Full wwPDB NMR Structure Validation Report (i)

Feb 16, 2022 – 06:29 AM EST

PDB ID	:	1MM3
Title	:	Solution structure of the 2nd PHD domain from Mi2b with C-terminal loop replaced by corresponding loop from WSTF
Authors	:	Kwan, A.H.Y.; Gell, D.A.; Verger, A.; Crossley, M.; Matthews, J.M.; Mackay, J.P.
Deposited on	:	2002-09-02

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 (i) symbol.

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

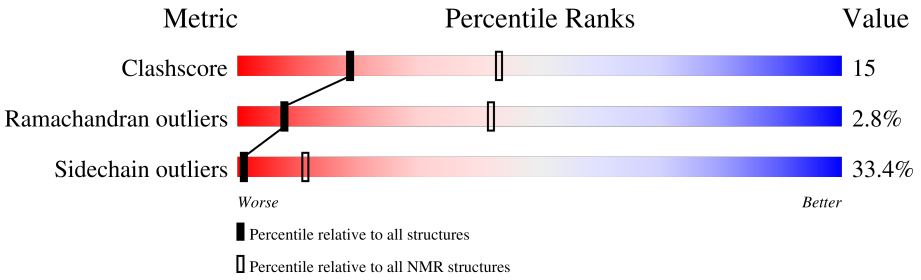
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	2.26
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.26

1 Overall quality at a glance (i)

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	61	34% 38% 28%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 12 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:9-A:52 (44)	0.65	12

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 1 single-model cluster was found.

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

3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 903 atoms, of which 434 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	61	901	288	434	83	86	10	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	cloning artifact	UNP Q14839
A	2	PRO	-	cloning artifact	UNP Q14839
A	3	LEU	-	cloning artifact	UNP Q14839
A	4	GLY	-	cloning artifact	UNP Q14839
A	5	SER	-	cloning artifact	UNP Q14839

- 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: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 34% 38% 28%

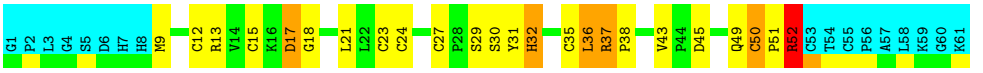
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 33% 30% 8% • 28%



4.2.2 Score per residue for model 2

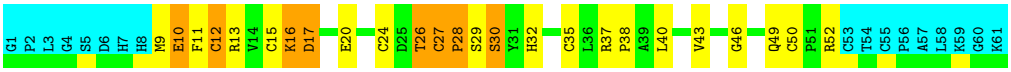
• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 31% 36% • • 28%

4.2.3 Score per residue for model 3

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 31% 28% 13% 28%



4.2.4 Score per residue for model 4

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 34% 26% 11% 28%

4.2.5 Score per residue for model 5

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 28% 34% 10% 28%

4.2.6 Score per residue for model 6

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 31% 33% 8% 28%

4.2.7 Score per residue for model 7

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 30% 36% 7% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 R13 V14 C15 K16 D17 G18 L21 L22 C23 C24 D25 T26 C27 S30 Y31 H32 C35 L36 R37 P38 E42 E47 W48 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.8 Score per residue for model 8

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 43% 21% 8% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 R13 V14 C15 K16 D17 C27 P28 S29 S30 Y31 H32 I33 H34 C35 L36 R37 P38 E42 D45 Q49 C50 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.9 Score per residue for model 9

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 39% 30% • 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 R13 V14 C15 K16 D17 L21 L22 C23 C24 C27 P28 S29 S30 Y31 H32 C35 L36 R37 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.10 Score per residue for model 10

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 31% 34% 7% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 R13 V14 C15 K16 D17 E20 L21 L22 C23 C24 C27 P28 S29 S30 Y31 H32 I33 H34 C35 L36 R37 L40 P44 E47 W48 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.11 Score per residue for model 11

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

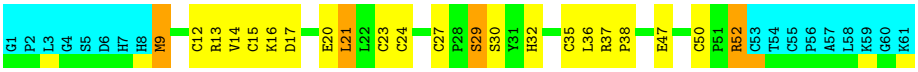
Chain A: 28% 36% 8% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 C12 R13 V14 C15 K16 D17 E20 L21 L22 C23 C24 D25 T26 C27 P28 S29 S30 Y31 H32 C35 L36 R37 P38 A39 L40 P44 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.12 Score per residue for model 12 (medoid)

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 36% 30% 7% 28%



4.2.13 Score per residue for model 13

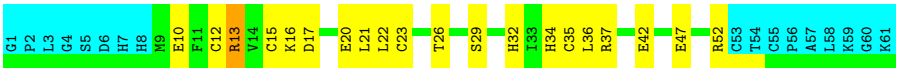
• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 34% 30% 8% 28%

4.2.14 Score per residue for model 14

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

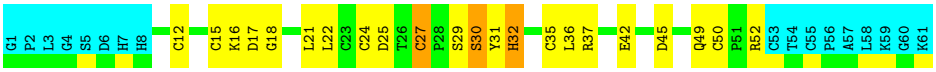
Chain A: 39% 31% • 28%



4.2.15 Score per residue for model 15

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 36% 31% 5% 28%



4.2.16 Score per residue for model 16

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 39% 25% 8% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 R13 V14 C15 K16 D17 G18 L22 C23 C24 S29 S30 Y31 H32 I33 H34 C35 L36 R37 P38 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.17 Score per residue for model 17

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 38% 20% 15% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 C15 K16 D17 L21 L22 C23 C24 C27 P28 S29 S30 Y31 H32 C35 L36 R37 P38 D45 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.18 Score per residue for model 18

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 39% 31% • 28%

G1 P2 L3 G4 S5 D6 H7 H8 C12 R13 V14 C15 K16 D17 C23 C24 D25 T26 C27 P28 S29 S30 Y31 H32 C35 L36 R37 P38 A39 L40 Y41 E42 Q49 C50 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.19 Score per residue for model 19

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 36% 28% 8% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 C12 R13 V14 C15 K16 D17 E20 L21 L22 C23 C24 C27 P28 S29 S30 Y31 H32 C35 L36 R37 E42 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

4.2.20 Score per residue for model 20

• Molecule 1: Mi2-beta(Chromodomain helicase-DNA-binding protein 4) and transcription factor WSTF

Chain A: 31% 28% 13% 28%

G1 P2 L3 G4 S5 D6 H7 H8 M9 E10 F11 C12 C15 K16 D17 G18 L21 L22 C23 C24 D25 T26 C27 P28 S29 S30 Y31 H32 C35 L36 R37 P38 P44 Q49 C50 P51 R52 C53 T54 C55 P56 A57 L58 K59 G60 K61

5 Refinement protocol and experimental data overview (i)

The models were refined using the following method: *simulated annealing, molecular dynamics, torsion angle dynamics.*

Of the 500 calculated structures, 20 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
DYANA	refinement	1.5
ARIA	structure solution	1.1.2

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	348	317	317	10±3
All	All	7000	6340	6340	194

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 15.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:24:CYS:HA	1:A:49:GLN:HA	0.80	1.49	15	1
1:A:32:HIS:HB2	1:A:35:CYS:SG	0.79	2.18	16	18
1:A:37:ARG:HB2	1:A:38:PRO:HD3	0.74	1.59	17	7
1:A:11:PHE:HA	1:A:18:GLY:HA3	0.72	1.62	16	1
1:A:12:CYS:HA	1:A:30:SER:O	0.71	1.85	11	14
1:A:12:CYS:SG	1:A:31:TYR:HA	0.70	2.27	1	6
1:A:24:CYS:SG	1:A:49:GLN:HB2	0.68	2.29	15	1
1:A:15:CYS:SG	1:A:17:ASP:HB2	0.67	2.29	16	8
1:A:17:ASP:HB3	1:A:32:HIS:HE1	0.66	1.50	11	4
1:A:31:TYR:HD1	1:A:35:CYS:HB2	0.66	1.49	20	1
1:A:24:CYS:HB3	1:A:49:GLN:HA	0.65	1.68	20	1
1:A:36:LEU:HD12	1:A:38:PRO:HD2	0.64	1.68	17	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:24:CYS:HB2	1:A:50:CYS:HB3	0.63	1.70	18	2
1:A:21:LEU:HG	1:A:30:SER:HB2	0.63	1.71	5	3
1:A:11:PHE:HA	1:A:21:LEU:HD21	0.62	1.71	20	3
1:A:49:GLN:HE21	1:A:50:CYS:N	0.61	1.94	7	1
1:A:27:CYS:HB3	1:A:52:ARG:HH12	0.60	1.55	17	1
1:A:31:TYR:CD1	1:A:35:CYS:HB2	0.59	2.31	20	2
1:A:18:GLY:HA2	1:A:21:LEU:HD22	0.58	1.75	20	3
1:A:33:ILE:HD13	1:A:42:GLU:N	0.58	2.13	6	1
1:A:37:ARG:HB3	1:A:38:PRO:HD3	0.57	1.76	18	4
1:A:32:HIS:N	1:A:35:CYS:SG	0.57	2.71	1	12
1:A:24:CYS:SG	1:A:29:SER:HB2	0.56	2.40	10	2
1:A:21:LEU:HG	1:A:30:SER:CB	0.54	2.33	12	1
1:A:17:ASP:HB3	1:A:32:HIS:CE1	0.54	2.37	11	2
1:A:12:CYS:O	1:A:16:LYS:HA	0.54	2.02	11	5
1:A:9:MET:HB2	1:A:29:SER:HA	0.54	1.80	8	1
1:A:14:VAL:HB	1:A:35:CYS:HB3	0.53	1.81	10	2
1:A:31:TYR:CD1	1:A:36:LEU:HD23	0.53	2.39	6	1
1:A:18:GLY:HA2	1:A:21:LEU:HD11	0.53	1.80	7	2
1:A:33:ILE:HD13	1:A:42:GLU:H	0.53	1.64	6	1
1:A:15:CYS:O	1:A:17:ASP:N	0.53	2.42	10	3
1:A:36:LEU:HD13	1:A:51:PRO:HD3	0.53	1.81	1	1
1:A:36:LEU:HD13	1:A:51:PRO:HG2	0.53	1.80	7	2
1:A:21:LEU:CG	1:A:30:SER:HB2	0.52	2.33	5	1
1:A:12:CYS:HB2	1:A:31:TYR:HA	0.52	1.79	9	4
1:A:24:CYS:HB3	1:A:27:CYS:O	0.52	2.04	15	2
1:A:12:CYS:HB2	1:A:17:ASP:H	0.52	1.62	5	1
1:A:52:ARG:HH11	1:A:52:ARG:HB3	0.50	1.66	4	1
1:A:13:ARG:NH2	1:A:52:ARG:HB2	0.50	2.21	14	1
1:A:33:ILE:HB	1:A:40:LEU:HB2	0.49	1.83	2	1
1:A:31:TYR:HB3	1:A:35:CYS:SG	0.49	2.48	5	6
1:A:43:VAL:H	1:A:44:PRO:HD2	0.49	1.67	6	1
1:A:33:ILE:HG21	1:A:42:GLU:HA	0.49	1.83	6	1
1:A:24:CYS:HB2	1:A:27:CYS:O	0.48	2.08	9	3
1:A:12:CYS:SG	1:A:17:ASP:OD1	0.48	2.72	18	7
1:A:32:HIS:HB2	1:A:35:CYS:HB2	0.48	1.84	8	3
1:A:12:CYS:SG	1:A:15:CYS:O	0.47	2.72	10	2
1:A:37:ARG:CB	1:A:38:PRO:HD2	0.47	2.39	20	1
1:A:23:CYS:HB3	1:A:29:SER:O	0.47	2.10	12	1
1:A:50:CYS:HB2	1:A:51:PRO:HD2	0.46	1.88	5	1
1:A:37:ARG:HB3	1:A:38:PRO:HD2	0.46	1.88	20	1
1:A:25:ASP:HB3	1:A:49:GLN:NE2	0.45	2.26	5	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:24:CYS:SG	1:A:25:ASP:N	0.45	2.90	15	2
1:A:36:LEU:HB2	1:A:38:PRO:HD2	0.45	1.89	1	1
1:A:27:CYS:CB	1:A:52:ARG:HH12	0.45	2.25	17	2
1:A:23:CYS:HA	1:A:29:SER:O	0.45	2.13	19	1
1:A:15:CYS:SG	1:A:17:ASP:CB	0.44	3.04	13	5
1:A:50:CYS:SG	1:A:52:ARG:HB2	0.44	2.53	20	1
1:A:43:VAL:N	1:A:44:PRO:HD2	0.43	2.28	6	1
1:A:21:LEU:HD11	1:A:30:SER:HB2	0.43	1.89	17	1
1:A:22:LEU:HD11	1:A:44:PRO:HD2	0.43	1.90	11	1
1:A:40:LEU:HD22	1:A:44:PRO:HG3	0.43	1.90	4	1
1:A:20:GLU:O	1:A:32:HIS:HA	0.43	2.14	11	1
1:A:15:CYS:O	1:A:16:LYS:HB2	0.43	2.13	16	1
1:A:13:ARG:HD2	1:A:31:TYR:OH	0.42	2.14	5	1
1:A:9:MET:HB3	1:A:29:SER:HA	0.42	1.90	12	1
1:A:27:CYS:HB2	1:A:29:SER:OG	0.42	2.15	4	1
1:A:24:CYS:SG	1:A:49:GLN:HG2	0.42	2.54	18	1
1:A:10:GLU:CD	1:A:10:GLU:H	0.42	2.17	3	1
1:A:11:PHE:HA	1:A:18:GLY:HA2	0.42	1.91	6	1
1:A:22:LEU:HB3	1:A:32:HIS:O	0.42	2.15	7	1
1:A:37:ARG:HB2	1:A:38:PRO:CD	0.42	2.41	17	1
1:A:11:PHE:CD2	1:A:16:LYS:HA	0.42	2.50	3	1
1:A:13:ARG:O	1:A:16:LYS:HE3	0.42	2.14	19	1
1:A:9:MET:SD	1:A:29:SER:HA	0.41	2.55	10	1
1:A:12:CYS:SG	1:A:17:ASP:OD2	0.41	2.78	1	1
1:A:21:LEU:HD12	1:A:21:LEU:HA	0.41	1.77	11	1
1:A:24:CYS:SG	1:A:49:GLN:NE2	0.41	2.89	17	1
1:A:22:LEU:HD13	1:A:44:PRO:HG2	0.41	1.93	20	1
1:A:25:ASP:HB2	1:A:49:GLN:HA	0.41	1.90	11	1
1:A:26:THR:HG23	1:A:27:CYS:SG	0.40	2.56	3	1
1:A:40:LEU:HG	1:A:44:PRO:CG	0.40	2.46	10	1
1:A:9:MET:HG3	1:A:11:PHE:O	0.40	2.16	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	44/61 (72%)	36±3 (81±6%)	7±2 (16±6%)	1±1 (3±2%)	8 42
All	All	880/1220 (72%)	711 (81%)	144 (16%)	25 (3%)	8 42

All 12 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	32	HIS	7
1	A	16	LYS	4
1	A	52	ARG	3
1	A	14	VAL	3
1	A	18	GLY	1
1	A	28	PRO	1
1	A	46	GLY	1
1	A	24	CYS	1
1	A	25	ASP	1
1	A	34	HIS	1
1	A	10	GLU	1
1	A	38	PRO	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	40/53 (75%)	27±2 (67±5%)	13±2 (33±5%)	1 11
All	All	800/1060 (75%)	533 (67%)	267 (33%)	1 11

All 31 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	36	LEU	17
1	A	27	CYS	15
1	A	52	ARG	15
1	A	29	SER	14
1	A	15	CYS	13
1	A	50	CYS	13

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Mol	Chain	Res	Type	Models (Total)
1	A	23	CYS	12
1	A	37	ARG	12
1	A	49	GLN	11
1	A	12	CYS	11
1	A	22	LEU	11
1	A	9	MET	10
1	A	21	LEU	10
1	A	24	CYS	10
1	A	42	GLU	10
1	A	30	SER	9
1	A	13	ARG	8
1	A	16	LYS	8
1	A	10	GLU	8
1	A	20	GLU	7
1	A	26	THR	6
1	A	47	GLU	6
1	A	17	ASP	5
1	A	45	ASP	5
1	A	40	LEU	5
1	A	43	VAL	4
1	A	14	VAL	4
1	A	34	HIS	4
1	A	35	CYS	2
1	A	25	ASP	1
1	A	33	ILE	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 (i)

No chemical shift data were provided