Full wwPDB NMR Structure Validation Report (i)

Mar 1, 2022 – 06:05 PM EST

PDB ID	:	2GTO
Title	:	Oxidized form of ADAP hSH3-N
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Deposited on	:	2006-04-28

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:

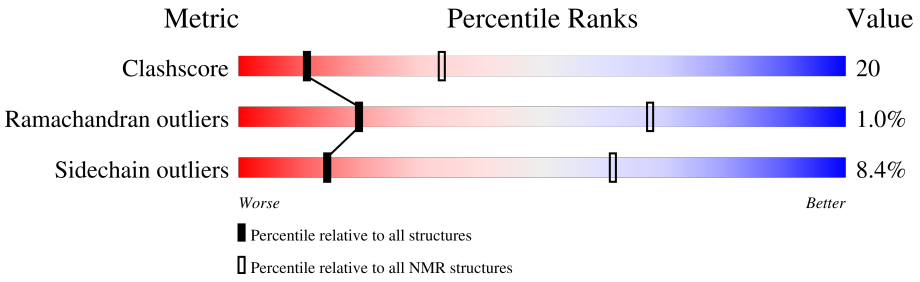
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	2.27
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.27

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	96	45% 22% • 29%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 18 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:14-A:58, A:63-A:85 (68)	0.32	18

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 2 single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1590 atoms, of which 814 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called FYN-binding protein.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	96	1590	491	814	134	149	2	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	95	LEU	-	cloning artifact	UNP O15117
A	96	GLU	-	cloning artifact	UNP O15117

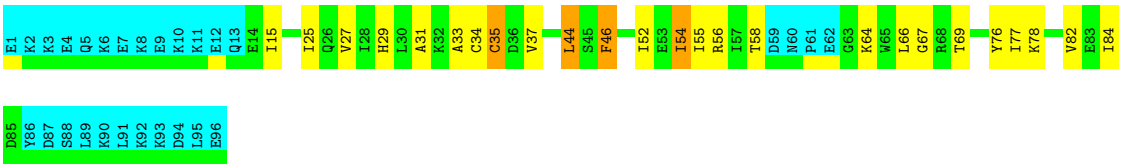
4 Residue-property plots (i)

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: FYN-binding protein

Chain A: 45% 22% • 29%



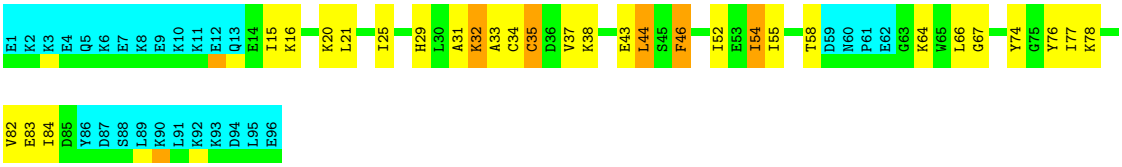
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: FYN-binding protein

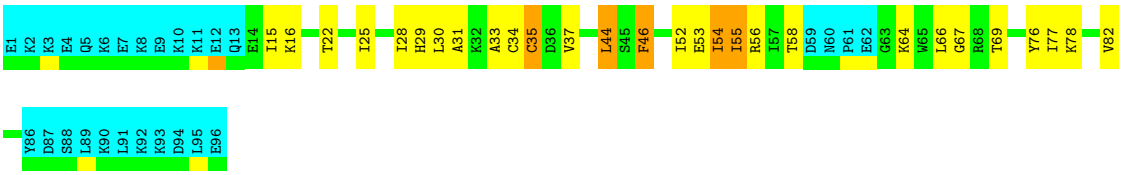
Chain A: 40% 26% 5% 29%



4.2.2 Score per residue for model 2

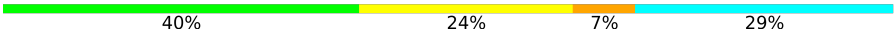
• Molecule 1: FYN-binding protein

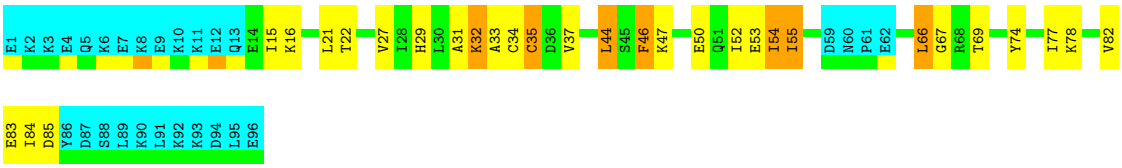
Chain A: 42% 24% 5% 29%



4.2.3 Score per residue for model 3

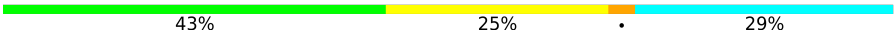
- Molecule 1: FYN-binding protein

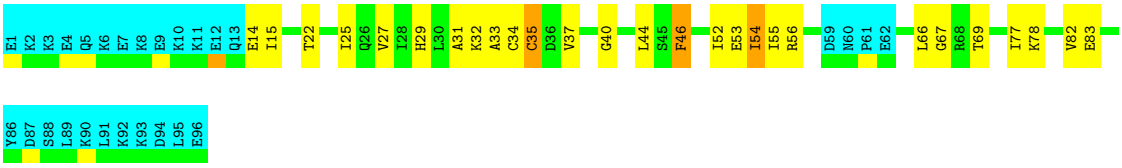
Chain A: 



4.2.4 Score per residue for model 4

- Molecule 1: FYN-binding protein

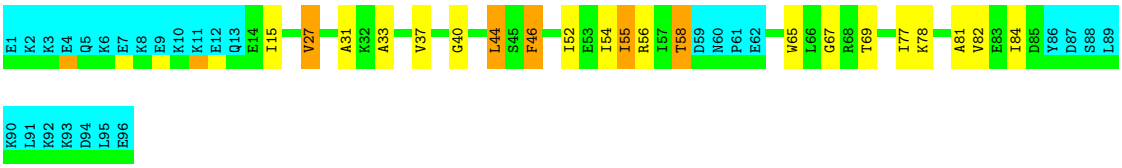
Chain A: 



4.2.5 Score per residue for model 5

- Molecule 1: FYN-binding protein

Chain A:



4.2.6 Score per residue for model 6

- Molecule 1: FYN-binding protein

Chain A: 41% 24% 6% 29%

E1 K2 K3 E4 Q5 K6 E7 K8 E9 K10 K11 E12 Q13 E14 I15 T22 I25 Q26 V27 I28 H29 L30 A31 K32 A33 C34 C35 D36 V37 G40 L44 S45 F46 K47 Q48 Q51 I52 E53 I54 I55 R56 I57 T58 D59 N60 P61 E62 G63 K64 W65 L66 G67 R68 T69

I77 V82 E83 I84 D85 Y86 D87 S88 L89 K90 L91 K92 K93 D94 L95 E96

4.2.7 Score per residue for model 7

- Molecule 1: FYN-binding protein

Chain A: 39% 29% • 29%

E1 K2 K3 E4 Q5 K6 E7 K8 E9 K10 K11 E12 Q13 E14 I15 K16 K20 L21 V27 I28 H29 L30 A31 K32 A33 C34 C35 D36 V37 L44 S45 F46 K47 Q48 G49 E50 Q51 I52 E53 I54 I55 R56 I57 T58 D59 N60 P61 E62 G63 K64 W65 L66 G67 R68 T69 Y74

G75 Y76 I77 K78 V82 E83 I84 D85 Y86 D87 S88 L89 K90 L91 K92 K93 D94 L95 E96

4.2.8 Score per residue for model 8

- Molecule 1: FYN-binding protein

Chain A: 36% 29% 5% 29%

E1 K2 K3 E4 Q5 K6 E7 K8 E9 K10 K11 E12 Q13 E14 I15 K16 K17 K18 F19 K20 L21 T22 V27 I28 H29 L30 A31 K32 A33 C34 C35 D36 V37 L44 S45 F46 K47 E50 Q51 I52 E53 I54 I55 R56 I57 T58 D59 N60 P61 E62 G63 K64 W65 L66 G67 Y76

I77 K78 V82 E83 I84 D85 Y86 D87 S88 L89 K90 L91 K92 K93 D94 L95 E96

4.2.9 Score per residue for model 9

- Molecule 1: FYN-binding protein

Chain A: 40% 27% • 29%

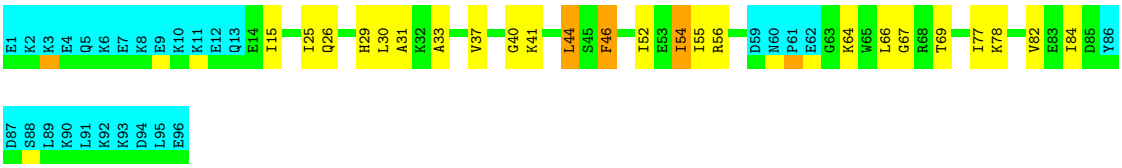
E1 K2 K3 E4 Q5 K6 E7 K8 E9 K10 K11 E12 Q13 E14 I15 I25 Q26 H29 L30 A31 K32 A33 C34 C35 D36 V37 G40 L44 S45 F46 K47 E50 Q51 I52 E53 I54 I55 R56 I57 T58 D59 N60 P61 E62 L66 G67 R68 T69 A70 R71 I77 K78

A81 V82 E83 I84 D85 Y86 D87 S88 L89 K90 L91 K92 K93 D94 L95 E96

4.2.10 Score per residue for model 10

- Molecule 1: FYN-binding protein

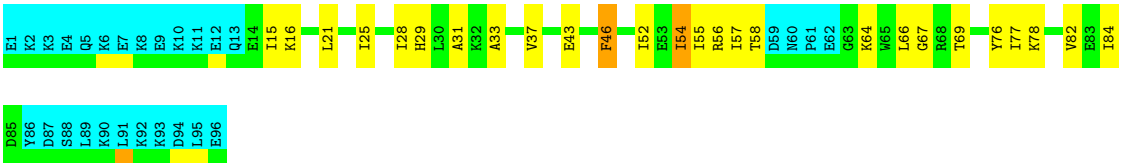
Chain A: 46% 22% • 29%



4.2.11 Score per residue for model 11

- Molecule 1: FYN-binding protein

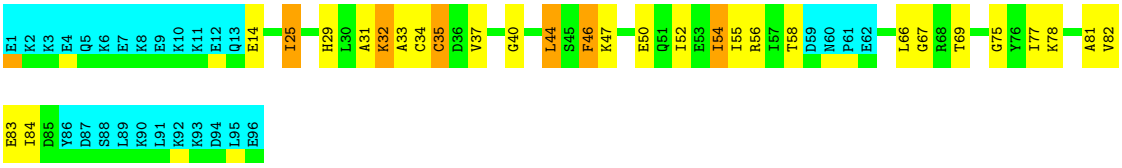
Chain A: 44% 25% • 29%



4.2.12 Score per residue for model 12

- Molecule 1: FYN-binding protein

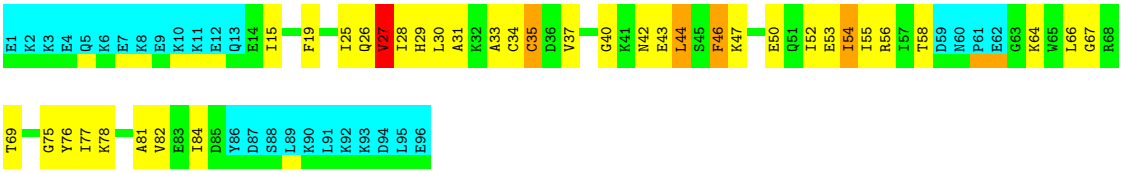
Chain A: 41% 24% 6% 29%



4.2.13 Score per residue for model 13

- Molecule 1: FYN-binding protein

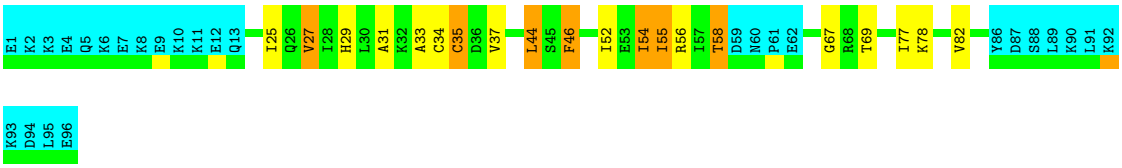
Chain A: 32% 33% • • 29%



4.2.14 Score per residue for model 14

- Molecule 1: FYN-binding protein

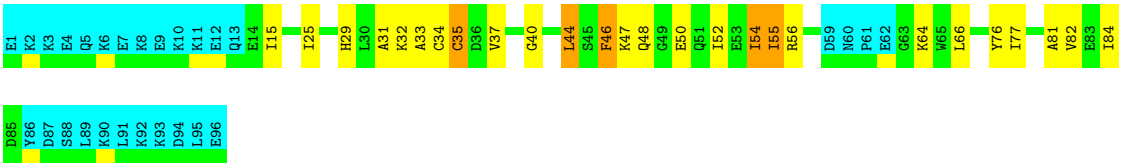
Chain A: 50% 14% 7% 29%



4.2.15 Score per residue for model 15

- Molecule 1: FYN-binding protein

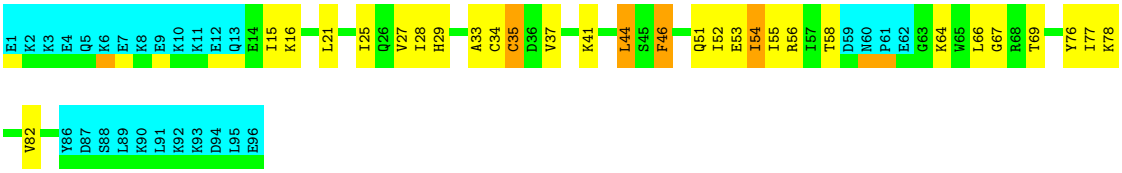
Chain A: 44% 22% 5% 29%



4.2.16 Score per residue for model 16

- Molecule 1: FYN-binding protein

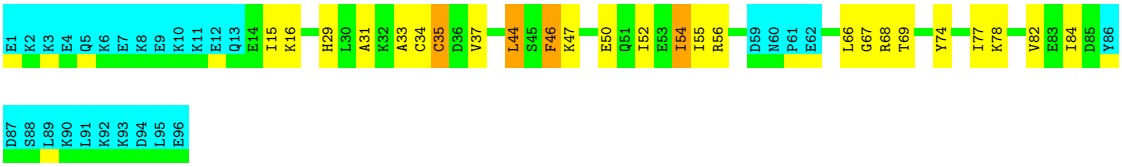
Chain A: 41% 26% • 29%



4.2.17 Score per residue for model 17

- Molecule 1: FYN-binding protein

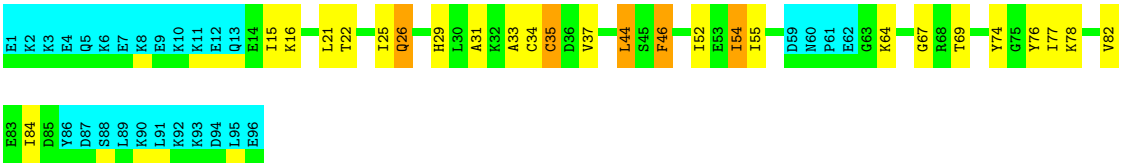
Chain A: 45% 22% • 29%



4.2.18 Score per residue for model 18 (medoid)

- Molecule 1: FYN-binding protein

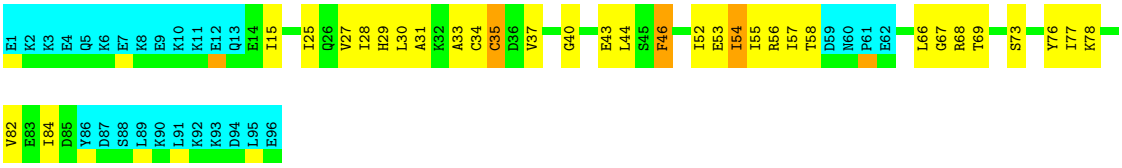
Chain A: 44% 22% 5% 29%



4.2.19 Score per residue for model 19

- Molecule 1: FYN-binding protein

Chain A: 38% 30% • 29%



4.2.20 Score per residue for model 20

- Molecule 1: FYN-binding protein

Chain A: 46% 22% • 29%

5 Refinement protocol and experimental data overview (i)

The models were refined using the following method: *Simulated Annealing with XPLOR NHI followed by water refinement.*

Of the 200 calculated structures, 20 were deposited, based on the following criterion: *closest to average after water refinement.*

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

Software name	Classification	Version
X-PLOR	structure solution	
X-PLOR	refinement	

No chemical shift data was provided.

6 Model quality (i)

6.1 Standard geometry (i)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the (average) root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#Z>5	RMSZ	#Z>5
1	A	0.98±0.03	1±0/540 (0.2± 0.1%)	0.77±0.02	0±0/722 (0.0± 0.0%)
All	All	0.98	17/10800 (0.2%)	0.77	0/14440 (0.0%)

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	0.1±0.2
All	All	0	1

All unique bond 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(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	35	CYS	CB-SG	6.03	1.92	1.82	16	16
1	A	34	CYS	CB-SG	5.03	1.90	1.82	20	1

There are no bond-angle outliers.

There are no chirality outliers.

All unique planar outliers are listed below.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	56	ARG	Sidechain	1

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	532	565	564	22±3
All	All	10640	11300	11280	442

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 20.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:29:HIS:HB2	1:A:54:ILE:HD11	0.91	1.42	14	19
1:A:56:ARG:HB3	1:A:66:LEU:HB3	0.85	1.49	7	15
1:A:52:ILE:HD11	1:A:82:VAL:HG11	0.81	1.52	16	20
1:A:25:ILE:HB	1:A:55:ILE:HG21	0.78	1.54	13	8
1:A:37:VAL:HG21	1:A:46:PHE:HE1	0.78	1.37	7	12
1:A:37:VAL:HG21	1:A:46:PHE:CE1	0.75	2.17	6	20
1:A:27:VAL:HG21	1:A:53:GLU:HB3	0.75	1.59	7	6
1:A:46:PHE:HE2	1:A:77:ILE:HG12	0.72	1.44	4	17
1:A:33:ALA:HA	1:A:82:VAL:HG12	0.71	1.63	15	20
1:A:52:ILE:HG22	1:A:69:THR:HA	0.69	1.64	13	16
1:A:47:LYS:HB2	1:A:50:GLU:HG2	0.67	1.66	15	5
1:A:47:LYS:HG2	1:A:48:GLN:H	0.66	1.49	7	2
1:A:25:ILE:HG13	1:A:26:GLN:H	0.64	1.51	10	2
1:A:46:PHE:HB2	1:A:50:GLU:HG2	0.64	1.69	8	1
1:A:30:LEU:HG	1:A:53:GLU:HG2	0.63	1.70	13	3
1:A:44:LEU:HB3	1:A:46:PHE:CD2	0.62	2.29	17	17
1:A:25:ILE:HD13	1:A:55:ILE:HG12	0.62	1.71	4	7
1:A:67:GLY:HA3	1:A:77:ILE:HD11	0.62	1.70	3	18
1:A:25:ILE:HD11	1:A:55:ILE:HG12	0.62	1.70	12	1
1:A:25:ILE:HG12	1:A:55:ILE:HG21	0.62	1.70	12	1
1:A:15:ILE:HG21	1:A:74:TYR:HB2	0.62	1.72	3	4
1:A:41:LYS:HE2	1:A:41:LYS:HA	0.61	1.70	10	1
1:A:43:GLU:HA	1:A:76:TYR:O	0.60	1.95	13	3
1:A:52:ILE:HD11	1:A:82:VAL:CG1	0.60	2.27	12	19
1:A:16:LYS:HG2	1:A:21:LEU:HB3	0.58	1.74	16	2
1:A:27:VAL:HA	1:A:55:ILE:HG22	0.57	1.75	14	3
1:A:56:ARG:HG2	1:A:58:THR:HG23	0.56	1.77	14	1
1:A:31:ALA:HB3	1:A:52:ILE:HG13	0.55	1.77	17	12
1:A:33:ALA:CA	1:A:82:VAL:HG12	0.55	2.32	14	20
1:A:16:LYS:O	1:A:20:LYS:HA	0.54	2.02	7	3
1:A:27:VAL:CG2	1:A:53:GLU:HB3	0.53	2.33	4	5

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:47:LYS:O	1:A:50:GLU:HB2	0.53	2.03	8	1
1:A:77:ILE:HG22	1:A:78:LYS:O	0.53	2.04	5	17
1:A:54:ILE:HG22	1:A:77:ILE:HD12	0.53	1.79	15	5
1:A:21:LEU:HD23	1:A:25:ILE:HG12	0.53	1.81	1	1
1:A:29:HIS:HB2	1:A:54:ILE:CD1	0.52	2.34	16	7
1:A:54:ILE:H	1:A:54:ILE:HD13	0.52	1.63	14	1
1:A:25:ILE:HD12	1:A:55:ILE:HG12	0.52	1.82	18	2
1:A:31:ALA:HB2	1:A:84:ILE:HD13	0.51	1.82	13	15
1:A:34:CYS:SG	1:A:35:CYS:N	0.51	2.84	9	16
1:A:28:ILE:HD12	1:A:57:ILE:HG12	0.50	1.83	11	2
1:A:16:LYS:HB3	1:A:22:THR:HG23	0.50	1.81	3	2
1:A:21:LEU:HD21	1:A:66:LEU:HD11	0.49	1.84	1	1
1:A:25:ILE:HB	1:A:55:ILE:CG2	0.49	2.36	1	5
1:A:25:ILE:HD13	1:A:55:ILE:HG21	0.49	1.85	14	1
1:A:54:ILE:HA	1:A:67:GLY:HA2	0.49	1.85	20	6
1:A:68:ARG:HA	1:A:73:SER:O	0.47	2.09	19	1
1:A:16:LYS:HB3	1:A:22:THR:HB	0.47	1.85	18	1
1:A:32:LYS:HE2	1:A:83:GLU:HB2	0.47	1.87	3	1
1:A:55:ILE:HD13	1:A:55:ILE:H	0.47	1.68	8	3
1:A:32:LYS:HG3	1:A:83:GLU:HB2	0.46	1.86	9	1
1:A:64:LYS:HB3	1:A:76:TYR:HB3	0.46	1.85	18	2
1:A:64:LYS:CB	1:A:76:TYR:HB3	0.46	2.40	15	9
1:A:37:VAL:HG11	1:A:46:PHE:HE1	0.46	1.71	17	1
1:A:64:LYS:HE2	1:A:78:LYS:HG2	0.46	1.87	2	1
1:A:67:GLY:HA3	1:A:77:ILE:CD1	0.46	2.41	3	2
1:A:28:ILE:HG22	1:A:29:HIS:CD2	0.46	2.46	13	3
1:A:18:LYS:HE3	1:A:19:PHE:CZ	0.45	2.46	8	1
1:A:46:PHE:HD2	1:A:52:ILE:HD13	0.45	1.72	8	3
1:A:29:HIS:O	1:A:54:ILE:HD13	0.45	2.12	8	1
1:A:47:LYS:H	1:A:50:GLU:HG3	0.45	1.72	3	1
1:A:78:LYS:HE3	1:A:81:ALA:HB2	0.44	1.89	13	1
1:A:18:LYS:HE3	1:A:19:PHE:CE2	0.44	2.47	8	1
1:A:25:ILE:HG13	1:A:26:GLN:N	0.44	2.25	18	1
1:A:25:ILE:HB	1:A:55:ILE:HB	0.44	1.89	2	2
1:A:42:ASN:O	1:A:76:TYR:HB2	0.44	2.12	13	1
1:A:44:LEU:HD13	1:A:46:PHE:HD2	0.44	1.73	10	3
1:A:47:LYS:HB3	1:A:50:GLU:HG2	0.44	1.90	7	1
1:A:28:ILE:HG22	1:A:29:HIS:HD2	0.44	1.72	2	1
1:A:37:VAL:HG11	1:A:81:ALA:HB1	0.44	1.89	15	4
1:A:52:ILE:HG22	1:A:69:THR:HG22	0.44	1.90	6	1
1:A:46:PHE:CD2	1:A:52:ILE:HD13	0.44	2.47	11	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:64:LYS:HE3	1:A:78:LYS:HG2	0.43	1.90	1	1
1:A:44:LEU:HG	1:A:75:GLY:N	0.43	2.28	20	1
1:A:38:LYS:HG2	1:A:43:GLU:OE1	0.43	2.13	1	1
1:A:19:PHE:CZ	1:A:75:GLY:HA2	0.43	2.48	13	1
1:A:15:ILE:HD12	1:A:16:LYS:HG3	0.43	1.91	17	1
1:A:21:LEU:HD11	1:A:66:LEU:HD11	0.43	1.90	3	1
1:A:35:CYS:N	1:A:48:GLN:HA	0.42	2.29	15	1
1:A:68:ARG:HA	1:A:74:TYR:HA	0.42	1.91	17	1
1:A:33:ALA:HB2	1:A:46:PHE:CD2	0.42	2.49	19	1
1:A:44:LEU:HG	1:A:75:GLY:HA3	0.42	1.92	12	2
1:A:32:LYS:HD2	1:A:83:GLU:O	0.41	2.15	1	1
1:A:31:ALA:HB2	1:A:84:ILE:CD1	0.41	2.45	9	2
1:A:26:GLN:O	1:A:27:VAL:HG13	0.41	2.14	13	1
1:A:21:LEU:HG	1:A:25:ILE:HG21	0.41	1.92	18	1
1:A:15:ILE:HD13	1:A:21:LEU:HD12	0.41	1.93	7	1
1:A:56:ARG:HD3	1:A:58:THR:HG23	0.41	1.91	5	1
1:A:21:LEU:HD21	1:A:66:LEU:HG	0.41	1.92	8	1
1:A:25:ILE:HD12	1:A:26:GLN:H	0.41	1.75	9	1
1:A:15:ILE:CD1	1:A:16:LYS:HG3	0.41	2.46	17	1
1:A:33:ALA:HB1	1:A:46:PHE:CD1	0.40	2.51	3	1
1:A:32:LYS:HG2	1:A:83:GLU:O	0.40	2.16	4	1
1:A:58:THR:OG1	1:A:65:TRP:HA	0.40	2.16	5	1
1:A:15:ILE:CG2	1:A:74:TYR:HB2	0.40	2.42	18	1
1:A:32:LYS:CG	1:A:83:GLU:HB2	0.40	2.46	12	1
1:A:46:PHE:CE2	1:A:77:ILE:HG12	0.40	2.52	8	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	68/96 (71%)	63±1 (92±2%)	5±1 (7±2%)	1±1 (1±1%)	20	68
All	All	1360/1920 (71%)	1253 (92%)	93 (7%)	14 (1%)	20	68

All 4 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	40	GLY	9
1	A	27	VAL	2
1	A	26	GLN	2
1	A	22	THR	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	56/84 (67%)	51±1 (92±2%)	5±1 (8±2%)	14 61
All	All	1120/1680 (67%)	1026 (92%)	94 (8%)	14 61

All 16 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	54	ILE	20
1	A	46	PHE	19
1	A	44	LEU	17
1	A	58	THR	10
1	A	55	ILE	8
1	A	32	LYS	4
1	A	22	THR	3
1	A	14	GLU	2
1	A	51	GLN	2
1	A	25	ILE	2
1	A	27	VAL	2
1	A	66	LEU	1
1	A	85	ASP	1
1	A	71	ARG	1
1	A	41	LYS	1
1	A	35	CYS	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)

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)

No chemical shift data were provided