



Full wwPDB NMR Structure Validation Report ⓘ

Feb 19, 2022 – 08:10 PM EST

PDB ID : 1UL4
Title : Solution structure of the DNA-binding domain of squamosa promoter binding protein-like 4
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Deposited on : 2003-09-09

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:

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 : 2.26
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.26

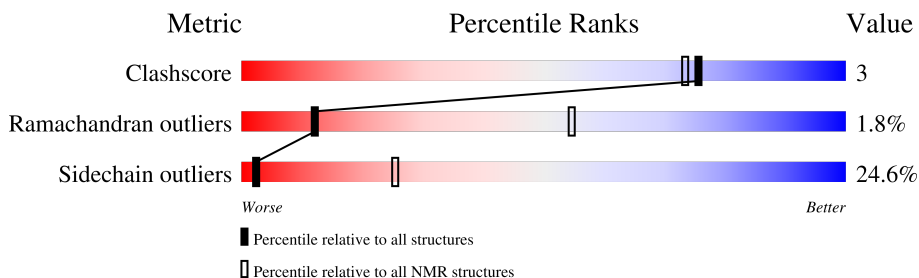
1 Overall quality at a glance

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	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	94	

2 Ensemble composition and analysis

This entry contains 20 models. Model 10 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:51-A:119 (69)	0.60	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 and 3 single-model clusters were found.

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

3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 1328 atoms, of which 657 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called squamosa promoter binding protein-like 4.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	81	1326	402	657	143	117	7	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	44	GLY	-	cloning artifact	UNP Q9S7A9
A	45	SER	-	cloning artifact	UNP Q9S7A9
A	46	SER	-	cloning artifact	UNP Q9S7A9
A	47	GLY	-	cloning artifact	UNP Q9S7A9
A	48	SER	-	cloning artifact	UNP Q9S7A9
A	49	SER	-	cloning artifact	UNP Q9S7A9
A	50	GLY	-	cloning artifact	UNP Q9S7A9
A	132	SER	-	cloning artifact	UNP Q9S7A9
A	133	GLY	-	cloning artifact	UNP Q9S7A9
A	134	PRO	-	cloning artifact	UNP Q9S7A9
A	135	SER	-	cloning artifact	UNP Q9S7A9
A	136	SER	-	cloning artifact	UNP Q9S7A9
A	137	GLY	-	cloning artifact	UNP Q9S7A9

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

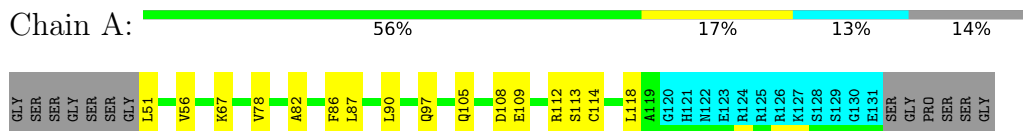
Mol	Chain	Residues	Atoms	
			Total	Zn
2	A	2	2	2

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: squamosa promoter binding protein-like 4

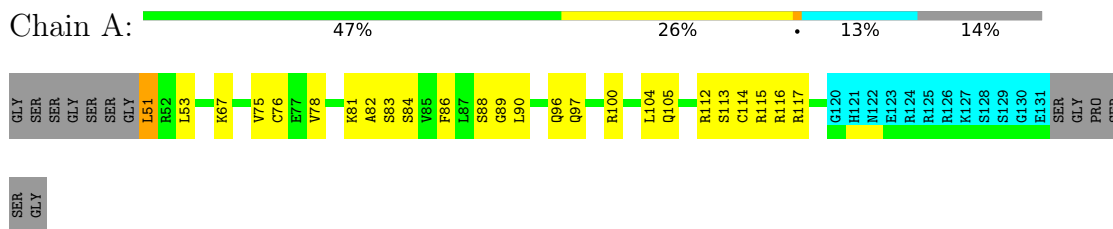


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

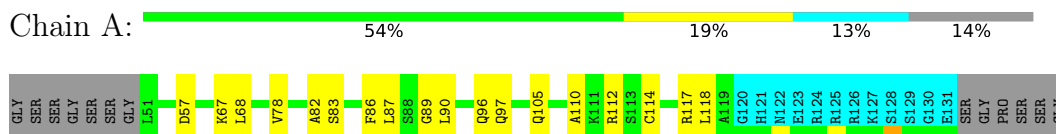
4.2.1 Score per residue for model 1

- Molecule 1: squamosa promoter binding protein-like 4



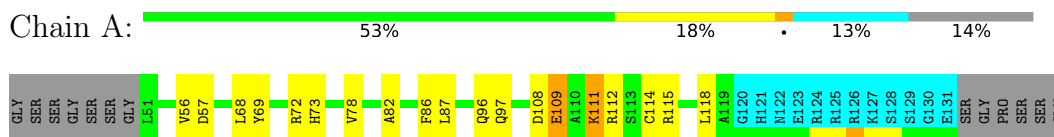
4.2.2 Score per residue for model 2

- Molecule 1: squamosa promoter binding protein-like 4



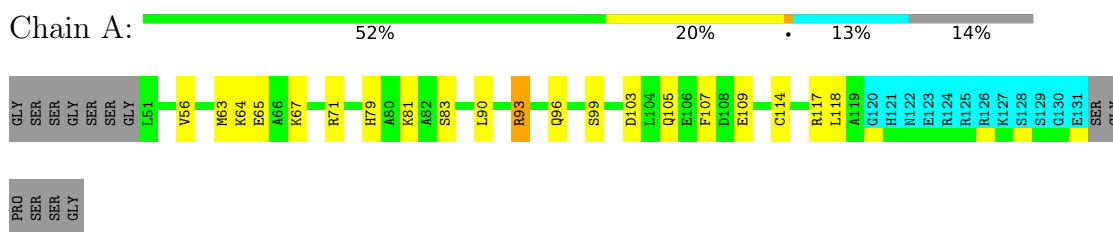
4.2.3 Score per residue for model 3

- Molecule 1: squamosa promoter binding protein-like 4



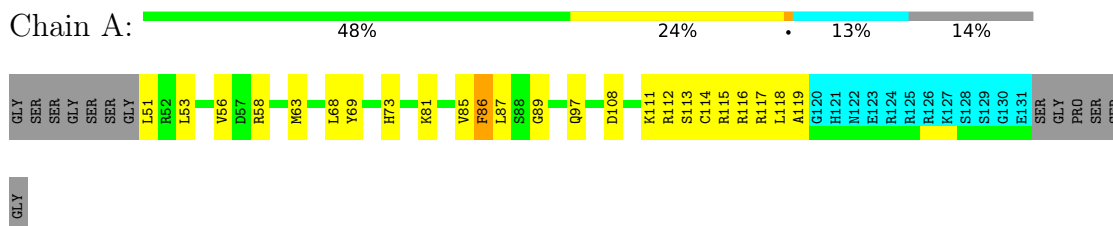
4.2.4 Score per residue for model 4

- Molecule 1: squamosa promoter binding protein-like 4



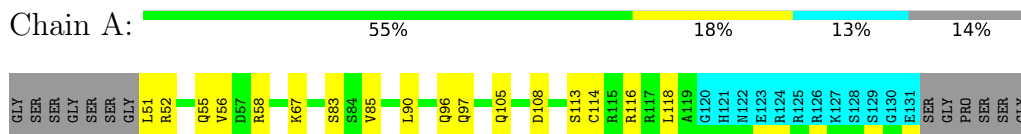
4.2.5 Score per residue for model 5

- Molecule 1: squamosa promoter binding protein-like 4



4.2.6 Score per residue for model 6

- Molecule 1: squamosa promoter binding protein-like 4



4.2.7 Score per residue for model 7

- Molecule 1: squamosa promoter binding protein-like 4

Chain A: 



4.2.8 Score per residue for model 8

- Molecule 1: squamosa promoter binding protein-like 4

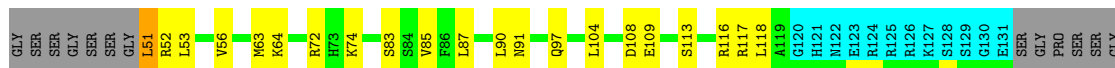
Chain A: 



4.2.9 Score per residue for model 9

- Molecule 1: squamosa promoter binding protein-like 4

Chain A: 



4.2.10 Score per residue for model 10 (medoid)

- Molecule 1: squamosa promoter binding protein-like 4

Chain A: 



SER
SER
GLY

4.2.11 Score per residue for model 11

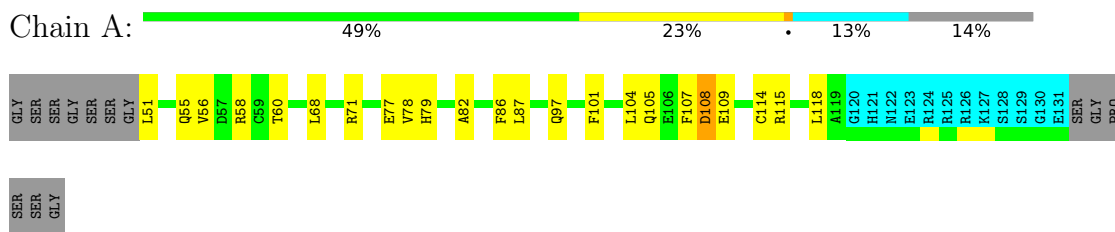
- Molecule 1: squamosa promoter binding protein-like 4

Chain A: 



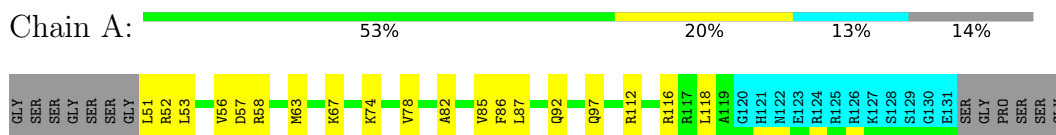
4.2.12 Score per residue for model 12

- Molecule 1: squamosa promoter binding protein-like 4



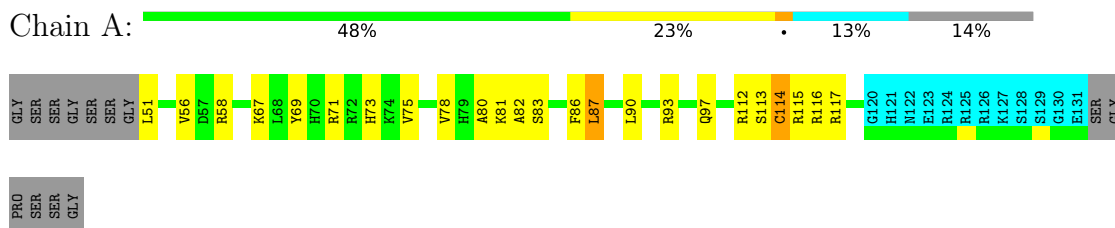
4.2.13 Score per residue for model 13

- Molecule 1: squamosa promoter binding protein-like 4



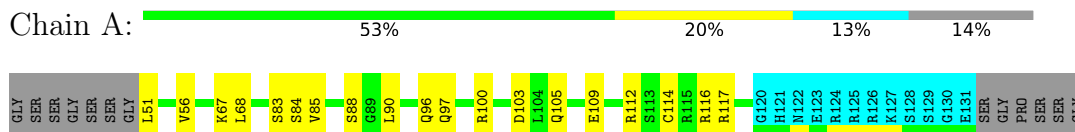
4.2.14 Score per residue for model 14

- Molecule 1: squamosa promoter binding protein-like 4



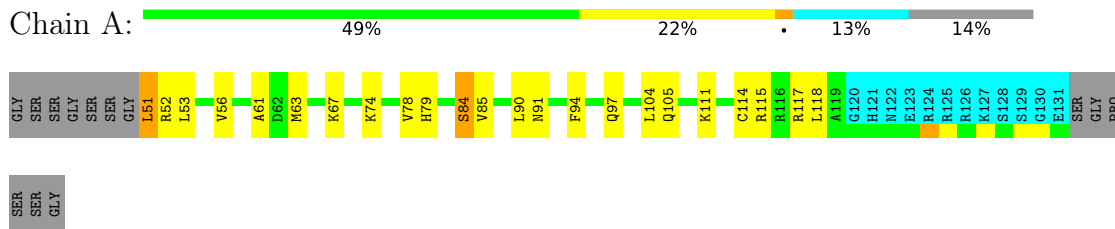
4.2.15 Score per residue for model 15

- Molecule 1: squamosa promoter binding protein-like 4



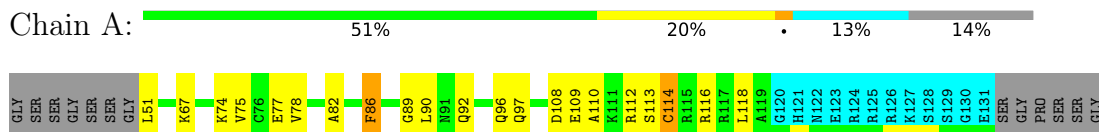
4.2.16 Score per residue for model 16

- Molecule 1: squamosa promoter binding protein-like 4



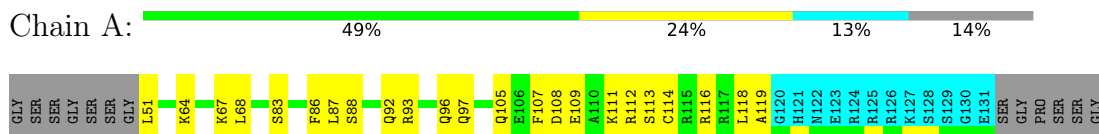
4.2.17 Score per residue for model 17

- Molecule 1: squamosa promoter binding protein-like 4



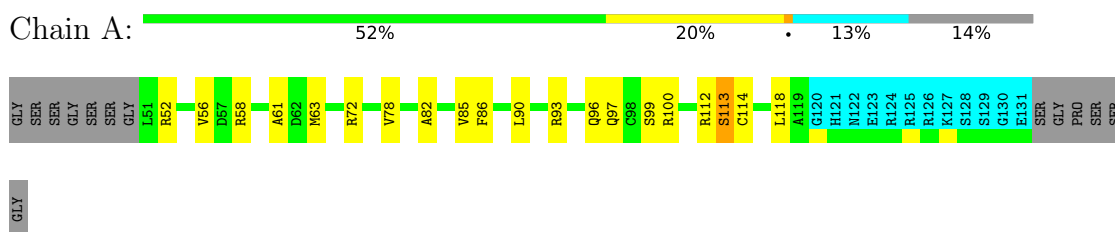
4.2.18 Score per residue for model 18

- Molecule 1: squamosa promoter binding protein-like 4



4.2.19 Score per residue for model 19

- Molecule 1: squamosa promoter binding protein-like 4



4.2.20 Score per residue for model 20

- Molecule 1: squamosa promoter binding protein-like 4



GLY	SER	SER	GLY	SER	GLY	L51	R52	V56	D57	R58	K67	R71	V85	F86	L87	R93	F94	C95	R96	Q97	C98	S99	Q105	E109	R112	S113	C114	R115	L118	A119	G120	H121	N122	E123	R124	R125	R126	K127	S128	S129	G130	E131	SER	GLY	PRO	SER	SER	GLY
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5 Refinement protocol and experimental data overview

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

Of the 50 calculated structures, 20 were deposited, based on the following criterion: *structures with the least restraint violations, structures with the lowest energy*.

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

Software name	Classification	Version
CNS	structure solution	1.1
CNS	refinement	1.1

No chemical shift data was provided.

6 Model quality i

6.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section:
ZN

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	571	564	564	4±2
All	All	11460	11280	11280	71

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:51:LEU:HD12	1:A:53:LEU:HD11	0.75	1.57	1	2
1:A:78:VAL:O	1:A:82:ALA:HB2	0.72	1.85	8	11
1:A:61:ALA:HB2	1:A:78:VAL:HG21	0.71	1.61	16	2
1:A:56:VAL:HG11	1:A:79:HIS:NE2	0.68	2.03	4	1
1:A:56:VAL:HG11	1:A:79:HIS:CD2	0.67	2.24	4	1
1:A:61:ALA:CB	1:A:78:VAL:HG21	0.65	2.22	16	1
1:A:111:LYS:HG2	1:A:118:LEU:HD23	0.61	1.73	7	1
1:A:111:LYS:HD2	1:A:118:LEU:HD23	0.61	1.73	16	1
1:A:56:VAL:HG11	1:A:85:VAL:HG11	0.56	1.77	15	8
1:A:51:LEU:HD22	1:A:53:LEU:HD11	0.56	1.77	9	1
1:A:56:VAL:HG11	1:A:85:VAL:CG1	0.55	2.32	16	3
1:A:51:LEU:HD12	1:A:53:LEU:HG	0.54	1.80	16	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:56:VAL:HG21	1:A:79:HIS:CG	0.54	2.37	4	2
1:A:79:HIS:CD2	1:A:85:VAL:HG13	0.54	2.38	16	1
1:A:91:ASN:HB3	1:A:104:LEU:HD12	0.51	1.82	7	2
1:A:53:LEU:HD12	1:A:63:MET:CB	0.51	2.35	5	1
1:A:91:ASN:CB	1:A:104:LEU:HD12	0.51	2.36	7	2
1:A:56:VAL:CG1	1:A:85:VAL:HG11	0.49	2.38	7	5
1:A:111:LYS:CG	1:A:118:LEU:HD23	0.47	2.37	7	1
1:A:56:VAL:HA	1:A:87:LEU:HD21	0.47	1.86	3	2
1:A:51:LEU:HD12	1:A:53:LEU:CD1	0.46	2.35	1	1
1:A:93:ARG:CG	1:A:107:PHE:CE2	0.45	3.00	4	1
1:A:69:TYR:CZ	1:A:73:HIS:NE2	0.44	2.85	8	1
1:A:53:LEU:HD12	1:A:63:MET:HB3	0.44	1.89	5	1
1:A:75:VAL:HG22	1:A:76:CYS:N	0.44	2.28	1	1
1:A:69:TYR:CE1	1:A:73:HIS:NE2	0.43	2.85	5	3
1:A:75:VAL:O	1:A:75:VAL:HG13	0.43	2.13	17	1
1:A:93:ARG:CB	1:A:107:PHE:CD2	0.42	3.02	18	1
1:A:51:LEU:HD12	1:A:53:LEU:CG	0.41	2.45	16	1
1:A:86:PHE:CZ	1:A:89:GLY:O	0.41	2.74	17	2
1:A:75:VAL:CG1	1:A:80:ALA:HB2	0.41	2.46	14	1
1:A:86:PHE:CE1	1:A:89:GLY:O	0.41	2.74	2	3
1:A:91:ASN:CB	1:A:104:LEU:HD22	0.41	2.45	16	1
1:A:93:ARG:O	1:A:101:PHE:CD2	0.40	2.74	10	1
1:A:75:VAL:HG13	1:A:80:ALA:HB2	0.40	1.93	14	1
1:A:95:CYS:O	1:A:99:SER:N	0.40	2.54	20	1
1:A:55:GLN:OE1	1:A:101:PHE:CD1	0.40	2.74	12	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	68/94 (72%)	59±3 (86±4%)	8±3 (12±4%)	1±1 (2±1%)	12	54
All	All	1360/1880 (72%)	1175 (86%)	161 (12%)	24 (2%)	12	54

All 9 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	109	GLU	5
1	A	114	CYS	4
1	A	110	ALA	3
1	A	108	ASP	3
1	A	84	SER	2
1	A	111	LYS	2
1	A	119	ALA	2
1	A	113	SER	2
1	A	94	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	62/80 (78%)	47±2 (75±3%)	15±2 (25±3%)	2 25
All	All	1240/1600 (78%)	935 (75%)	305 (25%)	2 25

All 43 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	114	CYS	18
1	A	97	GLN	17
1	A	118	LEU	15
1	A	51	LEU	13
1	A	67	LYS	13
1	A	90	LEU	13
1	A	105	GLN	11
1	A	112	ARG	11
1	A	113	SER	10
1	A	116	ARG	10
1	A	68	LEU	10
1	A	86	PHE	10
1	A	58	ARG	10
1	A	83	SER	9
1	A	96	GLN	9
1	A	115	ARG	9
1	A	117	ARG	9

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Mol	Chain	Res	Type	Models (Total)
1	A	87	LEU	9
1	A	108	ASP	9
1	A	52	ARG	8
1	A	81	LYS	7
1	A	88	SER	6
1	A	109	GLU	6
1	A	63	MET	6
1	A	72	ARG	5
1	A	71	ARG	5
1	A	93	ARG	5
1	A	74	LYS	5
1	A	104	LEU	4
1	A	57	ASP	4
1	A	64	LYS	4
1	A	100	ARG	3
1	A	111	LYS	3
1	A	99	SER	3
1	A	84	SER	3
1	A	92	GLN	3
1	A	103	ASP	2
1	A	107	PHE	2
1	A	77	GLU	2
1	A	65	GLU	1
1	A	55	GLN	1
1	A	62	ASP	1
1	A	60	THR	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 monosaccharides in this entry.

6.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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