Full wwPDB NMR Structure Validation Report (i)

Mar 9, 2026 – 04:59 AM UTC

PDB ID	:	2COO / pdb_00002coo
Title	:	Solution structure of the e3_binding domain of dihydrolipoamide branched chaintransacylase
Authors	:	Zhang, H.P.; Hayashi, F.; Yokoyama, S.; RIKEN Structural Genomics/Proteomics Initiative (RSGI)
Deposited on	:	2005-05-18

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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

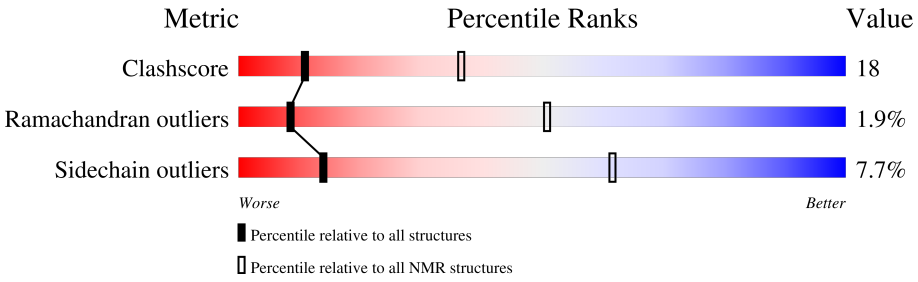
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

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	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

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	70	31% 17% 51%

2 Ensemble composition and analysis

This entry contains 20 models. Model 2 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:17-A:38, A:44-A:55 (34)	0.24	2

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1041 atoms, of which 530 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	70	1041	313	530	95	102	1	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	cloning artifact	UNP P11182
A	2	SER	-	cloning artifact	UNP P11182
A	3	SER	-	cloning artifact	UNP P11182
A	4	GLY	-	cloning artifact	UNP P11182
A	5	SER	-	cloning artifact	UNP P11182
A	6	SER	-	cloning artifact	UNP P11182
A	7	GLY	-	cloning artifact	UNP P11182
A	66	GLY	-	cloning artifact	UNP P11182
A	67	PRO	-	cloning artifact	UNP P11182
A	68	SER	-	cloning artifact	UNP P11182
A	69	SER	-	cloning artifact	UNP P11182
A	70	GLY	-	cloning artifact	UNP P11182

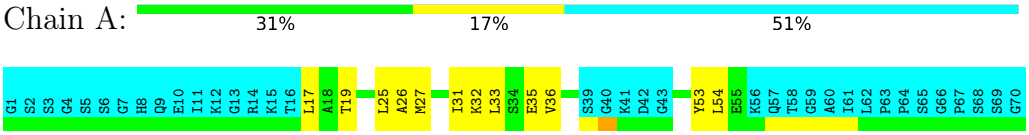
4 Residue-property plots (i)

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: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

Chain A:



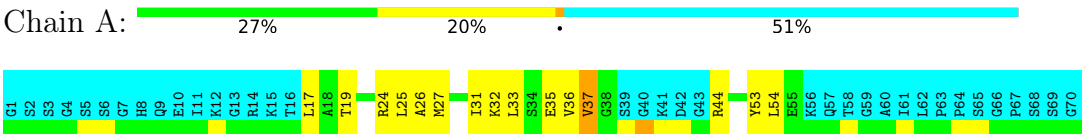
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

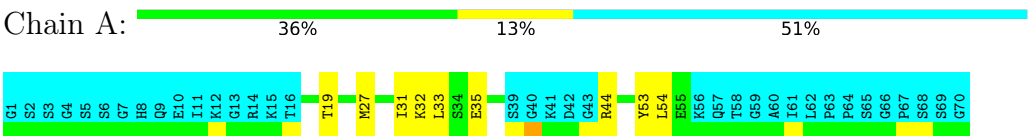
Chain A:



4.2.2 Score per residue for model 2 (medoid)

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

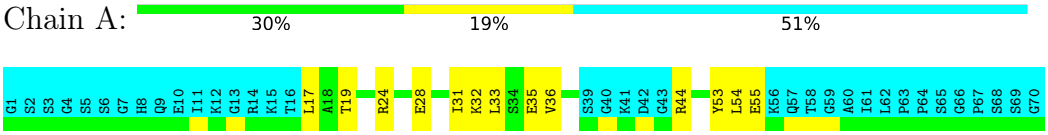
Chain A:



4.2.3 Score per residue for model 3

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

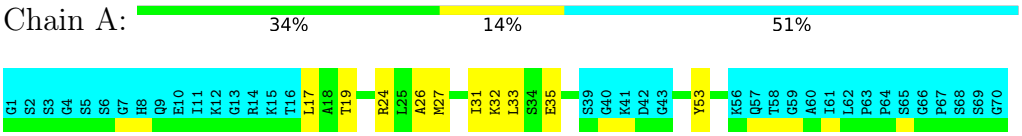
Chain A:



4.2.4 Score per residue for model 4

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

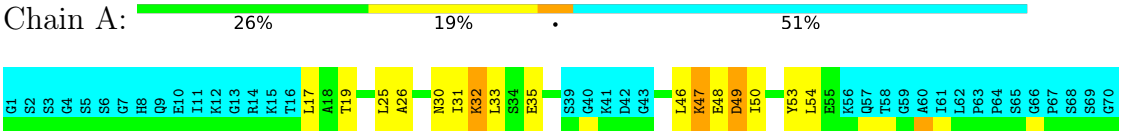
Chain A:



4.2.5 Score per residue for model 5

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

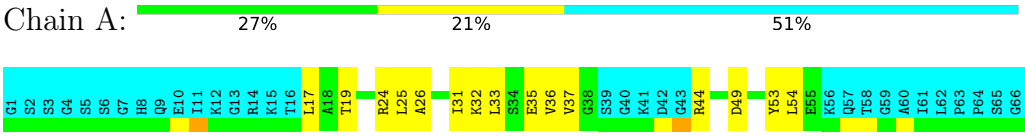
Chain A:



4.2.6 Score per residue for model 6

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

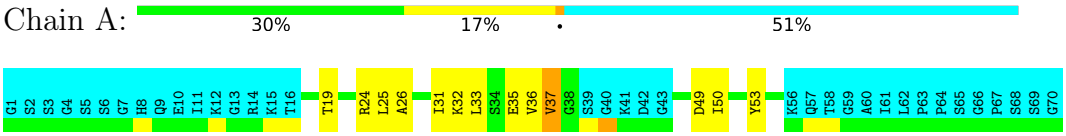
Chain A:



4.2.7 Score per residue for model 7

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

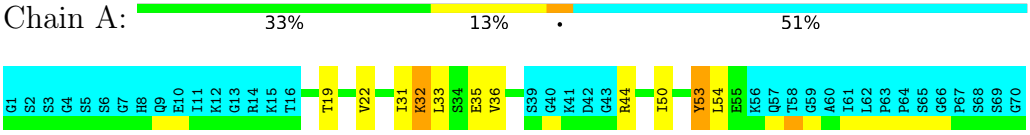
Chain A:



4.2.8 Score per residue for model 8

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

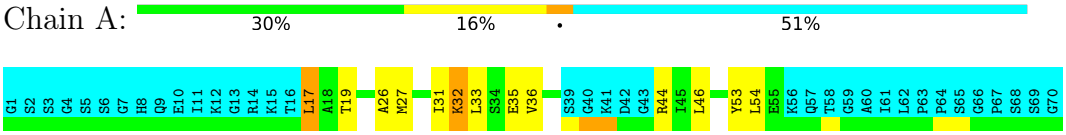
Chain A:



4.2.9 Score per residue for model 9

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

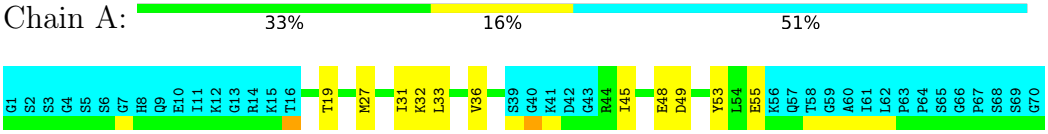
Chain A:



4.2.10 Score per residue for model 10

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

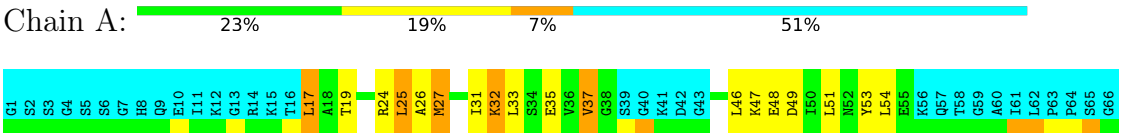
Chain A:



4.2.11 Score per residue for model 11

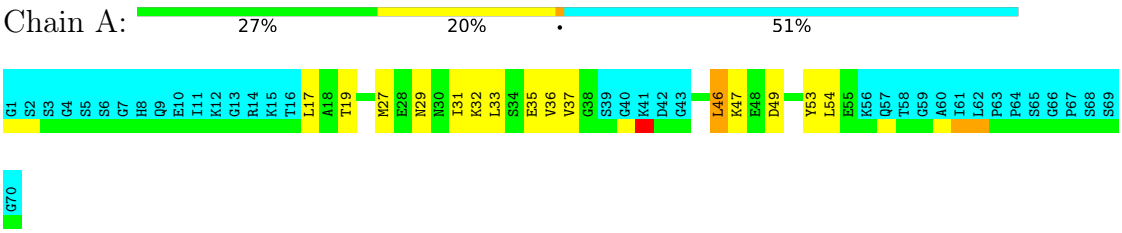
• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

Chain A:



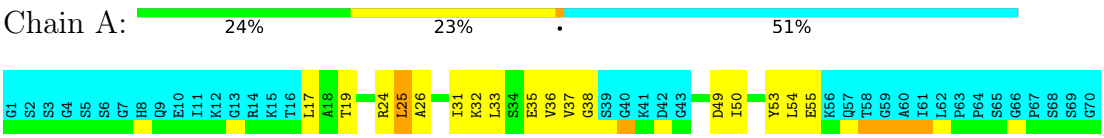
4.2.12 Score per residue for model 12

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial



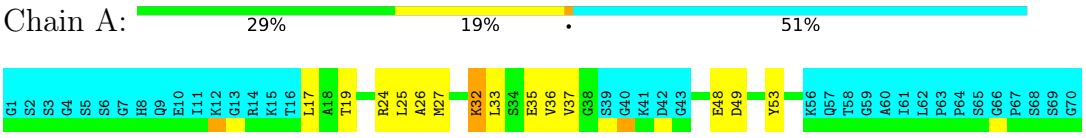
4.2.13 Score per residue for model 13

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial



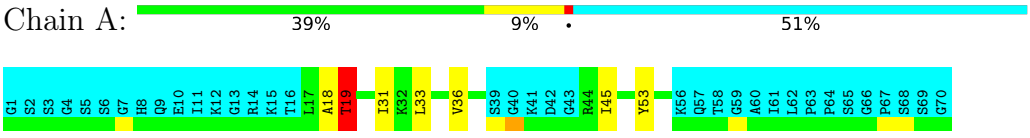
4.2.14 Score per residue for model 14

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial



4.2.15 Score per residue for model 15

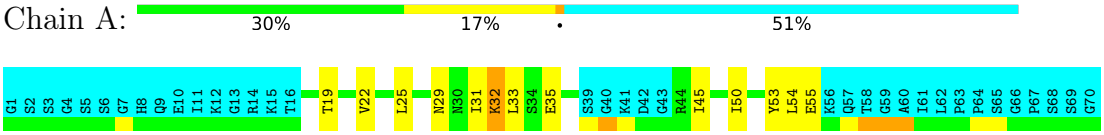
• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial



4.2.16 Score per residue for model 16

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

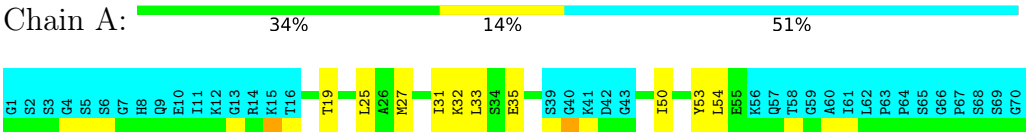
Chain A:



4.2.17 Score per residue for model 17

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

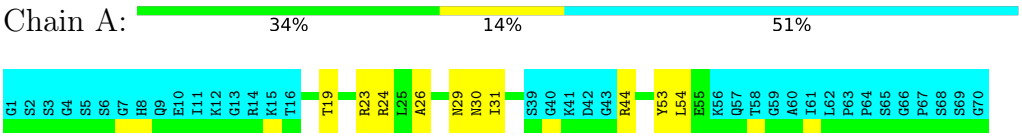
Chain A:



4.2.18 Score per residue for model 18

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

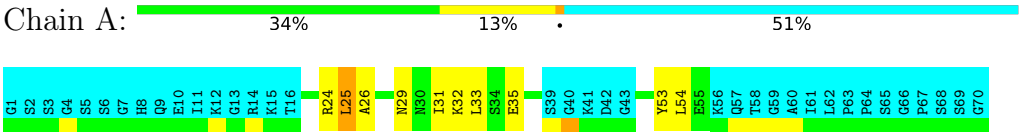
Chain A:



4.2.19 Score per residue for model 19

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

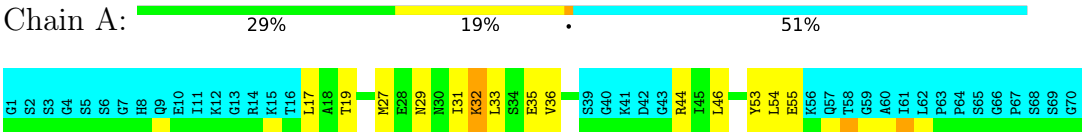
Chain A:



4.2.20 Score per residue for model 20

• Molecule 1: Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial

Chain A:


29%
19%
51%
G1 S2 S3 G4 S5 S6 G7 H8 Q9 E10 I11 K12 G13 R14 K15 T16 L17 A18 T19 M27 E28 N29 N30 I31 K32 L33 S34 E35 V36 S39 G40 K41 D42 G43 R44 I45 L46 Y53 L54 E55 K56 Q57 T58 G59 A60 I61 L62 P63 P64 S65 G66 P67 S68 S69 G70

5 Refinement protocol and experimental data overview

The models were refined using the following method: *torsion angle dynamics*.

Of the 100 calculated structures, 20 were deposited, based on the following criterion: *target function,structures with the lowest energy,structures with the least restraint violations*.

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

Software name	Classification	Version
CYANA	structure solution	2.0.17
CYANA	refinement	2.0.17

No chemical shift data was provided.

6 Model quality

6.1 Standard geometry

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

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	271	292	292	10±3
All	All	5420	5840	5840	207

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 18.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:44:ARG:CZ	1:A:46:LEU:HD23	0.87	2.00	20	1
1:A:36:VAL:HG12	1:A:49:ASP:OD2	0.83	1.72	12	4
1:A:36:VAL:HG22	1:A:53:TYR:CD2	0.73	2.18	10	8
1:A:31:ILE:HG23	1:A:53:TYR:CE1	0.73	2.18	17	11
1:A:33:LEU:HD22	1:A:45:ILE:HD13	0.70	1.61	15	3
1:A:36:VAL:HG12	1:A:49:ASP:CG	0.68	2.14	12	3
1:A:31:ILE:HD11	1:A:54:LEU:HG	0.64	1.70	19	9
1:A:46:LEU:H	1:A:46:LEU:HD22	0.60	1.55	12	1
1:A:53:TYR:C	1:A:53:TYR:CD1	0.60	2.80	8	11
1:A:53:TYR:O	1:A:53:TYR:CD1	0.60	2.55	7	4
1:A:46:LEU:HD22	1:A:46:LEU:N	0.60	2.12	12	1
1:A:31:ILE:HG23	1:A:53:TYR:CD1	0.59	2.31	12	5
1:A:53:TYR:CD1	1:A:53:TYR:C	0.57	2.82	9	9
1:A:44:ARG:NE	1:A:46:LEU:HD23	0.56	2.14	20	1

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:31:ILE:HD11	1:A:54:LEU:CD2	0.56	2.30	9	4
1:A:33:LEU:HD22	1:A:45:ILE:CD1	0.55	2.31	15	2
1:A:53:TYR:CD1	1:A:53:TYR:O	0.54	2.60	4	8
1:A:37:VAL:O	1:A:37:VAL:HG13	0.54	2.03	11	3
1:A:29:ASN:HB3	1:A:54:LEU:HD21	0.52	1.81	19	4
1:A:31:ILE:HD11	1:A:54:LEU:HD21	0.52	1.82	9	3
1:A:25:LEU:HD23	1:A:50:ILE:HB	0.51	1.83	13	2
1:A:25:LEU:HG	1:A:50:ILE:HG21	0.51	1.81	17	3
1:A:44:ARG:CZ	1:A:46:LEU:CD2	0.51	2.83	20	1
1:A:32:LYS:O	1:A:33:LEU:C	0.50	2.55	1	17
1:A:48:GLU:O	1:A:49:ASP:C	0.50	2.55	11	4
1:A:31:ILE:HD11	1:A:54:LEU:CG	0.50	2.36	19	7
1:A:45:ILE:HG23	1:A:49:ASP:OD2	0.50	2.06	10	1
1:A:31:ILE:CG2	1:A:36:VAL:CG2	0.50	2.90	7	2
1:A:17:LEU:HD22	1:A:44:ARG:HB2	0.49	1.83	3	2
1:A:46:LEU:O	1:A:47:LYS:C	0.49	2.56	11	3
1:A:32:LYS:O	1:A:35:GLU:N	0.49	2.45	7	16
1:A:24:ARG:O	1:A:26:ALA:N	0.49	2.45	19	7
1:A:24:ARG:O	1:A:25:LEU:C	0.47	2.57	11	2
1:A:24:ARG:C	1:A:26:ALA:N	0.47	2.72	6	9
1:A:31:ILE:HG23	1:A:53:TYR:CZ	0.47	2.45	12	5
1:A:29:ASN:O	1:A:30:ASN:CG	0.46	2.58	18	1
1:A:22:VAL:HG13	1:A:50:ILE:HG13	0.46	1.87	8	2
1:A:37:VAL:HG13	1:A:37:VAL:O	0.46	2.10	1	1
1:A:17:LEU:C	1:A:17:LEU:CD1	0.45	2.90	11	1
1:A:26:ALA:HB1	1:A:31:ILE:O	0.45	2.10	4	2
1:A:24:ARG:O	1:A:27:MET:N	0.45	2.49	11	2
1:A:24:ARG:NH2	1:A:28:GLU:OE2	0.45	2.50	3	1
1:A:33:LEU:O	1:A:36:VAL:N	0.44	2.50	9	5
1:A:44:ARG:O	1:A:46:LEU:HD12	0.44	2.13	9	1
1:A:48:GLU:O	1:A:51:LEU:N	0.44	2.51	11	1
1:A:25:LEU:CG	1:A:50:ILE:HG21	0.44	2.43	5	3
1:A:17:LEU:CD1	1:A:17:LEU:C	0.44	2.91	9	1
1:A:44:ARG:NE	1:A:46:LEU:CD2	0.43	2.82	20	1
1:A:26:ALA:O	1:A:30:ASN:N	0.42	2.51	5	1
1:A:32:LYS:N	1:A:32:LYS:HE3	0.42	2.30	11	1
1:A:18:ALA:O	1:A:19:THR:C	0.41	2.62	15	1
1:A:32:LYS:HB2	1:A:35:GLU:CG	0.41	2.46	8	2
1:A:36:VAL:CG1	1:A:49:ASP:CG	0.40	2.90	12	1
1:A:37:VAL:C	1:A:49:ASP:OD2	0.40	2.64	7	1
1:A:44:ARG:C	1:A:44:ARG:HD3	0.40	2.42	20	1

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:29:ASN:C	1:A:30:ASN:OD1	0.40	2.64	18	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	34/70 (49%)	30±2 (87±5%)	4±2 (11±4%)	1±1 (2±3%)	8	51
All	All	680/1400 (49%)	594 (87%)	73 (11%)	13 (2%)	8	51

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	25	LEU	6
1	A	37	VAL	5
1	A	38	GLY	1
1	A	19	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	30/56 (54%)	28±1 (92±4%)	2±1 (8±4%)	14	61
All	All	600/1120 (54%)	554 (92%)	46 (8%)	14	61

All 8 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	19	THR	19
1	A	27	MET	9
1	A	32	LYS	8
1	A	17	LEU	6
1	A	47	LYS	1
1	A	49	ASP	1
1	A	53	TYR	1
1	A	46	LEU	1

6.3.3 RNA

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.5 Carbohydrates

There are no oligosaccharides in this entry.

6.6 Ligand geometry

There are no ligands in this entry.

6.7 Other polymers

There are no such molecules in this entry.

6.8 Polymer linkage issues

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided