14	1
1:A:114:LEU:N	1:A:114:LEU:HD13	0.45	2.26	10	1
1:A:24:ILE:HG21	1:A:142:ILE:HD12	0.44	1.90	7	1
1:A:34:VAL:HB	1:A:35:PRO:CD	0.44	2.43	5	2
1:A:123:ALA:HB1	1:A:127:ARG:NH1	0.44	2.27	11	1
1:A:139:GLU:O	1:A:142:ILE:HG22	0.44	2.12	4	1
1:B:110:TRP:O	1:B:111:ILE:HD12	0.44	2.13	5	1
1:B:60:ALA:HB1	1:B:62:TYR:CE1	0.44	2.48	15	1
1:A:33:LEU:HD13	1:A:36:ILE:HD11	0.44	1.90	10	3
1:B:50:GLN:HG2	1:B:54:LEU:HD12	0.43	1.90	9	1
1:A:76:VAL:O	1:A:79:VAL:HG12	0.43	2.13	1	1
1:B:115:GLU:HB2	1:B:119:GLU:HB2	0.43	1.90	5	1
1:A:115:GLU:HG2	1:A:119:GLU:HB3	0.43	1.90	12	1
1:A:114:LEU:HD13	1:A:114:LEU:H	0.43	1.73	10	1
1:A:56:ASN:HA	1:A:66:TRP:CZ2	0.43	2.48	12	1
1:B:32:PRO:C	1:B:33:LEU:HD22	0.43	2.34	8	1
1:B:129:GLU:O	1:B:130:LEU:CB	0.43	2.66	12	2
1:A:34:VAL:N	1:A:35:PRO:HD2	0.42	2.28	1	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:153:GLU:HA	1:A:156:LEU:HD12	0.42	1.91	4	1
1:B:22:GLU:HA	1:B:25:ILE:HD12	0.42	1.90	3	1
1:B:65:ARG:HD2	1:B:65:ARG:O	0.42	2.13	9	1
1:B:121:THR:HA	1:B:124:ARG:HD3	0.42	1.91	6	1
1:B:152:LEU:HD12	1:B:153:GLU:N	0.41	2.30	5	1
1:A:96:GLU:HA	1:A:99:LEU:HD12	0.41	1.92	9	1
1:B:48:ALA:O	1:B:52:VAL:HG22	0.41	2.15	9	1
1:B:33:LEU:HD22	1:B:36:ILE:CG2	0.41	2.46	15	1
1:B:75:LEU:O	1:B:79:VAL:HG23	0.41	2.16	4	1
1:B:138:ASN:O	1:B:142:ILE:HG22	0.41	2.16	5	1
1:B:50:GLN:CG	1:B:54:LEU:HD12	0.41	2.46	8	1
1:B:78:LEU:CD1	1:B:78:LEU:C	0.40	2.83	1	1
1:A:59:LYS:HA	1:A:66:TRP:CH2	0.40	2.52	2	1
1:B:13:ARG:HB3	1:B:136:LEU:HD11	0.40	1.93	4	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	147/174 (84%)	137±2 (93±1%)	8±2 (6±1%)	1±1 (1±1%)	20	68
1	B	147/174 (84%)	137±3 (94±2%)	8±3 (5±2%)	2±1 (1±1%)	17	64
All	All	4410/5220 (84%)	4122 (93%)	239 (5%)	49 (1%)	18	66

All 28 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	B	130	LEU	5
1	A	61	GLN	4
1	B	35	PRO	4
1	B	61	GLN	3
1	B	63	TYR	2
1	B	60	ALA	2
1	A	131	ALA	2

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Mol	Chain	Res	Type	Models (Total)
1	A	111	ILE	2
1	A	59	LYS	2
1	A	112	GLN	2
1	B	62	TYR	2
1	A	62	TYR	2
1	A	157	GLY	2
1	B	132	ARG	1
1	A	13	ARG	1
1	B	115	GLU	1
1	B	111	ILE	1
1	A	132	ARG	1
1	B	87	THR	1
1	B	114	LEU	1
1	A	12	GLU	1
1	B	58	TRP	1
1	A	114	LEU	1
1	A	35	PRO	1
1	B	129	GLU	1
1	A	116	ARG	1
1	B	113	GLU	1
1	B	59	LYS	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	126/151 (83%)	94±5 (75±4%)	32±5 (25±4%)	2	24
1	B	126/151 (83%)	86±4 (68±3%)	40±4 (32±3%)	1	14
All	All	3780/4530 (83%)	2703 (72%)	1077 (28%)	2	18

All 202 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	18	MET	15
1	B	135	THR	15
1	B	46	ILE	15

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Mol	Chain	Res	Type	Models (Total)
1	B	75	LEU	15
1	B	133	MET	14
1	B	155	LYS	14
1	B	125	ARG	13
1	B	87	THR	13
1	B	124	ARG	12
1	B	63	TYR	12
1	A	61	GLN	12
1	B	20	PHE	12
1	B	26	TYR	12
1	B	117	ARG	11
1	B	88	SER	11
1	B	18	MET	11
1	A	85	TYR	11
1	B	62	TYR	11
1	B	29	LYS	10
1	B	142	ILE	10
1	B	39	LEU	10
1	A	108	LYS	10
1	A	20	PHE	10
1	B	101	GLU	10
1	B	136	LEU	10
1	B	65	ARG	10
1	A	95	LYS	10
1	B	59	LYS	10
1	A	149	LEU	9
1	B	90	LYS	9
1	B	100	LYS	9
1	A	65	ARG	9
1	A	13	ARG	9
1	B	82	SER	9
1	B	152	LEU	8
1	A	117	ARG	8
1	B	143	LYS	8
1	B	91	GLU	8
1	B	78	LEU	8
1	A	127	ARG	8
1	A	159	LYS	8
1	A	115	GLU	8
1	B	109	LEU	8
1	B	27	HIS	8
1	A	125	ARG	8

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Mol	Chain	Res	Type	Models (Total)
1	A	64	PHE	7
1	A	112	GLN	7
1	B	53	ARG	7
1	A	75	LEU	7
1	B	141	GLU	7
1	A	66	TRP	7
1	A	116	ARG	7
1	B	127	ARG	7
1	A	101	GLU	7
1	A	130	LEU	7
1	A	59	LYS	7
1	B	126	LYS	7
1	A	53	ARG	7
1	A	153	GLU	7
1	B	132	ARG	7
1	A	58	TRP	7
1	B	61	GLN	7
1	B	122	GLU	7
1	B	113	GLU	7
1	B	159	LYS	7
1	A	114	LEU	7
1	B	130	LEU	7
1	A	40	LEU	7
1	B	134	LYS	7
1	B	129	GLU	7
1	B	146	GLU	6
1	A	134	LYS	6
1	A	50	GLN	6
1	B	92	LEU	6
1	B	71	GLN	6
1	B	38	CYS	6
1	A	100	LYS	6
1	A	148	GLU	6
1	A	96	GLU	6
1	B	114	LEU	6
1	A	120	GLU	6
1	A	119	GLU	6
1	B	118	GLU	5
1	B	108	LYS	5
1	B	57	LYS	5
1	A	102	LYS	5
1	B	116	ARG	5

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Mol	Chain	Res	Type	Models (Total)
1	B	23	ARG	5
1	A	33	LEU	5
1	A	57	LYS	5
1	B	119	GLU	5
1	B	19	THR	5
1	B	115	GLU	5
1	A	15	LEU	5
1	B	120	GLU	5
1	A	155	LYS	5
1	A	17	ASP	5
1	A	54	LEU	5
1	A	122	GLU	5
1	A	132	ARG	5
1	A	126	LYS	5
1	A	83	PHE	5
1	A	110	TRP	5
1	B	147	LYS	5
1	B	12	GLU	4
1	B	102	LYS	4
1	A	14	ASP	4
1	B	112	GLN	4
1	A	111	ILE	4
1	B	52	VAL	4
1	A	92	LEU	4
1	A	70	LEU	4
1	B	58	TRP	4
1	A	146	GLU	4
1	A	124	ARG	4
1	A	39	LEU	4
1	A	158	LYS	4
1	A	106	ARG	4
1	A	133	MET	4
1	A	143	LYS	4
1	A	109	LEU	4
1	A	113	GLU	4
1	A	139	GLU	4
1	B	158	LYS	4
1	A	29	LYS	4
1	B	64	PHE	4
1	A	129	GLU	4
1	B	13	ARG	4
1	B	151	ASP	4

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Mol	Chain	Res	Type	Models (Total)
1	A	31	GLN	4
1	A	47	LEU	3
1	A	26	TYR	3
1	A	107	GLU	3
1	B	137	GLU	3
1	B	70	LEU	3
1	A	156	LEU	3
1	B	30	LYS	3
1	A	93	LYS	3
1	A	137	GLU	3
1	B	104	LYS	3
1	B	93	LYS	3
1	B	33	LEU	3
1	B	111	ILE	3
1	A	12	GLU	3
1	A	78	LEU	3
1	B	110	TRP	3
1	B	156	LEU	3
1	A	27	HIS	3
1	A	118	GLU	3
1	A	90	LYS	3
1	A	62	TYR	3
1	B	47	LEU	3
1	A	152	LEU	3
1	A	147	LYS	3
1	B	56	ASN	3
1	B	149	LEU	2
1	B	106	ARG	2
1	A	88	SER	2
1	A	144	ASN	2
1	A	71	GLN	2
1	A	51	ASN	2
1	B	153	GLU	2
1	B	67	ARG	2
1	A	67	ARG	2
1	A	56	ASN	2
1	A	30	LYS	2
1	B	105	MET	2
1	B	16	ASP	2
1	A	97	GLU	2
1	B	85	TYR	2
1	A	104	LYS	2

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Mol	Chain	Res	Type	Models (Total)
1	A	63	TYR	2
1	A	136	LEU	2
1	B	17	ASP	2
1	A	105	MET	2
1	B	107	GLU	2
1	A	91	GLU	2
1	A	141	GLU	2
1	B	144	ASN	1
1	B	51	ASN	1
1	A	121	THR	1
1	B	139	GLU	1
1	A	24	ILE	1
1	B	41	THR	1
1	A	140	GLU	1
1	B	95	LYS	1
1	A	138	ASN	1
1	A	154	ASN	1
1	A	145	LEU	1
1	A	99	LEU	1
1	A	150	SER	1
1	A	135	THR	1
1	A	98	GLN	1
1	B	154	ASN	1
1	B	98	GLN	1
1	A	28	CYS	1
1	A	151	ASP	1
1	A	23	ARG	1
1	A	22	GLU	1
1	B	54	LEU	1
1	B	24	ILE	1
1	B	22	GLU	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 [i](#)

The completeness of assignment taking into account all chemical shift lists is 40% for the well-defined parts and 38% for the entire structure.

7.1 Chemical shift list 1

File name: input_cs.cif

Chemical shift list name: *assigned_chem_shift_list*

7.1.1 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	1779
Number of shifts mapped to atoms	1779
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	0

7.1.2 Chemical shift referencing [i](#)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction \pm precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	154	-0.87 ± 0.35	Should be applied
$^{13}\text{C}_\beta$	145	1.27 ± 0.18	Should be applied
$^{13}\text{C}'$	146	-0.81 ± 0.29	Should be applied
^{15}N	149	0.65 ± 0.27	Should be applied

7.1.3 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 40%, i.e. 1557 atoms were assigned a chemical shift out of a possible 3922. 0 out of 50 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	712/1472 (48%)	280/588 (48%)	288/592 (49%)	144/292 (49%)
Sidechain	820/2244 (37%)	512/1316 (39%)	308/798 (39%)	0/130 (0%)

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	Total	¹ H	¹³ C	¹⁵ N
Aromatic	25/206 (12%)	23/106 (22%)	2/90 (2%)	0/10 (0%)
Overall	1557/3922 (40%)	815/2010 (41%)	598/1480 (40%)	144/432 (33%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 38%, i.e. 1592 atoms were assigned a chemical shift out of a possible 4184. 0 out of 52 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹ H	¹³ C	¹⁵ N
Backbone	737/1578 (47%)	288/630 (46%)	300/636 (47%)	149/312 (48%)
Sidechain	830/2382 (35%)	516/1400 (37%)	314/846 (37%)	0/136 (0%)
Aromatic	25/224 (11%)	23/116 (20%)	2/98 (2%)	0/10 (0%)
Overall	1592/4184 (38%)	827/2146 (39%)	616/1580 (39%)	149/458 (33%)

7.1.4 Statistically unusual chemical shifts [i](#)

There are no statistically unusual chemical shifts.

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.

Random coil index (RCI) for chain A:

